A Geographic Study of the Issyk-Kul' Area

Summary (to include all major topics and conclusions developed in the paper)

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THE ISSYK-KUL' -- CENTRAL TIEN SHAN REGION

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Summary

The Issyk-Kul' -- Central Tien Shan region occupies the most extensive and highest mountain country in the entire Soviet Union. Elevations in most of the area exceed 3,000 feet. Only a small area south of Lake Issyk-Kul' has elevations lower than 7,000 feet. Physiographically, the area consists of alternating mountain ranges trending in an east-west direction, separated by intermontane depressions. Four mountain arcs make up the basic orographic framework. The northernmost arc is formed by the Zailiyskiy Ala-Tau and Chu-Iliyskiye Mountains; the Ketmen Range, the Kungey Ala-Tau, and the Kirgizskiy Range form the second series of ranges. The third linear system, the Terskey Ala-Tau, lies immediately south of Lake Issyk-Kul'. The fourth series of ranges, the Kok Shaal-Tau, forms the international boundary between the USSR and the Province of Sinkiang, China. The major intermontane lowlands are the Chu Valley, the Karkara-Kegen' Basin, the Issyk-Kul' Basin, the Kochkur Valley, and the Lower Naryn Valley.

At the bottom of the Issyk-Kul' Basin lies Lake Issyk-Kul', a very deep, nonfreezing, brackish lake. Its area is 2,400 square miles, roughly one-third that of Lake Ontario; its maximum depth, 2,303 feet, is almost twice that of any of the Great Lakes.

The cover of natural vegetation over most of the region is grass. Forests are confined to the northern slopes of the mountains north of Lake Issyk-Kul' and to the mountain slopes forming the

eastern walls of the Issyk-Kul' Basin. Because of the great contrasts in altitude differences in vegetation are correlated with altitudinal zones.

Since the Issyk-Kul' — Central Tien Shan region is an area of high mountains, the climate is extremely diverse. The mildest climates are characteristic of the Issyk-Kul' Basin, the Chu Valley, and the Alma-Ata Lowland. The area south of Lake Issyk-Kul' has the most severe climate. There subfreezing average temperatures can be expected from October through July.

Sociologic and economic features of the Issyk-Kul' — Central Tien Shan region are closely related to the physical conditions. Population throughout the region is unevenly distributed, with the greatest concentrations in the intermontane valleys. The most densely populated area is the Chu Valley; the Issyk-Kul' Basin and the Alma-Ata Lowland are a little less densely populated. The mountain country north and south of Lake Issyk-Kul' is sparsely inhabited, being peopled mostly by groups of nomadic herders. Throughout most of the region, the population is predominantly of the rural type. The rural population consists mainly of Russian and Ukrainian settlers in the Chu Valley and the Alma-Ata Lowland and of Kirgiz and Kazakh nomads in the remainder of the region. The urban population is predominantly Russian and Urkainian and is concentrated in Alma-Ata, Frunze, Tokmak, Przheval'sk, Kant, Naryn, and Rybach'ye.

Throughout the mountain areas, a migratory type of animal husbandry is the major economic activity. Crop cultivation is undertaken mainly in the river valleys and intermontane lowlands. Wheat is the principal food crop, and barley, oats, and alfalfa are the main fodder crops. Industrial crops such as sugar beets, tobacco, and hemp are intensively cultivated in the Chu Valley.

Industrial activities are centered mainly in the cities of Alma-Ata and Frunze. Industries include both heavy and light manufacturing. Minor industrial installations for processing local agricultural products are located along the Chu River and in the Issyk-Kul' Basin. Fishing is being developed into an important phase of the economy along Lake Issyk-Kul'.

The transportation network within the area focuses on Alma-Ata, Frunze, Rybach'ye, and Przheval'sk. Alma-Ata and Frunze are major centers of the Turksib Railroad system and are also important terminals of several air routes leading into the area. Rybach'ye and Przheval'sk have the main port installations on Lake Issyk-Kul', as well as being junction points of the principal highways and roads of the region. Rybach'ye is an important transloading station between rail and road traffic and lake shipping.

I. Introduction

This study describes and analyzes selected elements in the geography of the Issyk-Kul' -- Central Tien Shan Region. It is a roughly triangular area at the extreme eastern part of Soviet Central Asia. Its extent is arbitrarily defined by the parallel 49°15'N on the north, the meridian 74°30'E on the west, and the international boundary between the USSR and the Chinese province of Sinkiang on the south and east. These limits enclose an area of almost wholly mountainous terrain. (Map: The Issyk-Kul' -- Central Tien Shan Area).

The Issyk-Kul' Basin and its hinterland are treated individually in this study, although geographically they are intimately interdependent. The report is divided into three basic parts. The first part is a discussion of Lake Issyk-Kul'. It provides a degree of orientation regarding the physical character and chemical composition of the lake, and the nature of its plant and animal life. The second and third parts deal with the natural and cultural features of the Issyk-Kul' Basin and the mountainous hinterland surrounding the basin. Attention is given to terrain, climate, hydrography, vegetation, animal life, population, health, sanitation, economy, and transportation.

II. Lake Issyk-Kul'

A. General Characteristics

Lake Issyk-Kul' occupies practically the entire bottom of the Issyk-Kul' Basin. It is encircled by two high mountain ranges, the Kungey Ala-Tau to the north, and the Terskey Ala-Tau to the south. The Lake is roughly lenticular in shape and extends in an east-west direction (see map CIA 12545). Its length, between Pristan' Przheval'sk at the eastern extremity and Rybach'ye on the west, is 110 miles. A maximum width of 33 miles is reached across the central part of the lake between Korundy on the north and the mouth of the Tossor River on the south. The area of the lake surface is 2,400 square miles. The surface of the lake is 5,170 feet above sea level. Normally the lake level fluctuates only slightly throughout the year. The annual amplitude of variation generally ranges from 4 to 8 inches but occasionally reaches 10 inches. The highest level is observed in August when the melting of mountain snow and glaciers is at a maximum; the lowest level occurs from December through February. The only extrusions of land are two willow-covered islets less than a half mile from the southern shore near the village of Tossor. They are usually referred to collectively as Kayrak Island. Each islet is about 330 feet long and a maximum of 50 feet wide.

B. Shoreline

The shoreline of Lake Issyk-Kul' has little indentation. The Tyup and Dzhargalen (Kara-Su) inlets along the extreme eastern

shore are the largest embayments; each cuts inland for a distance of approximately 12 miles. The northern shore of the Tyup Inlet is broken by a number of deep, narrow estuaries of short streams dropping from the Kungey Ala-Tau Range. The shores of the Dzhargalan Inlet are straight except for the mouths of the Aryk Dzhana and Aryk Ak-Kurgan rivers, which cut the southern shore. The western shore of Lake Issyk-Kul' has no inlets. The northern shore is broken by a number of small coves, which are open to the lake and afford little shelter for lake craft. Along the southern shore, Zaliv Pokrovskiy is the largest indentation, with a length of about 4 1/2 miles and a width of 3 miles (Figure 1). Its eastern extremity forms a deep, lakelike body of water connected with the bay proper by a very narrow strait. Several rivers flowing from the Terskey Ala-Tau Range terminate as small embayments on the south shore. The largest of these are the estuaries of the Ak-Terek and Ton rivers, known as Zaliv Yurduk-Udzhar and Zaliv Ton, respectively. Each is a mile long and a half mile wide.

C. The Hydrological Balance

Issyk-Kul' is fed by more than 75 streams of various sizes flowing from the Kungey Ala-Tau and Terskey Ala-Tau mountains. The largest are the Tyup and the Dzhargalan, which empty into the eastern end of the lake. Four-fifths of the water entering Issyk-Kul' is received from streams flowing down the Terskey Range and only one-fifth from rivers of the Kungey Ala-Tau. The longest rivers and those carrying the greatest amount of water drain into the eastern part of

Figure 1. A view at the eastern extremity of Zaliv Pokrovskiy.

the lake. The Dzhargalan River has the highest yearly discharge. The streams flowing into the northern part of the lake, although small, are comparatively numerous. No permanent rivers enter the western extremity of Lake Issyk-Kul'. The quantity of water carried into the lake by streams amounts to 8,000,000 cubic yards a year. This figure, however, is based on relatively meager information and many assumptions.

The balance of water supply in Lake Issyk-Kul' is maintained entirely by evaporation, rather than by surface or subterranean outlets. Several hypotheses favoring the existence of underground outlets have been advanced, but all have been satisfactorily refuted. Since a fairly constant level is maintained, loss of water through evaporation is equal to the intake.

D. Depth and Bottom Conditions

1. The Open Lake

Depths in Lake Issyk-Kul' increase toward the south-central part, where a broad expanse ranges in depth from 2,150-2,303 feet. This area of greatest depths stretches between the longitudes of the mouths of the Ton and Tossor rivers, as far south as a point 7 miles from the south shore of Issyk-Kul' and north to a point roughly 13 miles from the north shore. From the north shore the depth increases gradually toward the long axis of the lake but from the southern shore the increase is quite rapid. Between the Ak-Terek and Dzhargi'chak rivers, along the southern shore, the greatest depths are only 7 to 10 miles offshore, and only 2 miles from the shore

depths exceed 650 feet. Within the same east-west extent along the northern shore, the maximum depth is much farther offshore. The northern limit of the south-central area of greatest depths lies 13 miles offshore. To the east of this deep area, the maximum depth is 20 to 25 miles offshore, and to its west, 15 to 20 miles offshore. The descent from Rybach'ye to a line between Toraygyn and Imeni Voroshilova appears to be gradual and uniform; eastward from the Toraygyn-Voroshilova line the depth increases rapidly.

The greatest known depth, 2,303 feet, occurs in a comparatively small depression 8 miles north-northeast of the village of Kadzhi-Say on the southern shore; this depression drops approximately 130 feet below the adjacent bottom level. A secondary trough of greater depths, 8 miles off the southern shore, extends for 15 to 20 miles east of the south-central area of greatest depths. The lake is shallowest at its western extremity. Except for the Tyup and Dzhargalan inlets, depth information for the eastern end of Issyk-Kul', beyond the line Anan'yeva-Zaliv Pokrovskiy, is almost entirely lacking. The depth is probably considerably less than 330 feet throughout most of the area.

Available bathymetric data are insufficient for a detailed determination of bottom relief. Bottom deposits are largely gray, strongly calcareous slime. At some points bottom samples also contain sand. The mechanical analysis of a bottom sample taken from a depth of 2,303 feet showed the following composition:

Size of Particles (millimeters)	Percentage of Sample
0.250-0.050	2.6
0.050-0.010	7.0
0.010-0.015	62.5
0.015-0.001	16.1
Smaller than 0.001	11.8

2. Inlets

The Tyup Inlet has an uneven bottom. Its depth ranges from about 5 feet along the southern shore to 33 feet at the estuaries along the northern shore. A channel 33 feet deep runs from the Kuxmenty estuary southwestward to 78° E. From 78° E. toward the main body of the lake, the bottom appears to drop more sharply. No depth information is available for the 5 miles between the Kuxmenty estuary and the inlet head.

The Dzhargalan Inlet has a minimum depth of 16 feet near Pristan' Przheval'sk. From Pristan' Przheval'sk to the mouth of the Aryk Dzhanm River the bottom descends fairly rapidly to a depth of about 130 feet; farther west, the bottom slope becomes much more gradual. At the mouth of the inlet depth exceeds 165 feet.

The inlets along the northern shore are shallower than those of the southern shore. Only the inlet at Grigor'yevka exceeds 50 feet in depth. Northern inlets have a very gradual bottom slope toward the open lake, and most of them also have a secondary slope from west to east, so that the greatest depth lies between the inlet center line and its eastern shore.

Along the southern shore most of the inlets are very deep, even at their heads, as a result of the sharp drop from the shores toward the inlet center. The Ak-Terek, Ton, Kikilik, and Dzhargyl'chak inlets are more than 130 feet deep. The depth in Zaliv Pokrovskiy, the shallowest inlet of the southern shore, apparently does not exceed 50 feet. Lake craft carefully keep to the middle of this inlet, indicating that the nearshore waters are shallow.

E. Water Characteristics

1. Chemistry

a. Salinity

The water of Lake Issyk-Kul' is brackish and not suitable for drinking purposes. The salinity is about half that of the Aral and Caspian seas. Salinity at various experimental stations on the open lake ranges between 5.77 to 5.86 grams of salt per kilogram (liter) of water, and at the Tyup Inlet and its estuaries between 2.2 and 5.5. For the open lake, variations in salinity, both vertically and horizontally, are reportedly insignificant.

b. Salts and Gases

The Issyk-Kul' waters contain a relatively large amount of magnesium and more sulfates than chlorides (see Table 1). Analyses indicate an absence of ferric oxide, aluminum oxide, silicon dioxide, nitric acid, and ammonia. The lake has a high oxygen content at all depths. The saturation of all bottom waters with oxygen exceeds 73.6 percent. At a depth of 2,280 feet an oxygen content of 5.57 cubic

centimeters per liter, or more than 75 percent saturation, has been observed. The oxygen content varies from 4.78 to 6.95 cubic centimeters per liter. In 1928 the zone of maximum oxygen content was determined to be between the depths of 80 and 165 feet. The open lake has no hydrogen sulfide zone; hydrogen sulfide has been observed, however, at the bottom at the Tyup Inlet, at Rybach'ye, and in the shallow water at the immediate northern shore.

Available chemical analyses are given in Table 1.

c. Alkalinity

Determinations of the concentration of hydrogen ions show that the water of Issyk-Kul' is alkaline. At the surface of the open lake a pH of 8.8 to 8.95 is usually observed. In the inlets of the northeast the pH values range between 8.2 and 9.2. With depth, a decrease of pH is evident, although the values at maximum depth are within 0.2 of the surface values. The even distribution of pH and high bottom values are attributed to strong vertical circulation, and the excellent aeration of water to maximum depth.

3. Temperature

Observations of water temperature are available for only the summer months of a few years. Measurements taken during the period 6 July through 5 August 1928 are used in this report, as they are considered the most comprehensive and the most representative for all of Lake Issyk-Kul' (see Table 2).

Table 1. Available Chemical Analyses for Lake Issyk-Kul' a/

Depth	1892	1912-13	1925	1928 (1)	1928 (2)	1928 (3)	1928 (4)
	In Grams Per Liter of Water			In Grams Per Kilogram of Water			
	Surface	Surface	Surface	1 Meter (3.3 Feet)	1 Meter (3.3 Feet)	1 Meter (3.3 Feet)	100 Meters (330 Feet)
Specific Gravity				1.0042	1.0042	1.0043	1.0045
Dry sediment	3.574	6.1921	6.500	5.502	5.5587	5.493	5.506
Chlorides (Cl)	0.558	1.5645	1.4555	1.579	1.587	1.585	1.590
Sulfates (SO_4)	2.000		1.7582	2.107	2.110	2.110	2.132
Carbonates (CO_3)				0.15	0.15	0.15	0.15
Sulfides (SO_3)	0.04						
Calcium (Ca)				0.1135	0.1172	0.1132	0.1138
Magnesium (Mg)				0.2843	0.2900	0.2955	0.2958
Potassium (K)	0.06			0.06887	0.0660	0.0680	0.0688
Calcium salts (CaO)	none		0.300				
Magnesium salts (MgO)	0.447		0.730				
Sodium (Na)	0.413						

a/ Samples were taken from the following places:
(1) 1892--Unknown
(2) 1912-13--Rybach'ye
(3) 1925--2 miles from mouth of Zaliv Ton
(4) 1928, 1--5 miles from mouth of Zaliv Ton
2--7 miles from mouth of Tossor River
3--7 miles from Zaliv Turduk-Udzhar
4--9 miles from the shore east of Zaliv Ton

Considering the elevation of Lake Issyk-Kul', the average summer time surface temperature of 66°F is fairly high. Water temperature drops somewhat rapidly from the surface to a depth of 165 feet where it averages 44°F; from 165 feet to 655 feet the temperature drops to 40°F; and from 655 feet to the bottom it remains fairly constant at 39°F. Lake Issyk-Kul' does not freeze over in winter, but a narrow strip of ice not over 2 feet thick forms along the shoreline.

The following table presents the only available statistics on the water temperature of Lake Issyk-Kul':

Table 2. Water Temperature of Lake Issyk-Kul', 6 July-5 August 1928

Depth (Feet)	Mean Temperature (°F)	Maximum Temperature (°F)	Minimum Temperature (°F)	Number of Determinations
0	66	70.9	62.6	59
33	64.8	66.4	61.4	6
50	59.2	64.6	53.1	5
66	52.9	56.3	49.8	4
82	49.4	53.1	47.8	6
164	43.5	44.8	42.5	4
328	40.8	41.2	40.5	5
656	39.7	39.9	39.7	4
984	39.7	39.7	39.7	3
1640	39.7	39.7	39.5	3
1968	39.5	39.5	39.5	5
2280	39.5	39.5	39.5	

3. Transparency

Transparency is fairly constant over most of the lake. Measured from the surface and using a white disc 13.8 inches (35 centimeters) in diameter, it ranges between 43 and 50 feet during summer. The nearshore area of the northern part of the lake is slightly less transparent than the southern nearshore strip. Transparency near the south shore averages 45 feet, and near the north shore 41 feet. The muddying influence of rivers is confined to their inlets and does not reach the open lake. In the comparatively shallow western part of the lake, near Rybach'ye, the bottom can be seen for slightly more than a mile from shore during calm weather. Transparency probably increases during the winter when the streams carry less sediment into the lake. No data are available on the limits of visibility at specific depths. The waters are dark blue in the open lake and greenish within a few hundred feet of the shore.

F. Aquatic Life

Little is known about the plant and animal life of Lake Issyk-Kul'. The open part of the lake has few species of plankton. Masses of Botryococcus brauni are found at the surface; at depths below 50 meters, the diatom Amphiprora paludosvar is widely distributed. Among the rotifera, the Anuraea acuteata and Synchaeta sp. are common. Among the copepoda the common varieties are Diaptomus salinus and Cyclops viridis. Cladocera are lacking.

Amphipoda include the species Issykogammarus and several species of genus Gammarus. The mollusks encountered are several species of Lymnaea and Caspia issykkulensis; the latter actually belong to the species Hydrobia ventrosa common along the European shores.

The species of fish caught commercially are: Carp (Cyprinus carpio), "marinka" (Schizothorax pseudaksaiensis issykkul'), "osman" (Diptychus dybowskii), Issyk-Kul' dace (Leuciscus schmidti), and "chebachek" (a small dace) (Leuciscus bergi). Other fish in the lake are the Issyk-Kul' gudgeon (Gogio gobio latus), Issyk-Kul' loach (Phoxinus issykkulensis), Diplophysa strauchi, and Diplophysa dorsalis. The Nemachilus stoliczkai is caught in the streams.

III. The Issyk-Kul' Basin

A. Physical Characteristics

The Issyk-Kul' Basin is a deep, elongated, tectonic depression completely ringed by high and rugged mountains. The Kungey Ala-Tau Range, on the north, and the Terskey Ala-Tau, on the south, converge east and west of Lake Issyk-Kul' to form the canoe-shaped Issyk-Kul' Basin. Lake Issyk-Kul' occupies practically the entire bottom of the depression. Only at the extreme eastern end of the basin is there extensive lowland. Elsewhere mountain barriers rise within 8 miles from the lake shore. The length of the basin, from the Buam Gorge in the west to the Santash Pass in the east, is approximately 162 miles; the width, from the upper reaches of the Barskaun River in the south to the Kok-Bel' Pass of the Kungey Ala-Tau Mountains in the north, is about 75 miles. Of a total area of approximately 8,500 square miles, Lake Issyk-Kul' covers 2,400 square miles and much of the remainder is mountain slope.

1. Terrain

a. Kungey Ala-Tau Mountains

The Kungey Ala-Tau Mountains, north of Lake Issyk-Kul', are a sharply dissected mountain barrier 180 miles long, which slopes very steeply on the south and more gradually on the north. The range as a whole is a massive high mountain wall, somewhat flattened at the crest, with sharply defined peaks only in the center. The crestal zone is archlike, having the highest elevations near the center. In the western part, the Kungey rises to about 11,000 feet; toward

the center, at the headwaters of the Bol'shoy Kebin (Bol'shaya Kemin) and Chilik rivers, the elevation increases to about 13,000 feet; farther east the elevation again decreases. At the Sary Bulak Pass, approximately on the meridian of the eastern extremity of Lake Issyk-Kul', the elevation is 11,000 feet. Beyond this pass, at the Taldy-Su River, the elevation increases to about 12,100 feet. In the vicinity of Santash Pass, at the eastern extremity of the Issyk-Kul' Basin, elevations drop to about 8,200 feet. The lower eastern part of the range swings slightly southeastward to join the Terskey Ala-Tau Range, thus closing off the Issyk-Kul' Basin from the east. The highest peaks of the range, at the headwaters of the south-flowing Choktal River, rise slightly above 17,000 feet (Mount Choktal, 17,050 feet).

The western part of the Kungey Range rises about 5,800 feet above the level of Lake Issyk-Kul' (5,170 feet); the central area, 8,000 feet above the lake; and the extreme east, 3,000 feet. Although the numerous valleys cutting the Kungey are deep, they are relatively wide so that travel is not arduous. The range rises sharply from the lake shore, with no belt of foothills. The Kungey is interrupted only at the Chon-Aksu River valley, where a short southern range forms a spur toward the shore of Lake Issyk-Kul'.

Permanent snow covers the whole central part of the range and the highest parts of the west. The permanent snowline ranges between 11,200 and 11,900 feet. The central area also has a number of short glaciers.

b. Terskey Ala-Tau Mountains

The Terskey Ala-Tau, forming the southern border of the Issyk-Kul' Basin, is the highest range of the entire Soviet Tien Shan mountain system. The range stretches in a west-east direction across the entire central part of the study area, from a point near Lake Son-Kul' to the Khan-Tengri mountain node at the international border with Sinkiang. The range is asymmetrical, having a long northern slope (20-25 miles) and a very short southern slope (3-5 miles). The stretch from the Kochkur Valley to the upper course of the Tyup River, in the east, forms the southern wall of the Issyk-Kul' Basin.

The altitude of the Terskey Ala-Tau gradually increases from west to east. Throughout most of its extent the mountain barrier exceeds 13,000 feet in elevation and is several hundred feet higher than the Kungey Ala-Tau. The Terskey Ala-Tau also has many more distinct peaks than the Kungey Ala-Tau. At the western extremity of Lake Issyk-Kul' the crestal elevation is about 11,500 feet. Eastward the range gradually rises to the meridian of Zaliv Pokrovskiy, at the southeast corner of the lake, where the divide elevations lie between 13,000 and 14,800 feet. The highest and most inaccessible part of the Terskey Ala-Tau lies between the Pokrovskiy meridian and the upper course of the Tyup River; here the divide elevations generally exceed 14,800 feet. A few individual peaks rise above 16,000 feet, the highest being Mount Aleksandrovskaya (18,012 feet), near

the headwaters of the Karakol River. From west to east the Terskey crest lies from 6,500 to 9,800 feet above Lake Issyk-Kul'. The southern slope of the Terskey Ala-Tau is very short and, in general, rises only 1,500 to 2,000 feet above the adjacent lowlands. As a result, from the Naryn Upland to the south, the Terskey Ala-Tau has the appearance of a rough upland rather than a formidable mountain barrier.

East of the Barskaun River, the Terskey Ala-Tau appears to have a flattened summit from which mountain spurs branch off toward Lake Issyk-Kul'. West of the Barskaun, the crest becomes much more dissected, and flat-topped summits are much smaller in area and rather widely separated.

The Terskey Ala-Tau has a secondary lower crest about 3 miles from the main crest. This secondary crest is especially pronounced toward the east where several streams flow for a considerable distance between the two ridges before cutting through the secondary crest and flowing down to the lake. The Terskey Range lies farther from the lake shore than the Kungey Ala-Tau and a definite foothill belt.

Through most of its extent the Terskey Ala-Tau rises above the permanent snowline, which lies at 11,800 to 12,200 feet. Small glaciers (generally less than 3 miles in extent) are found at the sources of most of the streams of the Terskey Ala-Tau, but they are most common on the southern slope. Facing Lake Issyk-Kul', glaciers are confined primarily to the area east of the upper course of the Barskaun River.

c. The Littoral of Lake Issyk-Kul'

The Issyk-Kul' littoral comprises three types of terrain. Along the western and northern shores of Lake Issyk-Kul', the land slopes gradually upward from the lake toward the mountains. The northern littoral reaches its maximum width of 7 1/2 miles between Korumdy and Anan'yeva; its width near Rybach'ye is 6 miles, and near the Tyup Inlet only 1 mile. Along the southern littoral, the Terskey foothills trail off almost to the lakeshore, and the terrain is rough. At the eastern part of the Issyk-Kul' Basin, an extensive belt of lowland extends from the lakeshore to the Kungey and Terskey ranges.

The entire western shore of Issyk-Kul' and part of the northern shore are boulder-stream, relatively level, and barren, especially between Karashar and Toraygyn (Figure 2). Vegetation is restricted to the courses of the small streams crossing the littoral and to a narrow marshy strip at the immediate shoreline. East of Korumdy the wasteland character rapidly disappears and a grass cover becomes prominent. Southwest of Rybach'ye, the foothill Gora Bos-Barmak, towering 1,000 feet above its surroundings, juts out to break the gradual slope toward the mountains.

The northern banks of Lake Issyk-Kul' are composed of friable, sandy, gravelly material. East of Choktal, they rise from the lake in terrace-like fashion. A marshy strip runs along the entire northern shore but varies in width and continuity. At Rybach'ye, at the western end of the lake, the strip is about 1,000 feet wide and appears to consist of alternating marsh and sandy or pebbly ridges.

Figure 2. Boulder-strewn western shore of Lake Issyk-Kul', near Rybach'ye.

Between Toraygyn and Korumdy, the strip is much narrower and consists of a series of small marshes. Just south of Koshkol', 25 miles northeast of Rybach'ye, there are two small reed-filled lakes between the shoreline and the main road along the shore. These lakes are about 100 feet wide and 1,000 feet long and are oriented in a north-south direction. East of Korumdy the elevation of the shore drops slightly and the marshy strip becomes more prominent. Near Chonuryukty and Uytal the strip widens to several hundred feet, and east of Kuturga it disappears.

The southern littoral of Lake Issyk-Kul' includes a narrow strip with little relief, similar to that of the northern littoral, backed by a belt of foothills (Figure 3). Numerous rounded boulders are scattered over the eastern part of the immediate shore strip. At Imeni Voroshilova, Aktersk, and Tamga beaches of gray sand are prominent.

In the area east of the Barskaun River the southern face of the secondary Terskey ridge slopes down almost to the lake shore. The area west of the Barskaun River has a foothill belt that extends 10 to 15 miles from the lake shore. The foothills are oriented in a general east-west direction and have steep southern slopes and gentle northern slopes. Summits reach as high as 500 feet above the level of Lake Issyk-Kul'. The eastern foothills have higher elevations and are more agglomerated, but peaks in the west tend to stand out independently. There are many hot springs, some of which are the sites of health resorts. Fresh-water springs are also abundant.

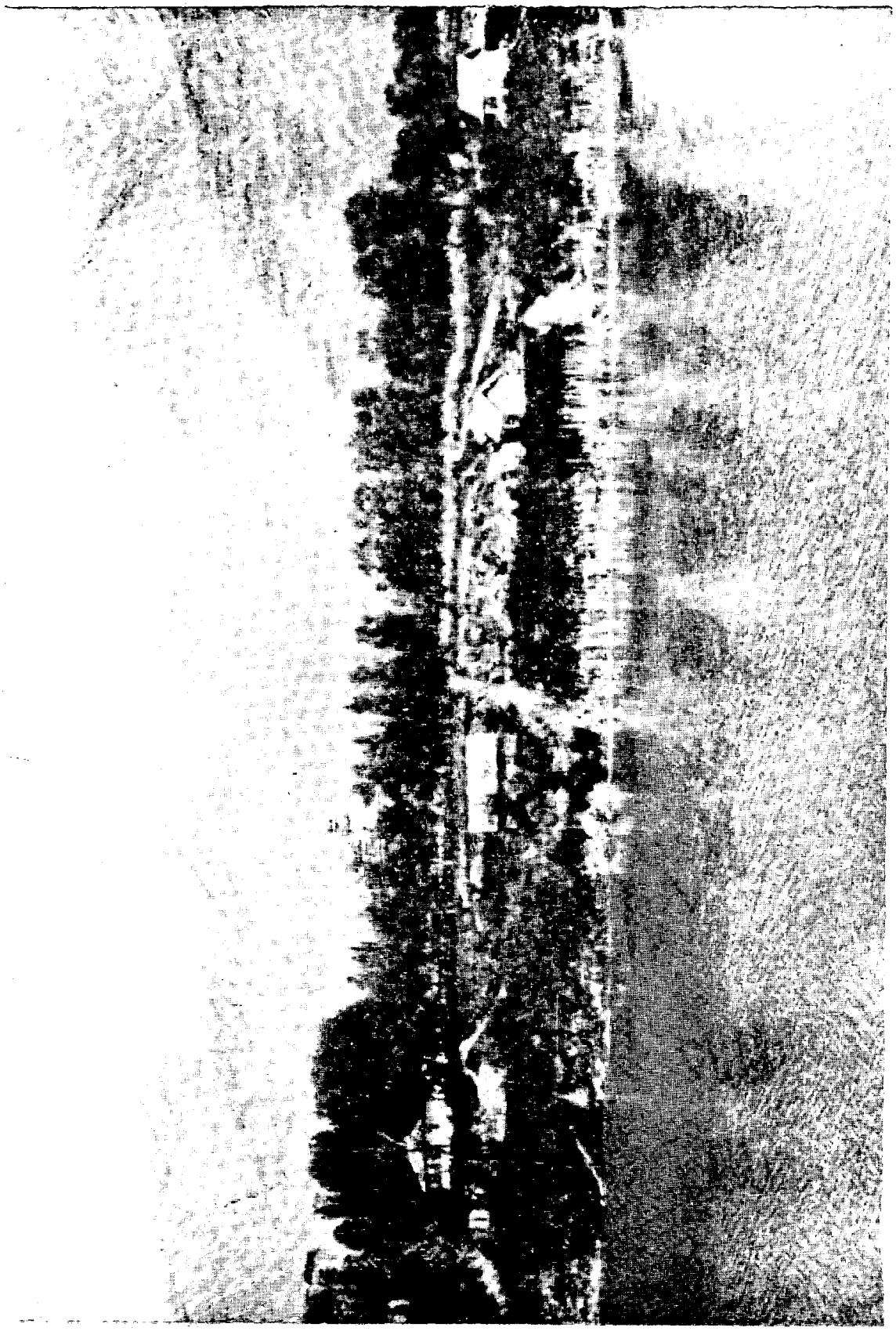

Figure 3. A view along the southern shore of Lake Issyk-Kul', with the Terskey foothills in the background.

The eastern littoral consists of two wide gently sloping valleys, the Dzhargalan and the Tyup, separated by a low divide that bisects the littoral in an east-west direction. The divide begins in the east as the Chubar-Zhan Range, where the Kungey and Terskey Ala-Tau ranges converge, and ends in the west as a promontory jutting into Lake Issyk-Kul'. Its elevation gradually lowers from east to west; only the eastern half is rugged and high enough to be an obstacle to movement on foot. The altitude of the Chubar-Zhan Range is 8,000 feet; westward, this range merges with the Tosma Mountains, and finally with the Ichke-Tosma Mountains, slightly more than 730 feet above Lake Issyk-Kul'. From the Ichke-Tosma Mountains, near the central part of the eastern littoral, the divide broadens considerably and tends to lose its distinctive hill character. The highest point has an altitude of about 5,580 feet. The western part of the divide has very few streams but is dissected by innumerable small dry ravines.

Two other mountains are located on the southeast shore of Lake Issyk-Kul'. Mount Orgocher, about 5 miles east of Zaliv Pokrovskiy, rises about 1,230 feet above its surroundings to an elevation of 6,650 feet; Mount Berbash, just south of Pristan' Przheval'sk, has an elevation of 5,824 feet, which is about 500 feet above the adjacent area. Both highlands have no vegetation and are dissected by small, dry, gorge-like valleys.

The Dzhargalan and Tyup valleys are broad and shallow with little irregular terrain. In the middle reaches of the Tyup and Dzhargalan rivers, there are soft, wet meadow lands. A strip of moist meadow and marshlands also borders Lake Issyk-Kul'.

d. Accessibility

The principal routes to the Issyk-Kul' Basin lie at its eastern and western extremities. The western routes follow the Buam Gorge and the Kochkur Valley. The eastern routes go by way of the Santash Pass.

The Buam Gorge is the easiest and most heavily traveled route. It serves as the principal connection between Soviet Central Asia and the Issyk-Kul' Basin and is, in effect, the "true gateway" to both the Issyk-Kul' Basin and the mountains of the Central Tien Shan. The principal caravan route southward to Sinkiang goes by way of the Kochkur Valley, and the main caravan route leading eastward beyond the USSR frontiers follows the Santash Pass.

The Buam Gorge makes a roughly semicircular cut, with the concavity to the southwest, through the Kungey-Kirgizskiy mountain barrier (Figure 4). The elevation ranges from about 60 feet above the level of Lake Issyk-Kul' at the eastern outlet of the gorge to about 40 feet below the Issyk-Kul' level at the western outlet.

Normal routes of travel from the Alma-Ata Lowland, on the north, enter the Issyk-Kul' Basin by way of the Buam Gorge and Santash Pass. They detour eastward and westward for many miles to avoid crossing two very high and rugged mountain barriers, the Zailiyskiy Ala-Tau and the Kungey Ala-Tau. From Alma-Ata, direct travel across the mountains involves an ascent of about 6,500 feet to the Zailiyskiy crest, a descent of about 6,000 feet from the Kungey crest to the lake, mastery of two craggy, glaciated, snow-covered summit zones, and the traverse of two short but rugged mountain slopes between Zailiyskiy and Kungey crests.

Figure 4. Chu River through the Buam Gorge. Note the paucity of vegetation on the slopes.

In approaching the basin from the north, travel over the extreme eastern part of the Kungey Ala-Tau appears practicable. The comparatively low eastern extremity of the Kungey can be approached over the relatively easy terrain of an intermontane lowland which is only lightly populated. Several trails across the eastern Kungey lead to the eastern part of the Issyk-Kul' Basin.

In approaching the Issyk-Kul' Basin from the mountainous Naryn Upland in the south, the most difficult terrain of the journey is encountered along the descent of 6,500 feet and more from the Terskey crest to the shores of Lake Issyk-Kul'. The easiest route is the Rybach'ye-Kashgar caravan route across the western part of the Naryn Upland.

Numerous passes cut the Terskey, Kungey, and Zailiyskiy crests and are used regularly by native nomadic herders. The glaciated valleys near the summits are generally trough-shaped and fairly wide at the bottom. Accumulations of morainic materials, sometimes blocking the valley, are the major obstacles to movement on foot. The most difficult parts of the routes to passes lie at the lower slopes where the valleys are V-shaped and wild. The degree of difficulty and danger in negotiating passes depends largely on the weather. Snowfalls conceal pits and chasms; after steady rains the abundant deposits of loose rock fragments become very slippery. The crests of moraines sometimes make fairly good routes of travel, however, since they are frozen most of the time and generally provide a firm footing. Thawing usually affects only a thin surface layer. Animal trails,

although they may follow circuitous routes, provide a firm footing for movement by humans and lead to points where a range can be crossed more easily.

Most of the passes in the main Terskey Range are above 10,000 feet in elevation, or more than 4,800 feet above the level of Lake Issyk-Kul'. Passes in the central and western Kungeys are a few hundred feet lower, and those in the eastern part of the Kungey Ala-Tau are still lower. Santash Pass, at the eastern extremity, has an elevation of 6,500 feet, only 1,300 feet above the level of Lake Issyk-Kul'.

2. Climate

a. Temperature

The Issyk-Kul' Basin has an average annual temperature of 44°F. The winter climate is distinctly milder than that of the rest of the Tien Shan mountainous region. Summers for the most part are moderately cool. July is the hottest month with an average temperature of 63°F; January is the coldest month with an average of 23°F (see Table 3). These averages indicate that temperatures are practically ideal for human efficiency and comfort.

The average temperature for winter (December through February) is 24°F. January is usually a few degrees colder than December, but only slightly colder than February. Maximum daily temperatures at freezing or below can be expected for about half of January and February, although they occur as early as October. Through all of December, January, and February, and much of November and March,

Table 3. Temperature in the Issyk-Kul' Basin

	Przheval'sk						Rybach'ye
	Average Temperature (°F)	Average Temperature (°F) for Specific Times of Day 0700	1300	2100	Average Number of Days With Minimum Temperature of 32°F or Less	Average Number of Days With Maximum Temperature of 32°F or Less	Average Temperature
January	23	18	31	19	31	17	22
February	24	17	32	19	28	13	25
March	33	30	44	31	24	2	34
April	46	42	55	41	6	0	45
May	54	50	62	48	1	0	53
June	60	57	69	55	0	0	61
July	63	60	73	58	0	0	65
August	63	57	73	57	0	0	63
September	56	50	67	50	0	0	56
October	43	38	53	38	9	1	45
November	34	29	42	30	25	2	34
December	26	22	34	23	31	10	26
Year	44	39	53	39	155	45	44

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minimum daily temperatures of 32°F or less are recorded. The lowest temperature in available records is -3°F. Cold spells are generally of short duration. Early-morning temperatures in winter are generally several degrees below freezing; by early afternoon the temperature rises to about 32°F; nightly temperatures drop to several degrees below freezing.

In March, the average temperature rises 10°F, and temperatures at freezing or slightly less can be expected only during the night and early morning hours. The rapid temperature rise continues through the end of May, when the high summer averages are approached.

The average temperatures of the summer months (June through August) also vary little, with July being warmest by a degree or two. The mean seasonal temperature during the summer ranges from about 57°F at 7:00 a.m. and 9:00 p.m. to about 72°F at 1:00 p.m. The highest temperature listed in available meteorological records is 89°F.

Average monthly temperatures drop about 7°F in September and continue falling rapidly through October and November. Early-morning temperatures in November are below freezing.

Since Issyk-Kul' Basin is a deep intermontane depression, the temperature also varies with the altitude. The rate of temperature rise with increased elevation averages 1.1°F per 330 feet. Frequently in winter and on summer nights, the temperature on the mountain slopes is significantly higher than at the bottom of the basin.

b. Precipitation

Precipitation in the Issyk-Kul' Basin increases progressively from west to east. The western area is dry and desert-like, whereas the eastern is much more moist. Even in the east, the total annual precipitation averages only 17 inches (see Table 4).

In the west precipitation averages only 4 to 8 inches annually. The months of November through March are almost completely devoid of precipitation. About 75 percent of the yearly fall occurs from May through August, with the maximum in July. Rains generally come as light showers; heavy downpours are infrequent. Upper-atmosphere rains that do not reach the surface are not uncommon. West of the line Grigor'yevka-Tamga, a thin mantle of snow remains on the ground for only a short period. The scant winter precipitation generally consists of snow, but it does not form a persistent cover.

The annual precipitation in the eastern end of the Issyk-Kul' Basin averages 17 inches, with the greatest fall at the base of the Kungey Ala-Tau Range. About 55 percent of the yearly total falls from May through August, the monthly maximum in July. The seasonal minimum occurs in winter. Both light showers and downpours occur in the summer, often during the afternoon or evening. Thunderstorms, sometimes accompanied by hail, can be expected on an average of 6 to 8 days during June, July, and August.

Only 10 percent of the yearly precipitation falls during December, January, and February. In winter, precipitation can be

Table 4. Precipitation in the Issyk-Kul' Basin a/

Month	Przheval'sk								Rybach'ye	Tyup
	Average Precipitation (Inches)	Percent of Yearly Total	Days With Precipitation	Days With Snow	Depth of Snow Cover (Inches) First 10 Days	Second 10 Days	Third 10 Days	Days With Thunderstorms	Average Precipitation (Inches)	Average Precipitation (Inches)
January	0.6	3.7	6.6	6.6	6.7	7.1	8.0	0	0	11.4
February	0.5	2.5	5.7	5.7	1.7	6.3	4.7	0	0	11.8
March	0.7	4.0	5.9	4.9	2.4	1.8	0.4	0.1	0.1	9.0
April	1.6	9.7	9.6	2.8	0	0	0	0.9	0.3	
May	2.4	14.5	10.8	1.0	0	0	0	0.9	0.3	
June	2.2	13.0	10.4	0.06	0	0	0	6.9	0.9	
July	2.7	16.0	10.4	0.0	0	0	0	8.2	1.1	
August	1.9	11.4	8.4	0.0	0	0	0	6.3	0.6	
September	1.3	7.9	6.5	0.4	0	0	0	3.1	0.3	
October	1.4	8.7	7.2	3.0	0	0	1.0	1.5		
November	0.8	5.0	6.5	5.0	0.4	1.2	2.0	0.2	0.04	13.8
December	0.6	3.6	6.7	6.6	3.9	5.5	5.9	0.2	0.04	16.9
Year	17.	100.	95	36				28.3		

a/ Statistics are for the period 1881-1902.

expected on 1 day out of every 5. During December, January, and February practically all precipitation is in the form of snow. An enduring snow cover begins to form toward the end of October and lasts until the end of March. From late December to mid-February the depth of the cover averages 6 inches or more. The maximum depth, about 8 inches, is attained in late January.

c. Winds

The prevailing winds associated with the cyclical weather of the Issyk-Kul' Basin are westerlies. The basic westerly flow is disrupted, however, by a system of local winds with a distinct diurnal periodicity. These local winds are expecially noticeable along the periphery of Lake Issyk-Kul' and on the lower mountain slopes, particularly from May through September. After sundown, winds blow from the mountain slopes to the lake; at mid-morning or late morning, the flow is reversed and winds blow from the lake up the mountain slopes. Calms usually prevail in early morning and toward sunset. The waters of Lake Issyk-Kul' are almost constantly in motion because of the confused pattern of wind flow.

At Rybach'ye, westerly and southeasterly winds appear to be dominant. At Przheval'sk, southeasterlies predominate, and winds from the north and northwest are the most infrequent. At Przheval'sk, calms have been observed more frequently than winds from any single direction. East winds coming through Santash Pass and west winds traveling through the Buam Gorge are felt farthest out on Lake Issyk-Kul'. Upper winds, affecting mainly the summit areas of mountains, are principally westerlies.

Throughout the year, the usual winds blow with little force. At the eastern end of the basin they are only slight breezes, with velocities less than 8 miles per hour; in the west the velocities are slightly greater. With the exception of the spring season, surface winds, unlike the average situation elsewhere, attain their highest velocities at night. In spring the strongest winds blow during the afternoon. Upper winds are strongest at night throughout the year. Rybach'ye has a constant breeze, but surface winds in the east are less steady and calms are much more frequent.

The strongest and the steadiest winds blow from October through February. During this period westerlies from the Buam Gorge or easterlies from the Santash Pass sometimes blow for two or three days. Occasionally these winds whip up storms severe enough to jeopardize even large lake craft. In the barren west the strong westerlies cause sand and dust storms. Winds frequently carry aloft enough sand and dust to make the weather unpleasant.

The basic pattern of summer winds is primarily an alternation of light breezes and calms. The surface waters of Lake Issyk-Kul' are quietest in June and July. In summer, localized storm winds are occasionally generated with little forewarning, and waterspouts sometimes form on the lake, but storms are rarely of long duration.

d. Cloudiness and Fog

Cloudiness is a significant weather factor only in the eastern part of the Issyk-Kul' Basin. Here, the mean

cloudiness for the year is 40 to 50 percent. The cloud cover exceeds six-tenths on only a few days of each month. Summer clouds usually form near the mountain summits, about 10,000 feet above the level of Lake Issyk-Kul'. In winter the cloud base lies 4,500 to 8,000 feet above the lake level.

At Rybach'ye clear skies are very common, but scattered clouds are usual. Clouds begin to form in the west and gradually lower and increase in density toward the east. In summer, billowy cumulus clouds are quite numerous over Lake Issyk-Kul'.

Fog is most common over the lake in winter and is rare over the land areas. Steam fog forms in patches over the lake and is most likely near the narrow band of thin ice along the shoreline.

3. Hydrography

A dense net of streams flows down the slopes of the Terskey and Kungey mountains toward Lake Issyk-Kul'. At the western extremity of the Issyk-Kul' Basin, however, only a few reach the lake. The Terskey streams cut deeply into the mountains, and many of them flow through fairly wide valleys. The streams of the Kungey Ala-Tau, though numerous, carry less water, cut less deeply into the mountains, and are shorter than those of the Terskey Ala-Tau. The longest streams flowing from the Kungey are the Bol'shaya Aksu (Aksuyka) and Malaya Aksu (Aksuyka). Both enter the Issyk-Kul' Basin near Grigor'yevka. The longest streams in the basin are the Dzhargalan (Kara Su) and Tyup, which flow from the

Terskey Ala-Tau into the eastern end of Lake Issyk-Kul'. The shortest is probably the Kutemaldy, an intermittent stream flowing from the Chu into the western end of the lake. Its waters are principally overflow from the Chu, and it is full-flowing in spring only (Figure 5).

Most of the streams are fast-flowing and even torrential in character. In their upper courses, the majority flow through trough-shaped glacial valleys devoid of spurs. As the streams move out of the glaciated areas, they cut much more sharply into the mountains, and gradients increase rapidly. Short spurs appear in the valleys, streams become winding, flow becomes turbulent, and rapids and waterfalls become numerous (Figure 6). Control of rafts is virtually impossible, and probabilities of raft destruction against large rocks within the stream course are great. In the lowland littoral of the lake the streams lose their wildness, currents become slow, meanders form, and detrital materials are deposited.

Since most of the streams are of glacial origin, they are full-flowing throughout the year, with a maximum flow, and even flooding, in late summer. Daily variations are characteristic. The diurnal increase in volume affects the fordability of streams. Many streams cannot be crossed for several hours during the high-water period. The high- and low-water levels occur at different times of the day at various points along a stream. Near the source the high-water level comes about mid-morning, and in the lower courses it is most

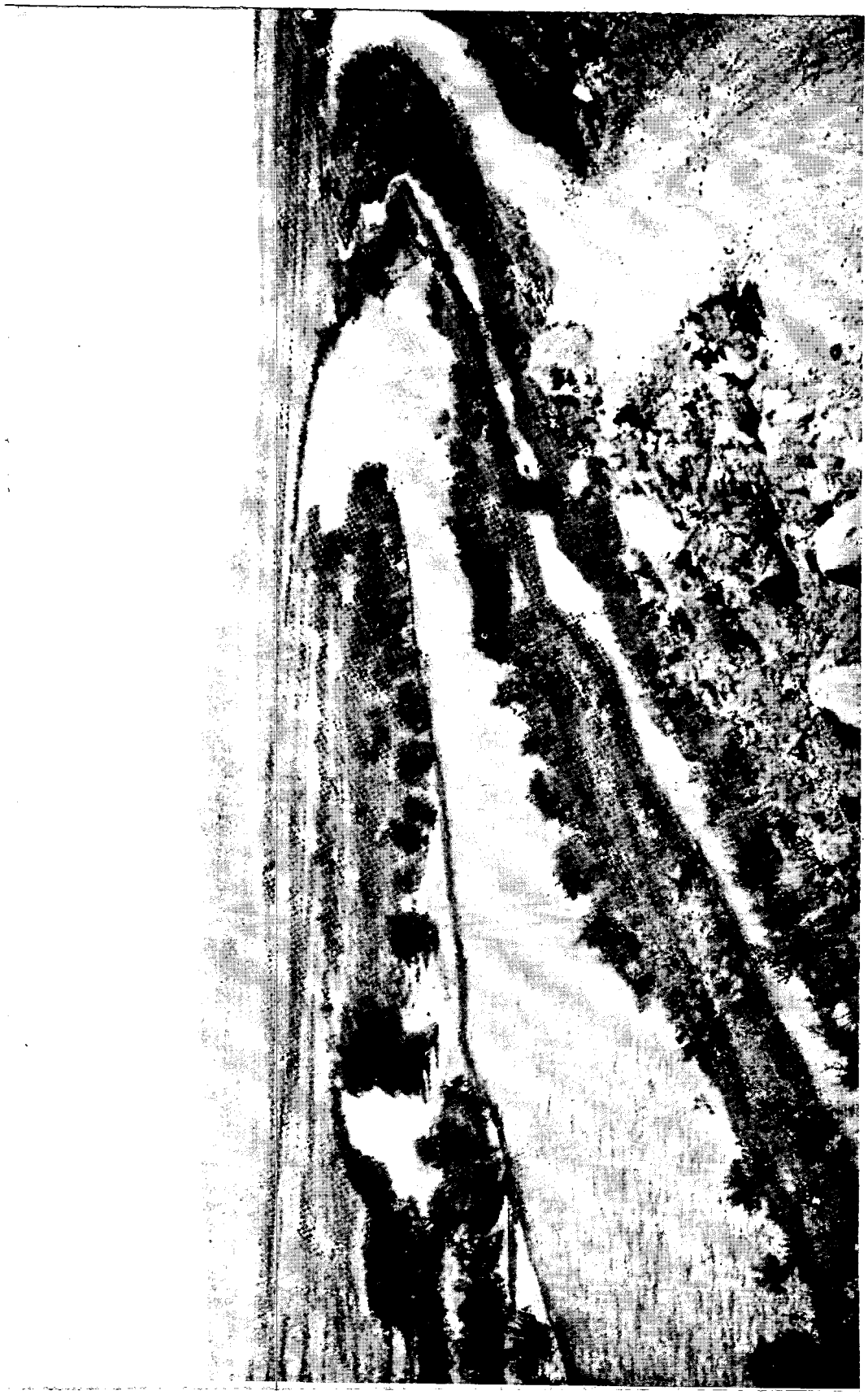


Figure 5. A view of Kutcmaldy River in spring.

Figure 6. A turbulent mountain stream in the Kungey Ala-Tau.

likely at night. Streams also swell considerably after a rainfall and, though normally turbulent, can become raging flood waters.

The glacial streams carry a tremendous amount of fine sediments which usually discolor the water and affect potability. Sediment-laden water may cause gastro-intestinal disturbances. If it becomes necessary to drink from these streams, a pool away from the main current where much of the sediment has settled should be selected. Discoloration by sediment also makes it difficult to select a suitable place for fording. Depths cannot be readily determined and the numerous loose, slippery rocks on the bottom cannot be seen. In fording, a person must "feel" his way across and can easily lose his footing on the rocks and suffer leg injury or be swept downstream by the swift current.

Large eddies and even sandbars are other dangers to stream travel. Bottom deposits at large eddies generally consist of fine detrital materials similar to quicksand. Sandbars should be watched for the same type of deposits. Possibilities of catching fish in the cold upper courses of glacial streams are slim, although fish do inhabit some of the small tributary streams of non-glacial origin.

4. Vegetation

The vegetation of the western part of the Issyk-Kul' Basin contrasts strikingly with that of the east. The west has barren shoreland and mountain slopes, whereas the east has short grasses in the lowlands and a forest belt in the mountains. Density

of the vegetation cover increases rapidly east of Korumdy on the north shore and the Ton River on the south shore.

The vegetation of most of the shoreland at the Rybach'ye end of the basin consists of sparse wormwood widely scattered among the many boulders. A varrow strip of marsh hugs the shoreline of Lake Issyk-Kul'. The lower course of the Kutemaldy River is also marshy. Near the Chu River, the Kutemaldy valley becomes drier and is bordered by a narrow band of high grasses. Over the mountain slopes there is a spotty distribution of sparse grass cover. The principal east-west trending valleys between the main and secondary Terskey ridges, however, have a fairly complete cover of short grass.

East of Korumdy and Tamga, the northern and southern littorals of Issyk-Kul' have extensive stretches of shallow-rooted grasses. The eastern lowland has a fairly complete, though discontinuous, short-grass cover. Patches of meadow along the Tyup and Dzhargalan rivers are high enough for limited concealment. The lowland is also an important agricultural center. Fields of wheat, mustard seed, barley, oats, and poppies are extensive. Truck gardens and orchards are found around most of the villages of this area, as in other parts of the basin. They produce squash, tomatoes, cucumbers, maize, poor-quality watermelons, apples, cherries, pears, plums, and apricots.

A belt of Tien Shan spruce covers the mountain slopes between the elevations of 6,500 and 9,800 feet. This belt begins at the

upper reaches of the Ton River, encircles the eastern part of the basin, and terminates at the meridian of Korumdy. The forest cover is densest along the river valleys cutting the Terskey slopes east of the Barskaun River. West of the Barskaun, the forest thins out rapidly and covers a much narrower belt, between 8,800 and 9,800 feet. Forests of the Kungey slopes are much less dense than on the Terskey slopes and are limited largely to river valleys.

The Tien Shan spruce rarely forms a dense and extensive forest. The forests are usually clustered on the mountain slopes amidst open spaces of grassland and bare ground. Birch, mountain ash, and aspen also are intermingled with the Tien Shan spruce. The spruce forest provides good cover and concealment possibilities, and the sparseness of the undergrowth facilitates penetration.

The high mountain elevations between the upper limit of forest growth and the permanent snowline are largely in alpine meadows covered with flowering, herbaceous plants from 12 inches high in the lower reaches to approximately 4 inches near the snowline. Low bushes and vine-type plants also grow near the forest boundary. Above 12,000 feet, vegetation again becomes scanty and very sparse. A few plants are scattered on open slopes, between rocks, and along moraines in areas of thawing snow.

5. Animal Life

Wildlife is fairly abundant in the Issyk-Kul' Basin. Birds are the most numerous. Sea gulls and the ravenlike cormorant fly above Lake Issyk-Kul'. Quail and partridge inhabit the eastern half of the lowland littoral. On the mountain slopes, the dipper

frequents mountain streams; the wagtail, stone-martin, and nuthatch are also numerous. The crow, woodpecker, flocks of mountain finch, and black grouse live in the belt of spruce forests.

Large animals are encountered at high elevations. The Siberian roe deer is fairly common in the spruce-forest zone; on rare occasions a Siberian moose can be seen. Mountain goats roam the craggy summit areas of the Kungey Ala-Tau and Terskey Ala-Tau. The Tien Shan brown bear and wolf are the most common predatory animals. The small animals include the marten and the ermine. Small burrowing marmots live in dispersed colonies over the alpine meadows.

B. Cultural Features

1. Population

a. Density, Distribution, and Types

The Issyk-Kul' Basin has an estimated population of over 50,000 inhabitants, almost half of whom live in the urban settlements of Przheval'sk and Rybach'ye. The basin is one of the most densely populated regions in the Kirgiz SSR because of its highly developed agricultural economy. Most of the people are engaged in crop cultivation and animal husbandry, the remainder in fishing, lumbering, and some mining.

Approximately 40,000 inhabitants live in the eastern half of the basin. This densely populated area extends westward to Cholponata on the north shore and to Tamga on the south shore of the lake and includes most of the rural and urban settlements of the Issyk-Kul' Basin. Przheval'sk is the largest town, and its population of 20,000 constitutes almost half of the total. In the shore lands north and south of the lake, on the lower slopes of the Kungey Ala-Tau Mountains and in valleys of the Tyup and Dzhargalan Rivers, the minimum population density averages 65 persons per square mile. The upper reaches of the Kungey Ala-Tau are bare of population except for isolated shepherds and cattle herders. The lower slopes and upper reaches of the Terskey Ala-Tau Range are thinly populated, averaging less than 1 person per square mile.

The western half of the Issyk-Kul' Basin is sparsely populated. This area is largely unsuitable for agriculture because of its dry climate and limited water supply. Its population

density ranges from 1 to 25 persons per square mile. The least populated area, except for the town of Rybach'ye, extends around the barren, boulder-strewn western littoral of the lake. Rybach'ye has approximately 5,000 inhabitants. Its position as a transportation and traffic center in the Issyk-Kul' Basin is largely responsible for this concentration. The mountainous regions north and south of the lake are sparsely inhabited, mainly by a pastoral population.

The rural population is dominant in most of the Issyk-Kul' Basin. It consists mainly of farmers, herdsmen, and fishermen. Farmers, predominently Russians and Ukrainians, are settled mainly in kolkhoz (collective farm) and sovkhoz (state farm) villages. The herdsmen, mostly Kirgizi, are semipermanent settlers. They are essentially pastoral in nature and live in permanent villages only during the winter. For the greater part of the year the men move with their herds, while the women, children, and older people are left in the villages to cultivate grain and fodder crops for use during the winter. Prior to the Soviet social reorganization, these people were strictly nomadic with no type of permanent settlement. In the vast mountainous regions of the hinterland there are still a large number of nomadic people. Throughout the Issyk-Kul' Basin herders still maintain many of their nomadic traditions, particularly in their standards of living, social customs, and methods of livestock breeding.

Fishermen are found in most of the small villages bordering

the northern and southern shores of the lake. They are mainly Kirgizi and are organized into clans.

The urban population of the area is restricted to the towns of Przheval'sk, Rybach'ye, and Tyup. The dominant urban settlers are Russians and Ukrainians, who are engaged mainly in commercial and industrial activities.

b. Ethnic, Physical, and Social Characteristics

Russians and Ukrainians form the largest ethnic groups in the Issyk-Kul' Basin. Kirgizi are the dominant non-Slavic group. Other ethnic groups include Dunguns, Taranches, Kalmyks, and Sarts.

(1) Russians and Ukrainians

Russians and Ukrainians first settled here in large numbers in the period 1860-65. Attracted by the fertile lands of the basin, a second wave of colonists arrived in the period 1906-10. Under the Soviets, they were settled into kolkhozes and sovkhozes to pursue socialized agriculture. In sovkhozes, Kirgizi and other native Turkic peoples are mixed with Russians and Ukrainians, who introduce the natives to more advanced methods of irrigation, crop rotation, and livestock breeding.

Russians are usually of stocky build and medium height; they have round heads, light hair, and blue, gray or brown eyes. Ukrainians tend to have swarthy complexions, dark hair, and brown eyes.

Both Russians and Ukrainians, as a rule, carefully maintain

the social customs and traditions of their homelands. They are proud of their Slavic heritage and tend to have a superior attitude toward the more backward Kirgiz people. They command a leading role in the local political administration, as well as in all branches of the economy. This has created an interracial antagonism which is of great concern to the Soviets. Communist leaders are actively engaged in furthering mixed settlements (sovkhozes), and encourage the Kirgizi to assume leading positions now held by Russian or Ukrainian officials.

(2) Kirgizi

The Kirgiz people comprise the most numerous group of the native population of the basin. They are also known as Kara Kirgiz or Buruts. Kirgizi are not the original inhabitants of the Issyk-Kul' Basin but arrived there from the upper reaches of the Yenisey. They are widely distributed in the Tyup and Dzhargalan Valleys, and sizable numbers inhabit the lowlands and mountain slopes north and south of Lake Issyk-Kul'. Their main occupation is livestock herding and breeding, with crop cultivation and fishing usually purely secondary occupations. The Soviets are settling a considerable number of Kirgizi on collective farms and in small communities (kyshlak) where they practice irrigation farming.

Turkic in origin, the Kirgizi have some Mongol admixture. The people are of medium stature, with rather stocky build, long arms, and short legs. They have large round heads, black

hair, light-brown skin, wide faces, almond shaped eyes, and prominent noses. (Figure 7)

Clans and family groups are the basic units of Kirgiz society. In the family organization women control the domestic life and also perform the largest share of the work. Certain characteristics common to Asiatic nomads are prominent among the Kirgiz people. They are noted for their hospitality, carefree attitude, susceptibility to foreign influence, great tendency to lying, their desire for luxury, and tendency to excessiveness. While their native intelligence is rather high, the level of their formal education is one of the lowest in the Soviet Union. The Kirgizi, as a whole are very nationalistic and extremely proud of their history. Soviet rulers, aware of these nationalistic tendencies, tolerate Kirgiz culture and social customs but greatly restrict their traditional nomadic life. Although most of the Kirgizi are still allowed to engage in animal husbandry and migrate with their livestock to seasonal mountain pastures, they are induced to maintain permanently established villages as their winter quarters. While out on pasture, however, the Kirgiz herdsmen still practice many of the traditional nomadic customs. They usually live in portable dome-shaped tents (yurts), and are grouped into a number of encampments or "auls". (Figure 8)

(3) Dungans

The Dungans, a Moslem-Mongol group, settled in the southwestern part of the Issyk-Kul' Basin around 1880. Dungans

Figure 7. Kirgiz woman in festive dress.

Figure 6. Yurta encampment in a mountain pasture.

specialize in cultivating opium poppies and rice. Some are also engaged in commercial activities, particularly in the caravan trade. Dungans are of short to medium stature, with a stocky build and long torsos. They have round heads conspicuously broad faces with narrow foreheads and yellowish complexions. Many of the Dungan social customs and living habits are of Chinese origin. Their diet and language are Chinese.

(4) Taranches

A small number of Taranches inhabit the area extending northeastward from Lake Issyk-Kul'. They are mainly engaged in farming, and live in small villages. Their physical appearance is oriental. They have yellowish-white skin, broad heads, elongated oval faces, and straight projecting noses.

Taranches are known for their fondness for music and drama. They are hearty eaters and have a reputation for being lazy and pleasure loving. Their group customs deviate considerably from those of Moslem society. Women do not wear veils, and in general have more social freedom than those of most Turkic groups. Contrary to the principles of Islamic faith, the family instituition is extremely unstable. Divorce is easily obtained.

(5) Kalmyks

A small number of Kalmyks live in the eastern part of the Issyk-Kul' Basin. Of Mongolian origin, they migrated into the area about 1870. Whereas the Mongols of Central Asia are of Buddhist faith, the Issyk-Kul' Kalmyks are Mohammedans.

Physically, the Kalmyks are almost pure Mongols. Prominent features are their short stature, round heads, broad flat faces, and protruding jaws.

The family system of the Kalmyks is patrilineal. Marriage is permitted only within the ethnic bounds of the tribe. Their standard of living and many of their social customs are similar to those of the Kirgizi.

(6) Sarts

A group of people know as Sarts inhabit the western part of the Issyk-Kul' Basin. Originally, the Sarts were an ethnic group descending from the Iranian Turks. They settled as urban dwellers in places where an Aryan population was largely intermingled with Turk and Arab invaders, and in the course of time the connotation of the term Sart changed from an ethnic to a social one. Russians and Kirgizi alike applied the name to all Turkic people who settled in towns or larger villages where they developed a distinct commercial society.

Descendants of the original Sarts have notable Aryan traits, such as medium height, heavy beard, stoutness, and dark complexion. [redacted] 25X6

25X6

[redacted]

c. Languages

The principal languages spoken in the Issyk-Kul' Basin are Russian and Kirgiz. Both are used as official languages by the local administration.

Russian is spoken by all Slavic groups as well as by the younger Turkic people. Many of the older natives (Kirgizi, Dungans, Taranches, Kalmyks, and Sarts) are also able to understand Russian and speak it in broken fashion. Although Ukrainian is spoken in many villages, Russian can be understood by the inhabitants.

Kirgiz, a dialect of the northwestern group of the Turko-Tatar languages, is the predominant native language in the area. Kirgizian differs from other Turkic languages in having long vowels. It is closely related to Mongolian, particularly to Khakassian. Since 1940 the Kirgizi have adopted a Cyrillic alphabet. Prior to that time a Latin alphabet originated by the Soviets in 1926 was used.

Other Turkic languages spoken in the area are the dialects of the Taranches and Sarts. These are closely related to Uigur. The original orthography of the Taranches and Sarts was based on Arabic script, and there is no indication that they have adopted either a Latin or a Cyrillic alphabet.

Kalmyks speak a Mongol dialect; they adopted the Cyrillic alphabet in 1924. Dungans who formerly lived in Sinkiang and Central China still speak Chinese.

d. Religion

The Russians and Ukrainians in the Issyk-Kul' Basin belong to the Orthodox Christian Church, also known as "Pravoslavny." Some of the Ukrainians, however, are Roman Catholics or Uniats (Greek Catholic). As a rule religious worship is practiced

only by the older people. The younger generations of Slavs are influenced by Communist teachings and have few if any religious convictions.

The native population is predominantly of Moslem faith. Large groups of Kirgizi, Kalmyks, and almost all of the Dungans are orthodox Moslems. Their religious principles and dogmas are deeply rooted and are observed with fanatical devotion.

The Kirgizi belong to the Sunnite Mohammedans, who acknowledge the first four Caliphs to be the rightful successors of Mohammed. In their religious beliefs, Kirgizi are influenced by mysticism and superstition. Pagan Shamanistic beliefs, talismans, and amulets are common among the people. While moving with their livestock, some of the Kirgizi are less strict in their Moslem practices and forego many of the prescribed Moslem doctrines on personal cleanliness, fasts, and type of clothing. The women are not veiled and generally not secluded from the men, and they do not always strictly observe the daily hours of prayer.

The Sarts appear as strict Moslems to foreigners, but they are essentially lax in their religious practices. Shrewd businessmen in trade and commerce, they find many of the Moslem rites difficult to apply in pursuing their profession.

25X6

Taranches are the least religious group among the Moslem population. [redacted] This stems from

25X6

the fact that Taranchi church leaders (Mullahs) are more concerned with material matters and authority than with the spiritual. Their profession in the church is based on hereditary rights rather than on devotion to religion. Traditionally of the upper class, they have close ties with the social and political leaders of the group.

e. Political Attitudes

Political attitudes toward Soviet administration and Communism differ considerably between the native Moslem population, on one hand, and the large Russian and Ukrainian ethnic groups on the other.

(1) Attitude of the Moslems

The Moslems of the Issyk-Kul' Basin, in general, are accustomed to a carefree and traditionally nomadic life. As a result, they do not adapt themselves readily to the settled life prescribed by the Soviets. Soviet efforts to increase native interest in the workings of a socialized economy meet with little success. Moslems are reported to show considerable lack of enthusiasm for farming and industrial pursuits. Recent reports indicate that in kolkhozes throughout the basin new radio relay stations have been installed over which Communist propaganda is broadcast to Kirgiz peasants. The peasants seldom bother to listen to the programs, however, and questions put to them in an effort to evaluate the effectiveness of the propaganda.

Politically, the seeds of nationalism and independence still exist in most of the Moslem groups, particularly the Kirgizi.

Nationalist traditions are inherent in the cohesiveness of the Moslem family life. The Soviets are fully aware of this fact and are attempting to dissolve some of the family influence. They are educating the younger generations in Communist philosophy and induce them to participate in industrial and agricultural activities controlled by the Government. Attempts are also being made to re-write the history of the Kirgiz people.

Kirgizi and other Moslems in the area react unfavorably to persistent Soviet attacks against their practices of the Shariat. This Moslem code of laws permits polygymy, wife purchase, and the employment of preachers (Mullahs and Ishams). Native government officials often lead the common folk in these religious observances. Moslem discontent with Moscow is felt even in local Communist Party organizations. Kirgiz Communists have been striving for more self-rule and initiative in party activities. They are known to object to the controlling power of Russian Communists who are sent into the area to form political cadres and are unfamiliar with local conditions. As a result, many native Communists are purged from their posts, particularly in departments dealing with agitation and propaganda.

The civilian life and social organizations of Moslems are shadowed by Soviet internal security forces (MGB and MVD). It is doubtful that the freedom-loving Moslems willingly accept these restrictions, although they tolerate them with a certain amount of

resignation. The Turkestan National Union (Turkestan Milli Birligi, or TMB), an underground movement known to exist in Kirgizia, may have some outlets in the Issyk-Kul' Basin. The organization strives to build an independent Tartar State which is to include all Turkic-speaking peoples.

(2) Attitude of the Russians and Ukrainians

The political attitude of both Russian and Ukrainian groups depends largely on their social or political position in the area. The group most loyal to the Soviet regime is small but powerful, consisting of Soviet administrative officials, Communist Party functionaries, and a number of technicians and specialists who have voluntarily moved into the area to develop and expand local agriculture and industry. Members of this group hold the key positions in all phases of the economy. They are staunch Communists and are entrusted with the "re-education" of the native population.

A second group of Russian and Ukrainian settlers belongs to the "spets-pereselentsi" class. This category includes persons who have been forcefully evacuated from their homelands under a system of "special resettlement." These people are either accused of collaborating with the Germans during World War II or are considered politically unreliable by the Moscow regime. The "spets-pereselentsi" are usually employed as skilled industrial or agricultural laborers. Their freedom of movement is severely restricted by constant surveillance by the MVD. Politically, this group is less reliable than the

first group and may be persuaded into collaboration against the Communists. This is particularly true of the Ukrainians, who as a result of their traditions and sentiment are known to have an anti-Soviet attitude.

Finally, there is a group of Russians and Ukrainians who are forced laborers without any freedom of movement. These people are usually sentenced to hard labor for social or political crimes. They are engaged in railroad and road construction or work in lumber and mining camps. Such camps are believed to be in the Tamga and Dzhargalan areas. Members of this group are politically least reliable from the point of view of the Communists.

2. Settlements

a. Types and Distribution

Settlements in the Issyk-Kul' Basin are concentrated mainly in the lowland areas bordering the lake and in the Tyup and Dzhargalan River valleys. Russian and Ukrainian settlements are dominant throughout the area, particularly in the eastern lowland. Native settlements, largely Kirgizi, are situated mainly along the lakeshore and in livestock-raising areas in the eastern part of the basin. Health resorts and rest homes are other forms of settlement found in the basin.

(1) Russian and Ukrainian Settlements

Russian settlements in the area include the towns of Przheval'sk, Rybach'ye, and Tyup, and the large

communities of Cholponata, Grigor'yevka, Sazanovskoye, Kuturga, and Alekseyevka. In addition, there are numerous collective farms and small villages with a predominantly Russian population. The largest Ukrainian settlements are Mikhaylovka and Pokrovka. Other Ukrainian villages and collective farms are distributed in the rich farming area east of Lake Issyk-Kul'. Russian and Ukrainian settlers are also found in large numbers on state farms (sovkhozes), where they are mixed with native Moslem peoples.

Russian and Ukrainian settlements resemble settlements in the southern part of the European USSR. The towns of Przheval'sk and Rybach'ye have a rectangular shape, with long, straight, wide streets. In Przheval'sk, streets are bordered by irrigation ditches and rows of poplars. Rybach'ye has hardly any vegetation. As a rule, the streets are unsurfaced and become extremely muddy during rainy seasons. Houses are constructed of colorfully painted clay or mud bricks. Intermingled with these are a few stone, tile, or brick buildings. Soviet influences are noticeable in the commercial and industrial districts, where there are newly built schools, libraries, and party headquarters. Workers' housing projects and parks and recreational facilities are other Soviet urban improvements. Little modernization is apparent in the remaining sections of the towns.

Russian and Ukrainian villages, such as Kuturga, Grigor'yevka, and Mikhaylovka, are generally located on rivers or on principal routes of transportation. The villages generally consist of a long,

wide dirt road lined with houses of clay or wood. Larger villages, such as Grigor'yevka and Sazanovskoye, have several streets. Houses are, as a rule, painted white and surrounded by a wooden fence. Wooden houses are characteristic of Russian villages. Ukrainian settlers prefer their traditional clay (mud) houses. The narrow side of each house faces the street. The eaves are often supported by wooden columns. A spacious yard surrounds both the house and the stable shacks. A long garden behind the courtyard is generally divided into flower, fruit, and vegetable plots. The garden is enclosed by either a clay wall or a cane fence. Russian and Ukrainian villages have a system of irrigation ditches running through them, usually consisting of a main irrigation ditch parallel with the village street or streets and secondary water ditches leading to each farmhouse. In some villages, irrigation ditches cut across the village street at regular intervals and run alongside the fruit and vegetable gardens.

In the eastern part of the Issyk-Kul' Basin and in mountainous zones north and south of the lake, the villages are generally grouped into sovkhozes or kolkhozes. Villages of the kolkhoz type differ little in appearance from the average Russian or Ukrainian village in the area. Usually each kolkhoz village specializes in a single type of economic activity, such as fishing, crop cultivation, or animal husbandry. Russian or Ukrainian villages in sovkhoz organizations have a large admixture of Kirgiz, Dungan, and Tartar

elements. Villages of this type are found in 10 sovkhozes that occupy large areas of the Issyk-Kul' Basin. They are part of the Soviet plan to integrate the native peoples into the system of controlled socialized agriculture, particularly to indoctrinate them in methods of irrigation, crop rotation, and livestock breeding. Sovkhoz villages generally have more modern dwellings than non-sovkhoz villages, up-to-date irrigation networks, and most of the available motorized equipment and agricultural machinery. They also have the services of farm-tractor and hay-harvesting stations (MTS and MSS).

(2) Native Settlements

Native settlements in the Issyk-Kul' Basin are mainly villages inhabited by Moslems. Of these, the Kirgiz villages are most numerous. Some of the larger Kirgiz villages are Barskaun, Toraygyn, Choktal, Cholponata, Dzhergez, and Sokolovka. Such villages are groupings of walled-in farmsteads strung along a road. Each farmstead consists of the residence, associated farm buildings, and a fruit and vegetable garden. The buildings are constructed of yellowish sun-baked clay. A community irrigation ditch leads through each village and has feeders running into individual farmhouse enclosures. The living quarters and an assortment of buildings and sheds for housing livestock and storing crops surround a square-shaped courtyard. In the forward part of this cluster are the men's quarters, guestrooms, stables, and storage

sheds for agricultural tools and implements. These are separated by a high wall from the women's quarters, which are located to the rear. The outer walls of the living quarters are traditionally without windows. Daylight is received through shutter-type openings facing the courtyard. Interior walls are covered with colorful carpets and richly embroidered felting. Furniture is primitive. Open hearths serve for cooking and heating. The people sit or squat on very low, portable wooden platforms covered with felt or rugs.

At the outskirts of Kirgiz villages may be seen groups of dome-shaped felt-covered tents called "Yurtas." These tents are used mainly by livestock herders who are in a transition stage from nomadic to settled rural life. "Yurtas" are still used in mountain pastures as temporary living quarters.

Dungan villages, typified by Orto-Tokay and Karashar, are characterized by their own special variety of mud huts, with flat roofs and small windows. The houses and little courtyards are generally surrounded by sun-baked clay walls, which often reach to the roof tops. Plots of barley and opium poppies are frequently cultivated on the flat rooftops. Dungan and Kirgiz villages include a number of Sart settlers who are now engaged in agricultural pursuits. Sart farmhouses are believed to be more advanced in construction, interior layout, and furnishings than any of the other native dwellings.

Taranchi and Kalmyk villages are in the eastern and northeastern parts of the basin. Taranchi villages include Kurmenty, Taldy-Su,

and Chomuryukty. Taranchi settlers reportedly also constitute the largest ethnic group in Tamga, on the southern shore of Lake Issyk-Kul'. Taranchi villages are small and consist of loosely grouped individual farmhouses, mostly of clay construction. Kalmyk villages are located chiefly along the foothills and at higher elevations in the mountains. They are reportedly patterned after Kirgiz villages.

(3) Yurta Encampments

Yurta encampments, or "Auls," are frequently encountered in the mountain pastures (Figure 8). These encampments are seasonal settlements of the pastoral Kirgiz population. In general they consist of a group of three to six yurtas, but on some of the rich pastures encampments may occasionally include several hundred yurtas. The yurtas characteristic of Kirgiz and Kazakh nomads are circular tents consisting of a wooden lattice framework covered with animal skins or felts (Figure 9).

The interior arrangement of a yurta is extremely simple. The entrance is through a door flap. Against the opposite side of the tent from this opening are the sleeping accommodations. These consist of felt and brightly colored blankets, placed either on the floor or on trunks. In the center of the tent is a fireplace, which is usually a hole dug in the ground with a large opening in the tent above it. Household equipment, riding gear, and trunks are usually found to the left of the door flap. To the right of the entrance are cooking utensils and food supplies. Cooking is generally done

Figure 9. Kirgisi herders holding council in front of yurta.

in a large kettle suspended over the fireplace. A section in the back of the tent separated by a grass mat is used exclusively by women. Yurtas are well insulated against the cold and can be used during the winter season. To retain interior warmth, snow is shovelled against the outside walls of the tent and felts are spread over the floor.

(4) Health Resorts and Rest Homes

The moderating influence of Lake Issyk-Kul' on the climate and the presence of many hot springs are responsible for numerous health resorts in the area, mainly in the eastern part of the basin. A few of the resorts are the "Kurort Arasan" (in the Aksu River valley); the "Kurort Dzhety-Oguz" (in the Dzhety-Oguz River valley), which is especially known for its radioactive baths; the lake resort of Koysara, known for its salt-water baths; and the hot mineral springs in the Kizyl-Su Valley. According to Soviet claims, several thousand persons visit the Issyk-Kul' resorts every year.

In addition to the health resorts, there are numerous rest homes along the shores of Lake Issyk-Kul' and on the slopes of the Terskey and Kungey Ala-Tau Ranges. These are visited yearly by groups of adults or children who are permitted to spend their vacation in the lake region. One of the rest homes known to serve as a vacation place for children is at Cholponata (Figures 10 and 11).

b. Description of Towns

Przheval'sk, Rybach'ye, and Tyup are the only settlements in the area that can properly be classified as towns.

Figure 10. Rest home at Cholponata.

Figure 11. Children vacationing at Cholponata.

In the 1951 Administrative Territorial Handbook of the USSR, Przheval'sk is the only settlement officially classed as a town, but all three are referred to as towns in Soviet scientific and popular literature.

(1) Przheval'sk

The town of Przheval'sk is located in the eastern part of the Issyk-Kul' Basin, near the base of the Terskey Ala-Tau Mountains. It is the economic and cultural center if Issyk-Kul' Oblast. The town is located about 7 miles southeast of its port facilities, Pristan' Przhevalsk, situated near the mouth of the Karakol River.

Przheval'sk was built in 1869 as a military administrative center for the Tsarist Army in Turkestan. The town was originally known as Karakol and was renamed Przheval'sk in honor of the Russian explorer, N.M. Przheval'sky. In recent years the Soviets have maintained considerable numbers of troops in the area. As late as 1952, Przheval'sk was referred to as a garrison town for mountain troops entrusted with security duties along the Kirgiz-Sinkiang border. An MVD regiment is also reported to be stationed there. MVD billets, consisting of several barracks, are located at the southeastern outskirts of town.

The town has an estimated population of 20,000, predominantly Russians. The architecture is closely patterned after that of

towns in the European USSR. Its streets are wide, unsurfaced, and shaded by trees. The main streets run in a north-south direction. In the center of town is a large park with Tien Shan spruce trees. Large fruit orchards divide the town into several sections. The city is known for its Agro-Meteorological Institute, which is the oldest scientific establishment in the Kirgiz republic. The town is being developed into a significant industrial center, although at present industrial installations produce mainly for local needs. There are a number of plants and small shops engaged in producing clothing and consumer goods, other construction materials, alcoholic beverages, and starch syrup. Przheval'sk has a post office, located near the center of town, and telephone communication with the port, Pristan' Przheval'sk, has been in operation since 1928.

Pristan' Przheval'sk is the largest port on Lake Issyk-Kul'. It is the main shipping center for agricultural products, construction materials, coal, and fish from the eastern part of the basin. These commodities are transported across the lake to the transloading center of Rybach'ye. Passenger and freight service from Pristan' Przheval'sk is available almost every day of the month. The port also figures prominently in ship repair and maintenance.

(2) Rybach'ye

Rybach'ye, formerly known as Bachin, is located at the westernmost tip of Lake Issyk-Kul'. It is the administrative center of Balykchinskiy Rayon, which occupies the western part of the

basin. The town has approximately 5,000 inhabitants, most of whom are Russinas. Moslem minorities include Kirgizi, Dungans, and Sarts. Rybach'ye is significant for its transloading facilities between rail and road traffic and lake shipping; Rybach'ye has the second largest docking facilities on Lake Issyk-Kul'. Almost all trade from the Issyk-Kul' Basin to the hinterland and other parts of the Kirgiz SSR is handled here. It is the center of the fishing industry on the western side of the lake. The town is roughly rectangular and covers a relatively small area. The main streets of the town are parallel to the waterfront. They are unsurfaced, wide, and lined with single-story houses of stone construction. A hotel, several restaurants, and some smaller stores selling consumer goods are reported to be in the center of town, near the port area. Rybach'ye has only minor industrial installations, including a meat-packing plant, a small power station, a refrigerator plant, and several graneries. Gasoline storage tanks have been reported in the port area.

(3) Tyup

The town of Tyup, formerly known as Preobrazhenskoye, is located in the eastern part of the basin near the mouth of the Tyup River. Its population is mainly Russian. The latest available population figure, 6,245 inhabitants, dates back to 1927. Tyup is classified as a secondary port on Lake Issyk-Kul' and handles shipping of agricultural commodities and salted fish. The two small wooden piers in the port area serve a granery and a

of the Inspectorate, sales personnel are to be subjected to physical examination and must follow a prescribed code of cleanliness, and food items must be properly cleansed, packaged, and refrigerated. The enforcement of these regulations, however, is generally lax, and government stores often fail to maintain even the minimum standards of hygiene.

Sanitary conditons in rural areas are extremely poor. Village pharmacies, which serve both as medical aid stations and sanitary indoctrination centers, are few in number and are located mainly at kolkhozes and sovkhozes. Epidemics often occur among the native population, particularly in remote areas. There are hardly any sewage and garbage facilities for rural settlers. Throughout villages and winter camps it is not uncommon to see dirt, refuse, and waste material dumped on the grounds outside of living quarters. This is used as food by dogs and cats and attracts large numbers of insects and rodents. Diseases carried by lice, fleas, and bedbugs, are very common. Body hygiene is particularly slack among peasants and livestock herders. To maintain body warmth, clothes once donned are rarely removed during the winter months. In the western parts of the basin, where water is scarce, people are extremely filthy.

Caution must be exercised in drinking well water, particularly in the eastern part of the basin. Wells are uncovered and water is often polluted. In the mountainous zones, drinking water is obtained from rapidly flowing mountain rivers and is relatively free

of harmful bacteria. Glacial streams, however, especially in the higher mountains are not suitable for drinking.

Various diseases are known to be endemic in the area. Malaria is common in zones immediately surrounding the lake shore, especially in the swampy districts of the Tyup and Dzhargalan River valleys. Typhus, dysentery, and spotted and relapsing fever are prevalent throughout the area. In agricultural districts the Kirgizi type of wheat is reported to be a medium for spreading plagues. Wheat is contaminated by the feces of infested rodents, and inhaling of dust from infected crops may cause disease. Trachoma and frostbite are common among the livestock-raising population.

4. Economy

a. Agriculutre

The Issyk-Kul' Basin is one of the leading agricultural areas of the Kirgiz SSR. In the Issyk-Kul' Central Tien Shan region, it is surpassed only by the Chu Valley in agricultural production. Crop cultivation and animal husbandry are the dominant economic activities. They are most extensively developed in the eastern part of the basin. Under the Soviets, both have been collectivized and are organized into kolkhozes and sovkhozes. Sovkhozes conduct experimental farming and are responsible for the technical development of crop cultivation and animal husbandry. There are 10

sovkhozes in the area. The Tamchi and Issyk-Kul' Sovkhozes are located along the northern shore of Lake Issyk-Kul'. Parts of the Kok-Maynak and Kockkorskiy Sovkhozes extend into the western part of the basin. The Ulakhol and Ton Sovkhozes are located south of the lake. The other 4 sovkhozes--Orgocher, Karakol'skiy, Sukho-Khrebtinskiy, and Santash--are in the southeastern and eastern parts of the basin. (see map CIA 9254).

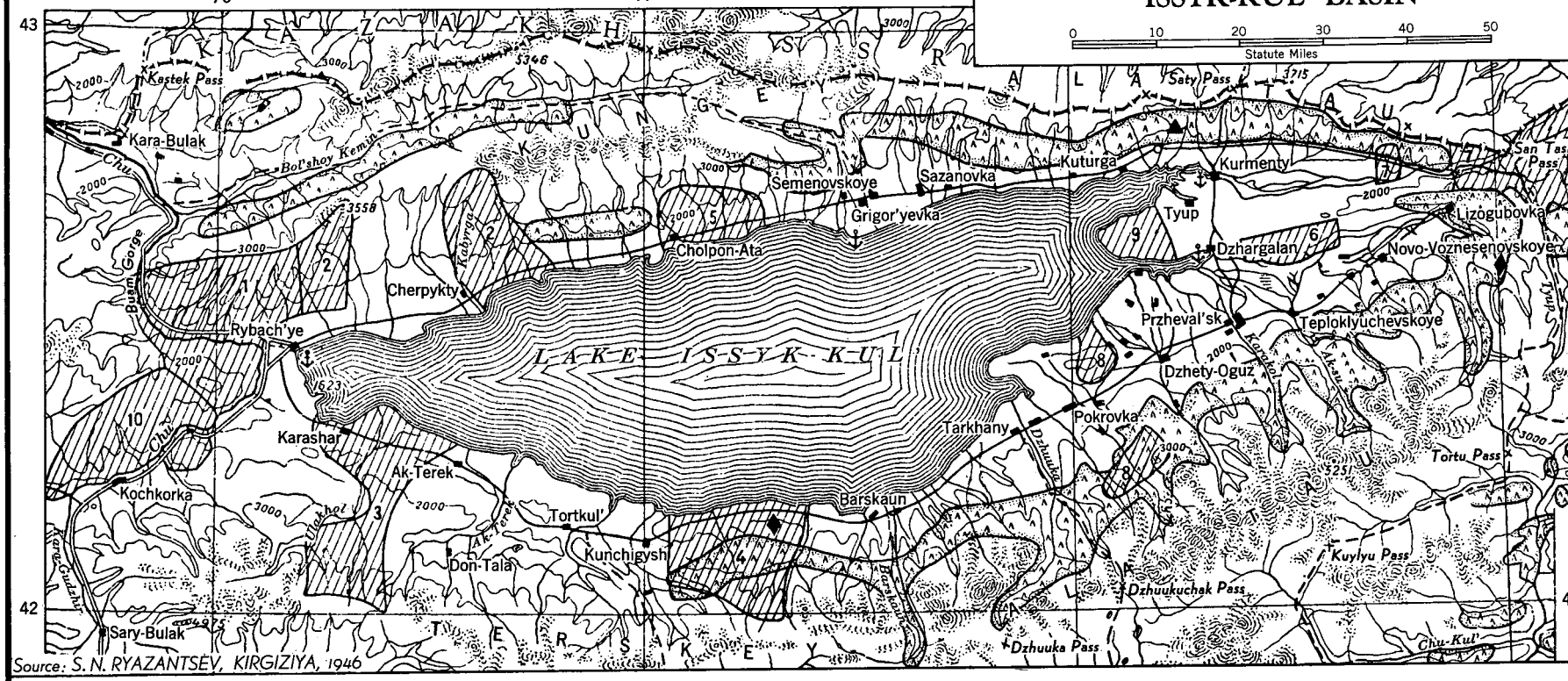
(1) Crop Cultivation

According to recent Soviet sources, the cultivated area of the Issyk-Kul' Basin occupies about 352,000 acres. Of these, 253,000 acres are irrigated farmland and 99,000 acres are in terrace farms. Cultivated areas include the narrow shores north and south of the lake; the alluvial fans of mountain rivers emptying into the lake (such as the Turaygyr, Choktal, and Ulakhol); the lower slopes of the Kungey Ala-Tau and the foothills of the Terskey Ala-Tau; and several narrow valleys (Konuralen, Alabash) lying between the foothills and the secondary range of the Terskey Ala-Tau.

The western half of the Issyk-Kul' Basin is largely unsuitable for crop production. Around Rybach'ye are large, barren, rock strewn expanses. Crop cultivation is very limited eastward to Cholponata, on the northern shore, and to Tossor, on the southern shore. Dry farming is practiced in a few small rural settlements along the lake littoral and on some mountain slopes at elevations up to 7,500 feet.

ISSYK-KUL' BASIN

0 10 20 30 40 50
Statute Miles



Source: S. N. RYAZANTSEV, KIRGIZIYA, 1946

LEGEND

- —2000— Approximate contour
- .3947 Summit elevation
- Glacier and firn field
- —x— Principal pass
- Highway
- Improved dirt road
- ------ Principal trail
- Principal lake port
- Coal deposit
- Cement raw materials
- Sovkhozes (State collective farm)
- Forest

SOVKHOZES

1 Kok-Maynak
2 Tamchi
3 Ulakhol
4 Ton
5 Issyk-Kul'skiy
6 Karakol'skiy
7 Santash
8 Orgocher
9 Sukho-Khrebtinskiy
10 Kochkorskiy

9254 2-53

Approximately 90 percent of all the crops in the basin are grown in the eastern half. Irrigated farmlands occupy the northern and southern littorals eastward from Cholponata and Tossor. Grigor'yevka and Sazanovskoye on the northern shore and Dzhety-Oguzov, Novo-Voznesensky, Pokrovka, and Tarkhan on the southern shore are centers of intensively cultivated areas. Terrace farming is practiced on the nearby mountain slopes up to an elevation of 7,500 feet. The largest farming areas are located within the wide valleys of the Tyup, Dzhargalan, and Karakol Rivers. Numerous small tributaries, irrigation canals, and water ditches provide sufficient water to this intensely cultivated region.

Irrigation networks usually consist of a trunk canal from which smaller canals branch off at right angles at equal intervals. The branch canals, in turn, are connected with numerous irrigation ditches that channel water to the individual fields. In a less widely used method of irrigation, mountain streams are tapped by a fan-shaped net of small water channels, which distribute water to the fields. Efforts are being made to reconstruct the irrigation systems of the Dzhargalan, Tyup, Turgin-Aksu, Irdyk, Dzhety-Oguz, Karakol, Zaluka-Dzhuka, and Kyzyl-Su Rivers to increase the amount of land under irrigation. According to Soviet plans, this will increase the irrigated area by 37,000 acres.

Grains and medicinal plants are the principal crops cultivated in the Issyk-Kul' Basin. The basin is one of the best grain-producing

regions in Kirgizia. The over-all area sown in grain is approximately 247,000 acres.

Wheat is the main food crop of the local population, and makes up the larger part of the total area under grain. Approximately 148,000 acres of wheat are cultivated, mostly in the eastern lowland. Barley and oats are also grown in significant quantities; 62,000 acres are in barley and 37,000 acres in oats. These are primarily fodder crops, which are grown during the summer and stored as supplementary fodder to winter pasturing. To a great extent, barley and oats are cultivated in mountainous areas which are used as livestock pastures. Cultivation of barley extends to the upper limits of dry-farming, reaching an elevation of 7,500 feet in the upper Tyup Valley.

Medicinal crops, such as opium poppies and oil-bearing plants, are cultivated in large quantities in the area between Tyup and Przheval'sk. The growing of opium poppies is controlled by special government agencies and is handled almost exclusively by Kirgiz farmers.

Mustard seeds, fruits, and vegetables are cultivated near the larger villages particularly in the vicinity of Przheval'sk.

Industrial crops are currently being cultivated for experimental purposes. Sugar beets are successfully grown southeast of Przheval'sk. The Soviets desire to develop the area into a large-scale sugar-producing region, similar to the Chu Valley.

Farming methods range from Soviet-introduced mechanized plowing, sowing, and harvesting to native hoe tillage. Modern farming equipment available to collective farms consists of machine tractors, automatic seeders, and harvester combines. The machinery is administered by machine-tractor stations (MTS) and hay-harvesting stations (MSS). Machine-tractor stations are currently located near Przheval'sk (Teplo-Klyuchenka MTS), in Pokrovka (Dzhety-Oguzov MTS), and in Sazanovskoye (Issyk-Kul' MTS). In addition, several hay-harvesting stations have been established in the eastern part of the basin. These stations are responsible for mowing of natural and cultivated hayfields. Each station is supplied with mechanized equipment and the necessary maintenance installations.

Native implements used include a native-type plow (wooden hoe blade with the pointed end reinforced by iron plates); a heart-shaped, round hoe or "Ketmen'," which is used largely in truck gardening; and a short-handled sickle. In more remote areas, horses and oxen or heavy rollers are used for thrashing harvested grain crops. The chaff is separated from the grain by the wind.

In the eastern lowland, a triple or single plowing method is used, depending on the size of the field under cultivation. In the triple-plowing method, a small part of a field (usually heavily weeded) is plowed in the fall (October-November) and the remainder of the field is plowed during the following spring season. The plowed areas are left fallow until May and October, respectively,

when a second plowing takes place. After the second plowing, the seeding is done. At times, however, a heavy weed growth may develop between the second plowing and the planting, so that a third plowing becomes necessary. This method is unsuitable for large farming areas, because the delayed planting often causes crop failures due to autumn frosts, and also requires an excessive use of farm labor and mechanized equipment. As a result, sovkhozes and kolkhozes use the single-plowing method.

In the western part of the basin, fields under cultivation are small and often cannot be planted for more than 1 year because of the shortage of moisture. At best, a field may be cultivated for 2 or 3 years in succession and then must be abandoned unless some sort of irrigation can be applied.

(2) Grazing Lands and Animal Husbandry

The Issyk-Kul' Basin has 2,900,000 acres of grazing land, more than 12 percent of the total grazing area of the Kirgiz republic. Grazing lands are located in the narrow belt of flat land surrounding the lake, on the slopes of the Kungey and Terskey Ala-Tau Ranges, and on the alluvial fans of many of the small mountain rivers.

The main grazing lands are found in the lowland area surrounding the lake. The western half of the basin, however, is arid and suitable only for the hardier kinds of livestock, such as sheep and native horses. In winter, livestock herders usually move most of

their animals to the richer pastures in the eastern part of the basin or in the Kochkur and Susamyr Valleys. Some herds of sheep are sent north to pastures in the Kungey Ala-Tau Range. The eastern part of the basin has good pasture lands, but large-scale grazing of livestock, mainly beef and dairy cattle, is restricted to the winter season. In summer much of the fertile land is used for crop cultivation. Winter grazing is centered in the Przheval'sk and Dzhety-Oguz areas and in the valleys of the Tyup and Dzhargalan Rivers.

Summer grazing takes place on pastures located on the mountain slopes, particularly the high-grass subalpine pastures of the Terskey Ala-Tau (Figures 12 and 13). The herds of some of the collective livestock farms are driven across the Terskey Ala-Tau to the high-altitude syrts of the Naryn Upland, where livestock are generally pastured until late fall. With the approach of winter, the herds of cattle, sheep, and horses are driven from their mountain pastures down to the lowland areas surrounding the lake.

The Issyk-Kul' Basin is one of the most important livestock-raising regions in Kirgizia. The number of livestock in northern Kirgizia is estimated at 700,000 head, almost half of all the livestock in northern Kirgizia and nearly one-fourth of that of the Kirgiz SSR.

Sheep and goats (550,000 head) make up the greater part of the livestock in the Issyk-Kul' Basin. Formerly, sheep in the area were mainly of a coarse-wooled, fat-tailed breed which yielded

Figure 12. Cattle pasture in the foothills of the Terskey Ala-Tau.

Figure 13. Sheep pasture in the foothills of the Terskey Ala-Tau.

large quantities of meat and tallow. Sovkhozes along the south shore of the lake are still breeding sheep of this type, but emphasis has shifted toward fine-wooled sheep. Several crossbreeds of fine-wooled sheep (Rambouillet and Wurtemberg) are already found in the area. These sheep provide less meat and tallow but yield a fine quality of wool for textile manufacture.

Cattle (84,000 head) are concentrated in the eastern areas of the basin. The breed has been improved in recent years through crossbreeding with imported Swiss cattle. Dairy cattle, particularly, have been improved.

An estimated 68,000 horses are found in the western part of the basin. They are known for their stamina in surviving winter conditions with only meager quantities of natural fodder. Horses are used by native herdsmen as work animals and as a means of transportation.

Camels are bred in the eastern part of the basin. They are used mainly for caravan transport across the Central Tien Shan Mountains to the Sinkiang Province of China.

By collectivizing the livestock-raising industry, the Soviets have considerably improved the selection and utilization of natural grazing lands as well as the distribution of supplementary fodder for winter-pasturing areas. In the past, livestock were subjected to mass starvation as a result of inadequate winter pastures and the complete failure to provide herds with supplementary fodder.

Experimentation in crossbreeding, as well as over-all responsibility for development of the industry, is delegated to the sovkhozes. In the western half of the basin, the sovkhozes of Tamchi, Kok-Maynak, Ulakhol, Kochkorskiy, and Ton specialized in sheep raising. The Issyk-Kul' Sovkhoz is noted for horse breeding. Located in the eastern half of the basin are the Karakol'skiy, Santash, and Sukho-Khrebtinskiy Sovkhozes, which specialize in beef and dairy cattle, and the Orgocher Sovkhoz, specializing in sheep.

b. Industry

Industry in the Issyk-Kul' Basin is based primarily on fishing and lumbering. Mining is currently insignificant, but promises to become an important branch of the economy. The few industrial installations currently in operation are minor as compared with those in the Chu Valley region. They are concentrated mainly in the towns of Rybach'ye and Przheval'sk. Since the opening of a highway and railroad line from Frunze to Rybach'ye, the Soviets have stressed the need for expanding industrial development in the Issyk-Kul' Basin. Emphasis is focused on increased production in fishing, lumbering, and mining. Expanded exploitation is planned for molybdenum and wolfram deposits in the Sazanovskoye area and for coal deposits around Dzhargalan and Tamga. To facilitate this development, plans are being considered for the extension of railroad and road facilities to the mining areas. Przheval'sk, the

economic center of Issyk-Kul' Oblast, is being developed into an industrial center capable of processing the agricultural resources of the more intensively cultivated eastern littoral of the lake.

(1) Fishing

Commercial fishing on Lake Issyk-Kul' supplies a large share of the local food requirements, and next to wheat, fish is the most important commodity exported to other parts of the Kirgiz SSR. The fishing industry is concentrated at the western side of the lake, with Rybach'ye as its center. Fishing extends as far eastward as Choktal on the north shore and Ton on the south shore of the lake. At the eastern side of the lake fishing is conducted on a smaller scale. The settlements of Grigor'yevka, Mikhaylovka, Tyup, Pokrovskoye, and Przheval'sk are the chief centers of the activity.

Fishing is controlled by the Rybpromkombinat (Fishing Industry Combine), which consists of 13 fishing kolkhozes and includes approximately 300 fishermen's families. Russians fish mainly in the lake, whereas Kirgizi restrict their fishing largely to the numerous mountain rivers emptying into the lake.

The annual fish catch ranges from 1,500,000 to 1,800,000 pounds. Types of fish caught include herring, dace (marinka), "osman," carp, trout, and "chegarkuni." Trout and "chegarkuni" were stocked several years ago from Lake Sevan in Armenia. "Osman" and carp are the most valuable commercial fish. Fish are caught during the

entire year except December and January. During that period the fish go down to great depths, usually far from the shorelines. The largest catches are made during the spring season.

Large dragnets are used by fishermen for operations on the lake itself. For fishing along the numerous rivers emptying into the lake, stationary nets attached to anchors, small dragnets, handnets, and fish baskets are used.

The fishing includes a number of "salting points" located along the northern and southern shores of the lake. The largest salting installations are located at Grigor'yevka.

(2) Lumbering

Lumbering is also an important phase of the economy of the Issyk-Kul' Basin. Considerable timber, mostly Tien Shan spruce, grows along the mountain valleys and slopes in the eastern part of the basin. Several of the mountain rivers emptying into Lake Issyk-Kul' are suitable for floating timber and are used extensively for that purpose. Timber felled along the upper courses of these streams is floated to lumber mills located near the river mouths or along their lower courses.

The annual output of cut and processed lumber is approximately 5,300,000 cubic feet. This constitutes more than half of the lumber milled in the entire Kirgiz SSR. Lumber is cut both for local consumption and for shipment beyond the Issyk-Kul' Basin. Most of the lumber is shipped via Rybach'ye, to centers in the Chu Valley, particularly Frunze.

There are 8 sawmills in the eastern part of the basin. One of the largest is located on the lake shore, according to one source, approximately 7 1/2 miles east-northeast of Tamga. It covers an area 490 x 330 feet, and consists of a 1-story wooden mill and 5 or 6 wooden warehouses. The mill receives spruce, juniper, and some pine and poplar logs from the Terskey Ala-Tau. Three or four truckloads of lumber are cut daily at the mill and shipped by boat to Rybach'ye.

Soviet plans for increasing lumbering activities in the basin include the establishment of mechanized lumber-milling centers in the vicinity of the Dzhergal'chak River. These will have a combined yearly production capacity of 3,000,000 cubic feet of lumber.

(3) Mining

Mining in the Issyk-Kul' Basin is little developed, with coal mining currently the main activity. Small-scale exploitation is reported at the Dzhargalan and Sogutin deposits.

The Dzhargalan coal fields are located along the upper course of the Dzhargalan River, on the northern slopes of the Terskey Ala-Tau. The mining area is about 40 miles from Przheval'sk. The reserves are roughly estimated at above 100 million tons, consisting mostly of lignite. At present there are only a few small shafts at the mines of the Uglekok Artel, with a yearly capacity of 10,000 tons. A new mine that is reported as under construction is to provide up to 50,000 tons of coal per year. Coal is transported via a dirt road

(constructed in 1939) to Pristan' Przheval'sk. It is used almost entirely as fuel for lake steamers or in local industries at Przheval'sk. To increase output at the mines, the Soviets are planning the construction of a narrow-gauge railroad from the pits to Przheval'sk.

The Sogutin coal deposits are located near the south shore of Lake Issyk-Kul' in the area between Ton and Tamga. Reserves are estimated at 150 million tons of bituminous coal and lignite. Mining activity is not continuous. Small quantities of coal are mined only periodically. A coal mine has been reported in operation approximately 6 miles southwest of Tamga and about 2 1/2 miles southwest of the lake shore. The mine employs about 200 Soviet prisoners and 300 civilians, and produces 4 or 5 truckloads of bituminous coal per day. Coal is hauled by truck to port installations at Tamga, where it is transloaded to lake steamers or barges and shipped to Rybach'ye.

In the summer of 1942, significant deposits of molybdenum and wolfram (tungsten) were discovered along the northern shore of the lake in the vicinity of Sazanovskoye. Although there is no definite information indicating active exploitation, it is quite possible that small quantities of ore are being extracted. The Soviets plan to build a railroad line from Rybach'ye through the mining region to Przheval'sk.

(4) Principal Industrial Installations

The principal industrial installations in the Issyk-Kul' Basin are concentrated in Przheval'sk and Rybach'ye.

Smaller installations are located at Tyup, Grigor'yevka, Tamga, and other points along the lake.

(a) Przheval'sk

The town of Przheval'sk is the economic and industrial center of Issyk-Kul' Basin. A torpedo-testing station is located at Pristan' Przheval'sk. A barbed-wire enclosed installation located on the lake shore west of town has been identified as the torpedo-testing station. The testing range on the lake, reported to be 2.2 square miles in area, extends westward from the station, and is enclosed by floating barriers. In addition, a much larger area adjacent to the testing range is closed to navigation. Torpedoes to be tested are received either assembled or in parts from the Alma-Ata Munitions and Torpedo Plant #175. Shipment from Alma-Ata is by rail via Frunze to Rybach'ye, and from there by boat to the testing station.

Pristan' Przheval'sk also has a ship-repair yard and facilities for the construction of diesel and other types of motorships, tugs, and barges for the lake fleet. The yards at Pristan' Przheval'sk are the largest on the lake. There is also a fish-salting plant.

Industries in Przheval'sk, located 7 miles southeast of the port, produce mainly for local consumption. An oil and glucose factory (producing starch syrup), a wine distillery, a brewery, a woodworking mill, a construction-materials plant, and several smaller shops engaged in the manufacture of clothes, footwear, and other consumer goods are located in Przheval'sk. The woodworking mill is also reportedly making furniture.

According to Soviet plans, the industrial capacity of Przheval'sk is to be increased to meet the demand of the growing agricultural and mining activities in the eastern part of the Issyk-Kul' Basin.

(b) Rybach'ye

Rybach'ye is the main traffic center in the basin. It is the transshipment station between railroad and road traffic to and from the Issyk-Kul' Basin and water traffic between Rybach'ye and Przheval'sk. Almost all trade between the Issyk-Kul' Basin and the hinterland, as well as with the rest of the Kirgiz SSR, passes through here.

Rybach'ye has only a few minor industrial installations. Soviet sources indicate, however, that facilities will be increased in the near future. Currently a meat-canning combine, a refrigerator plant, a small electric power station, and several grain elevators are in operation. The power station and grain elevators are located in the port area. Several oil-storage tanks are also reportedly located here. A large dairy combine is believed to be under construction.

(c) Tyup

A large cement plant with a yearly capacity of 30,000 tons is located about 3 miles northwest of Tyup. Tyup also has a small shipyard, which is engaged mainly in minor repairs and maintenance work.

(d) Grigor'yevka

The port of Grigor'yevka, located about 4 1/2 miles south of Grigor'yevka proper, has the largest

fish-salting installation of Lake Issyk-Kul'. Fish salted here are shipped to other parts of the basin and to Frunze.

(e) Tamga

Located on the southern shore of the lake, Tamga has minor fish-salting and fish-processing installations. A large sawmill 7 1/2 miles east-northeast of Tamga produces 3 or 4 truckloads of lumber daily. This lumber is hauled to Tamga for transshipment by boat to Rybach'ye. The mill consists of a 1-story wooden building where lumber is sawed and 5 or 6 wooden storage buildings.

About 37 miles east of Tamga a large brickyard is reported in operation. The yard is located a short distance from the settlement of Komsovaisk (not shown on available maps) and covers an area 165 by 110 yards. It consists of two 1-story brick buildings and an open storage area, enclosed by a 6-foot barbed-wire fence.

5. Transportation

a. Railroads

Railroad transportation in the Issyk-Kul' Basin is limited to a small sector of the Frunze-Rybach'ye railroad line. This sector extends roughly from the railroad stop of Kok-Maynak, near the eastern exit of the Buam Gorge, to Rybach'ye. It is approximately 32 miles long, single tracked, of broad gauge, and steam operated. The roadbed is well maintained and consists of impregnated wooden ties placed on a ballast of crushed stone. The line was first reported as completed and opened for rail traffic in 1952. The remaining stretch to Frunze has been in operation since 1941.

The line runs parallel to and north of the Frunze-Rybach'ye Highway. Its western part is deeply cut into the steep and rocky slopes of the Kungey and Kirgizskiy Mountains. In the open flatlands near the lake, the line crosses a barren rock desert. Rybach'ye, the terminal station, has the only railroad facilities in the basin. These consist of the stone railroad station, a siding extending to the port area, and two small buildings serving traffic and switching operations. The railroad station also serves as the transloading station between rail traffic and lake shipping.

Traffic to Rybach'ye consists mainly of freight shipments and military supplies. Manufactured goods, construction materials, cement, plumbing equipment, and processed sugar are some of the commodities shipped. From Rybach'ye they are distributed to various lake-shore settlements. Military supplies arriving by rail are consigned to the Soviet mountain troops stationed at Rybach'ye, Przheval'sk, and along the Sinkiang frontier. Torpedoes, either assembled or in parts, are shipped from the torpedo plant at Alma-Ata by rail to Rybach'ye and from there by boat across the lake to the testing area.

Westbound freight traffic from Rybach'ye consists mainly of grain, livestock, medicinal raw materials, and coal. The volume of westbound freight movement appears to be less than that of eastbound shipments. A postwar report indicates that during a 2-month period 122 freight cars were loaded for shipment from Rybach'ye,

while during the same period 603 incoming cars were unloaded at the same station. The number of freight trains operating daily on the rail sector is not known, but a 1951 report indicates that at least one freight train a day in each direction was seen passing the railroad station at Bystrovka in the Chu Valley. Little information is available on passenger movement to Rybach'ye. The latest available Soviet Railroad Time Table (1950) lists only one slow-moving passenger train operating daily in each direction between Frunze (the Kirgiz capital) and Bystrovka, the nearest main station outside the Issyk-Kul' Basin. This train service has probably been extended to Rybach'ye.

The construction of two additional railroad lines is believed to be under consideration by the Soviets. One broad-gauge, single-track line is to run along the northern shore of the lake and connect Rybach'ye with Przheval'sk, via Tyup. This line would also serve the larger fishing settlements along the lakeshore and permit direct shipment of Dzhargalan coal to Rybach'ye and Frunze. An unconfirmed report dated October 1951 indicates that construction of this line was already under way near Rybach'ye in 1947. Large groups of forced laborers were seen blasting rocks, preparatory to laying the roadbed. The second line under construction is a short, narrow-gauge line that will connect the Dzhargalan coal mines with Pristan' Przheval'sk, on Lake Issyk-Kul', where coal can be transloaded to lake vessels or to the Przheval'sk-Rybach'ye railroad, if constructed. Another plan provides for a broad-gauge line from Pristan' Przheval'sk

to the coal deposits. From this line entire coal trains could be moved by railroad ferries across the lake to the broad-gauge terminal at Rybach'ye.

b. Roads

The Issyk-Kul' Basin is connected by road with the important industrial and agricultural regions of Kirgizia, such as the Chu, Fergana, and Naryn Valleys. Important roads also link the basin with industrial Alma-Ata and provide travel routes to the Sinkiang Province of China. The four main roads of the basin, classified by the Soviets as highways, converge at the lake port of Rybach'ye. Two of the roads follow the north and south shores of the lake and lead to Przheval'sk. The other two roads are essentially sections of main highways leading into the Issyk-Kul' Basin. These are the Frunze-Rybach'ye Highway, which connects the lake area with the Chu Valley; and the Rybach'ye-Naryn-Kashgar highway, which links the basin with the fertile Naryn Valley and with Chinese Sinkiang. In addition, one improved road leads south across the Barskaun Pass in the Terskey Ala-Tau and another runs eastward to Narynkol on the Sinkiang frontier.

Numerous unimproved dirt roads traverse the intensively cultivated agricultural region bordering the eastern shore of the lake. Most of these dirt roads radiate from Przheval'sk and Tyup and lead to small villages and collective farms.

Many trails and paths lead from settlements along the northern and southern littorals of Lake Issyk-Kul' to livestock grazing lands on the slopes of the Kungey Ala-Tau and Terskey Ala-Tau Mountains. Trails also lead across the mountains to the Naryn, Bol'shaya Kemin, Kegen', Sharyn, and Chilik River valleys, and the Alma-Ata Lowland. Some of the trails across the mountain ranges wind through hazardous passes. At least one trail is considered a strategic trade route between the Issyk-Kul' Basin and Sinkiang, China. Originating at Saru, 3 miles southwest of Pokrovka, the trail crosses the Naryn Upland over the Ak-Bel' Pass (elevation 12,510 feet), Tozhiko Pass (elevation 12,215 feet) and Ishtyk Pass (approximately 12,300 feet) and moves in a southwestward direction to the Sinkiang border. After crossing the border over the Bedel' Pass (elevation 14,053 feet), the trail continues, in part, as a dirt road to Uch-Turfan and Aksu.

Movement on mountain trails and paths is best during the summer and fall season. During the winter snow often conceals pits and crevices, making travel hazardous. Even under ideal weather conditions, movement is very fatiguing and difficult. Some trails and paths lead through mountain gorges which are blocked by large morainic deposits. Most trails are suitable only for foot or pack-animal traffic. Trails leading across the Kungey Ala-Tau are somewhat easier to travel than those leading across the Terskey Ala-Tau. Up to date, only the Barskaun Pass (elevation 12,312 feet) in the Terskey Ala-Tau has been successfully widened to carry an improved motor road from Barskaun.

(1) The Rybach'ye-Przheval'sk Highway, Northern Route

The Rybach'ye-Przheval'sk Highway skirts the northern shore of Lake Issyk-Kul'. It is the principal motor road connecting the ports of Rybach'ye and Przheval'sk and also serves as a supply route to numerous fishing settlements along the shore. An alternate highway, which connects Rybach'ye with Przheval'sk via the southern shore, is used less by motor transport because the terrain is more rugged. From Rybach'ye, the northern highway leads to Tyup and follows the northern shore of the lake at distances ranging from several feet to approximately 4 miles inland. The surrounding terrain is flat, since the slopes of the Kungey Ala-Tau begin 1 to 6 miles from the shoreline. Grain and potato fields and fruit orchards extend on both sides of the highway, except where the road borders the lake. At Tyup the highway turns southward to Przheval'sk. This stretch of the route in general departs from the eastern and southeastern shores of the lake, reaching inland for distances up to 14 miles. Only at the eastern extremities of the Tyup and Kara-Su inlets does the highway run close to the lake shore. The surrounding countryside is hilly, especially between the Tyup and Kara-Su divides. The road crosses a densely cultivated area dotted with grain and potato fields and fruit orchards.

The highway from Rybach'ye to Przheval'sk is approximately 137 miles long. The width of the road is about 25 feet. There are

no soft shoulders, but drainage ditches 1.5 feet wide border the road on both sides. The road surface is of rolled gravel and permits trucks and motorcars to travel at speeds up to 45 miles per hour. The highway crosses about 23 streams flowing from the Kungey Ala-Tau to the lake. The bridges are of wood and all but two are approximately 6.5 to 10 feet in length and about 25 feet in width. The two wooden bridges, both located a short distance northwest of Tyup, are reported to be longer, with spans of 17 to 20 feet. The capacity of the bridges is not known but they appear to be sufficiently well constructed to permit loaded trucks to cross without slowing down.

Traffic on the highway consists mainly of shipments of agricultural commodities (grain, livestock, and opium poppies), machinery, fish and fish products, and some lumber. To a lesser extent the road is also used for civilian and military travel. Civilian traffic is mainly in the nature of local movement between lakeshore settlements. Horse-drawn wagons are the best available means of travel. Passenger cars are rare. Military traffic consists of the transport of supplies between the military installations at Rybach'ye, Krasnogvardeisk (new military port on Lake Issyk-Kul'), and Przheval'sk.

Several dirt roads branching off the main highway lead to port facilities on the lake or to collective grain or livestock farms. More of these are found in the densely cultivated area at the eastern part of the Issyk-Kul' Basin. Six miles northwest of Tyup, a dirt road leads to the east, skirting the southern slopes of the

Kungey Ala-Tau for 30 miles to the Santash State Farm near the Kyzyl-Kiya Pass. This road runs through the agricultural settlements of Taldy-Su and Korumdy and several winter quarters for livestock-raising sovkhozes. Dirt roads also radiate from Tyup. One leads sourthwest to Nikolayevka, a second to the east, south of and parallel to the Tyup River, to Toktoyan. A dirt road running south from Tyup crosses the main highway in the Malaya Sary-Tyube Mountain Range and turns eastward to Sovetskoye. South of the Malaya Sary-Tyube Mountains a dirt road branches off the main highway and leads to Mikhaylovka, where it turns southeastward and rejoins the main highway 3 miles north of Przheval'sk. At Mikhaylovka a motorable dirt road follows the Kara-Su River eastward to the agricultural centers of Cholpon, Otradnoye, Razdol'noye, and Sokolovka. At Sokolovka the road joins a main motor road leading from Przheval'sk to Narynkol on the Sinkiang frontier. Cholpon and Otradnoye are small road centers from which unimproved dirt roads run southwest to Przheval'sk, south to Teploklynchenka and Dzherges, and north to Toktoyan.

Numerous trails and paths can also be followed from the main highway to the shore of the lake and up the slopes of the Kungey Ala-Tau to pasture areas. Some of the trails lead across the Kungey Ala-Tau and Zailiyskiy Ala-Tau toward Alma-Ata.

(2) The Rybach'ye-Przheval'sk Highway, Southern Route

An alternate motor route between Rybach'ye and Przheval'sk generally parallels the southern shore of Lake Issyk-Kul'. The highway is approximately 135 miles long,

is gravel-surfaced, and has a road width of about 25 feet. Throughout most of its course, this road runs from 4 to 8 miles inland and passes through mountainous terrain. Two sections of the road, one from Rybach'ye to Karashar and the other from Tamga to Przheval'sk, cross relatively flat country. The only stretches where the highway skirts the shoreline of the lake are in these sectors.

From Rybach'ye the highway leads in a sourtheast direction to Karashar. It runs close to the shoreline, crossing a dry and barren rock-desert. Leaving Karashar, the highway departs from the shoreline and continues through the outer foothills of the Terskey Ala-Tau Ranges to Tamga. This stretch of the road follows the general contour of the lakeshore at distances ranging from 4 to 8 miles inland. The surrounding area is sparsely populated. Larger populated places near the road are Karashar, Aktersk (Ak-Terek), Kyzyltu, Bol'shevik, Bokombayevskoye (Kunchigysh), and Tamga. From Bol'shevik and Bokombayevskoye, unimproved dirt roads lead northeastward across the foothills to Lake Issyk-Kul'. West of Kadzhi-Say they unite into a single road, which follows the shoreline to Tamga (Figure 14).

The sector from Tamga to Przheval'sk crosses mainly through flat terrain where both population density and agricultural activity are much greater. The road passes through the larger communities of Barskaun, Akterek, Chichan, Darkhan, Dzhangyz-Uryuk, Pokrovka, and several other smaller settlements. Except for a 23-mile stretch

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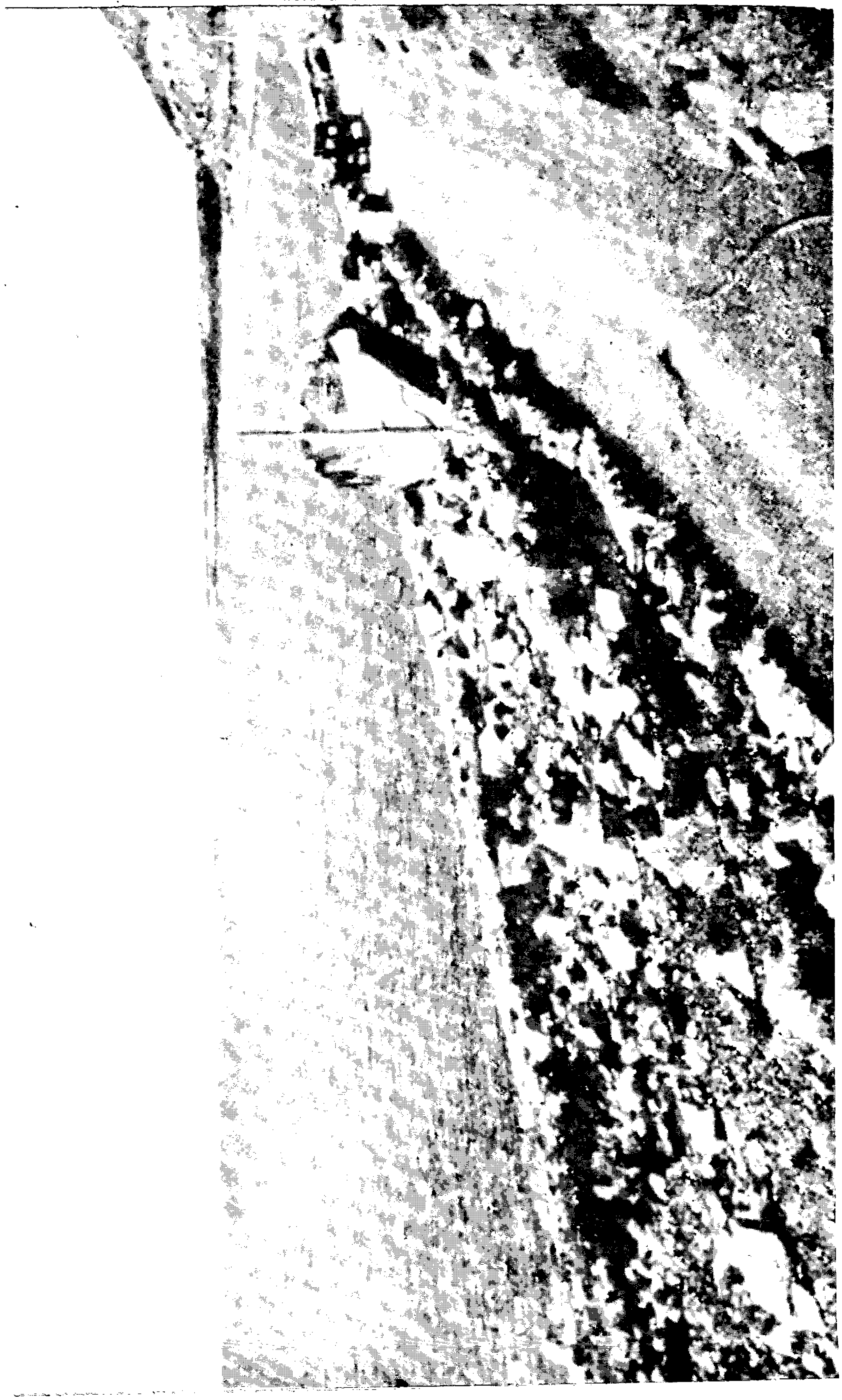

Figure 14. Unimproved dirt road along Issyk-Kul' shore west of Tamga.

between Tamga and Chichan, which runs close to the lakeshore, the road is up to 8 miles from the lake.

Several roads branch off the main highway. A motor road leads south from Barskaun to the Barskaun Pass, dirt roads north from Dzhangyz-Uryuk and Pokrovka toward the lake. South of Bosbeshik They join and continue northeastward, close to the shoreline, to Przheval'sk.

The southern route from Rybach'ye to Przheval'sk has considerably less motor traffic than the northern route. Traffic is restricted by the more difficult passage through mountainous terrain. Numerous steep grade crossings, sharp curves, and poorly maintained bridges reduce the speed of movement and to some extent limit the volume of cargo carried. The freight shipped over this route consists mainly of agricultural machinery and supplies destined for the cultivated lands north and east of Przheval'sk and agricultural products such as grain, fruit, wine, and opium. The only truck and automobile repair shop along the highway is located at Pokrovka. It is known as the "Pokrovskaya Avtoremontnaya masterskaya."

(3) The Przheval'sk-Narynkol' Road

The Przheval'sk-Narynkol' Road is one of two motorable roads that connect the Issyk-Kul' Basin with the Sinkiang Province of China.

Only a 32-mile sector of this improved motor road runs through the Issyk-Kul' Basin, northeastward from Przheval'sk to the Kyzyl

Kiya Pass. The road has a very loosely packed gravel or stone surface. It is believed to be a two-lane route.

The road crosses through one of the most heavily cultivated and irrigated farming areas of the Issyk-Kul' Basin. The area is also noted for its numerous livestock herds. Excellent grazing land can be seen south of the road extending up the foothills of the Terskey Ala-Tau. In the vicinity of Przheval'sk the road is bordered by extensive fruit orchards.

There is no information available as to the type or density of traffic carried over this road which serves as an alternate trade route to Alma-Ata via Karkara, Kegen', and Chilik. Mountain troops may be transported from Przheval'sk, a garrison town, to Narynkol' for frontier guard duty. Unimproved dirt roads and trails branch off the main road at the agricultural settlements of Teploklynchenka, Dzherges, Novo-Voznesenovka, Sokolovka, and Sovetskoye.

(4) The Frunze-Rybach'ye Highway

The sector of the Frunze-Rybach'ye Highway within the Issyk-Kul' Basin extends about 20 miles, roughly from the exit of the Buam Gorge to Rybach'ye. It is part of the strategic highway to Frunze, which is the only motor route between the Chu Valley and the Issyk-Kul' Basin. For most of its course, the road parallels the Chu River to the south and the Frunze-Rybach'ye Railroad to the north. The railroad lies at a slightly higher elevation than the road (Figure 15).

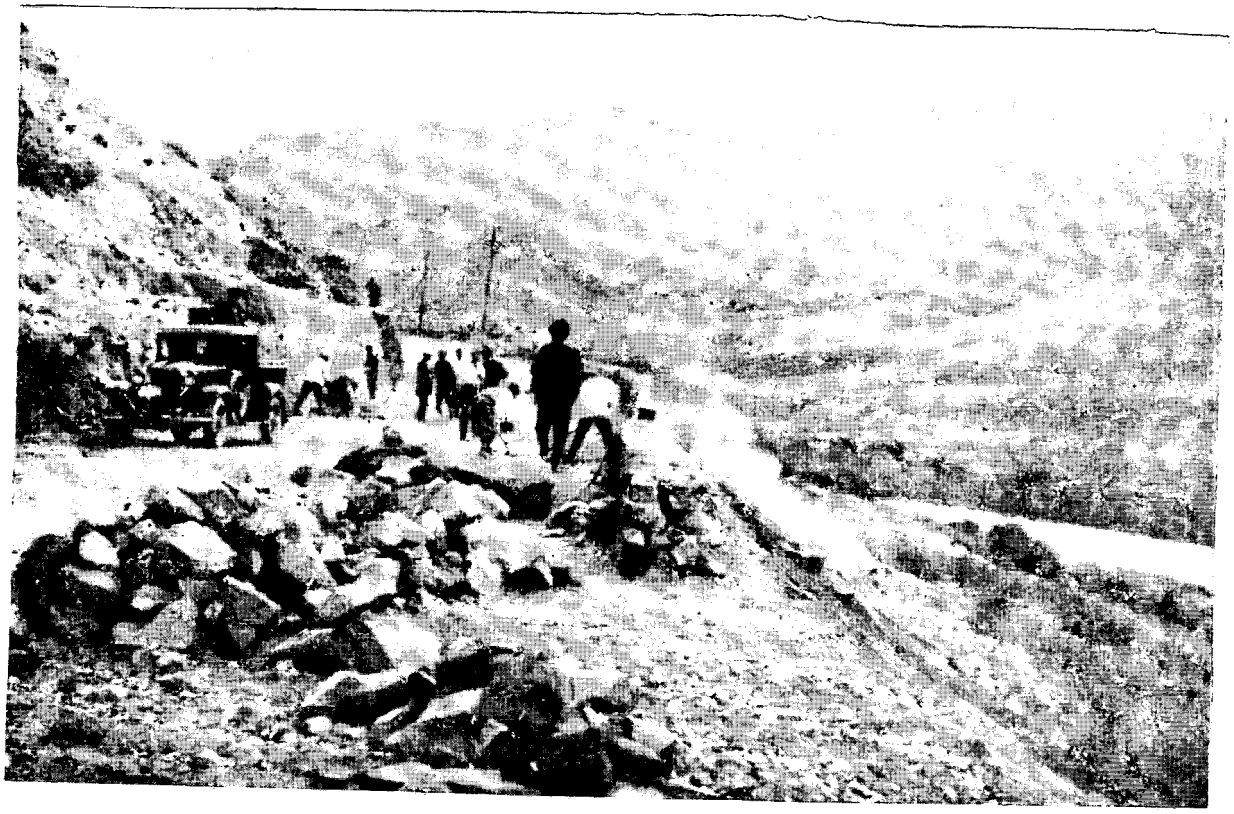

Figure 15. Construction work on the Frunze-Rybach'ye Highway.

Within the lowland area west of Rybach'ye, the road crosses extremely desolate terrain. At Rybach'ye it makes junction with the two motor roads that skirt the northern and southern shores of the lake and with the highway that leads south, through the hinterland area, to Kashgar in Chinese Sinkiang.

The highway is gravel surfaced and can carry heavy car and truck traffic. The volume of annual freight traffic moving between Frunze and Rybach'ye is estimated at 50,000 to 60,000 tons. Freight moving to Rybach'ye consists largely of construction materials, machinery, cement, and processed sugar. Commodities destined for Przheval'sk or other places in eastern basin are either transloaded at Rybach'ye to lake steamers or are shipped by truck along the northern or southern shore roads.

Freight shipments from Rybach'ye to Frunze included mostly coal, fish, grain, lumber, and meat products.

The road serves also as an important military supply route to mountain troops stationed at Rybach'ye and Przheval'sk. Military supplies are usually transloaded at Rybach'ye onto steamers or naval power boats and shipped to the recently established military port of Krasnogvardeisk, reportedly in use since May 1952.

Fueling facilities for motor vehicles are located at Rybach'ye, but repair facilities are available only in the Chu Valley at Kant, Novo-Pokrovka, and Frunze.

(5) <u>The Rybach'ye-Naryn-Kashgar Highway</u>

A strategic highway extends southward from Rybach'ye and leads through the Naryn Upland to the Sinkiang

frontier. Currently it is the only motorable road across the Naryn Upland. Traffic moving between the Soviet Union and Chinese Sinkiang is extremely heavy throughout the entire length of the road.

The sector within the Issyk-Kul' Basin is approximately 14 miles long. Southwest of Rybach'ye the road crosses a flat, barren region largely devoid of vegetation and population. At the Bozbarmak Hills, the highway enters the foothill region of the Terskey Ala-Tau. It bypasses the Bozbarmak Hills, runs east of the Chu River for a short distance, then crosses the river and follows it through the outer ranges of the Terskey Ala-Tau. In the vicinity of Orto-Tokay the highway passes the southern perimeter of the projected Orto-Tokay Reservoir.

The road is gravel or stone surfaced and is open for motor traffic throughout the year. The width of the roadway is unknown, but it has at least two traffic lanes and is wide enough for large trucks to pass.

Maintainance of the road is reportedly good. Huts occupied by Kirgiz road-repair personnel are scattered along the route. Native herdsmen participate in road repairs as well as in snow clearing.

c. Inland Waterways

Inland waterway transportation in the basin area is concentrated on Lake Issyk-Kul'. The lake is an important route for the shipment of supplies and bulk commodities from the industrial region of the Chu Valley to the agricultural and mining region along

the eastern littoral of the lake. Water transport also serves the several larger fishing settlements along the northern and southern shores of the lake. Navigation is mainly controlled by the Issyk-Kul' Shipping Line. This state-owned organization, which has been operating for 20 years, has its headquarters at Frunze and a regional office at Przheval'sk. The main harbor installations operated by the shipping line are located at Rybach'ye and Przheval'sk.

Rybach'ye is the main traffic terminal, where freight and passengers are transferred from railroad and road carriers to lake steamers. The wharves at Rybach'ye have been sufficiently improved to handle various types of cargo and vessels. Within the port area are the following known installations: a power station supplying power to transloading machines, personnel quarters of the lake merchant fleet, and a fueling depot for lake vessels.

Pristan' Przheval'sk, the port of Przheval'sk, is located about 7 miles northwest of the town of Przheval'sk. It is the largest port installation on the lake. In addition to handling most of the freight and passenger traffic originating from Rybach'ye, the port figures prominently in ship repair and maintenance. The ship-repair yard at Przheval'sk is equipped to handle all types of repairs and construction needs for the lake vessels. The only other repair yard, which is much smaller, is located at Tyup on a deep inlet of the lake. The wharves at Pristan' Przheval'sk have mechanized loading and unloading equipment and handle grain, coal,

fish, and other products. The port also handles some military traffic for troops stationed in Przheval'sk proper and for the torpedo-testing station operating from the port area. Most of the military traffic is consigned to the military port opened in 1952 at Krasnogvardeisk. This port is on the eastern shore of the lake, about 16 miles northwest of Przheval'sk. Additional smaller docking facilities are located along the northern, eastern, and southern shores of the lake. There are docking facilities along the northern shore at Choktal, Cholponata, Grigor'yevka, Anan'yevka (formerly Sazanovskoye), and Kuturga. Tyup and Mikhaylovka are important stops along the eastern shore. Tyup has a minor ship-repair yard capable of constructing small boats. The southern shore has smaller landing facilities at Kichidzhargylchak, Akterek, Ton, Tamga, and Pokrovka.

The Issyk-Kul' Shipping Line handles both freight and passenger traffic. Freight traffic averages 65,000 to 70,000 tons per year, and the passenger traffic total is reported to reach about 40,000 persons in a 2-year period. Freight traffic from Rybach'ye consists largely of merchandise, agricultural machinery, fuel, fertilizers, cement, and construction materials. Much of the freight is shipped to Przheval'sk, Grigor'yevka, and Tamga. Some of this freight is distributed among sovkhozes, kolkhozes, and machine-tractor stations located near port facilities. The ports on the north and east coasts are used primarily for the shipping of wheat, fruit, wool,

fish, and fish-products to Rybach'ye. Lumber and coal are the main outgoing products from ports along the southern shore.

Passenger steamship service on the lake was inaugurated in 1948. Passenger routes run from Rybach'ye to Przheval'sk along the southern and northern shores of the lake. Via the south shore, boats leave Rybach'ye on the 3rd, 6th, 12th, 15th, 21st, 24th and 30th of each month and stop at Akterek, Tamga, Pokrovka, and Koy-Sara. Return trips by the south shore make the same stops and leave Przheval'sk on the 1st, 4th, 10th, 13th, 19th, 22nd, and 28th of the month. Trips via the north shore leave Rybach'ye on the 7th, 16th, and 25th of each month. Stops along the northern route are at Cholponata, Grigor'yevka, Kuturga, and Tyup.

The merchant fleet consists of several large diesel-operated and coal-burning steamers, one or two tankers, a number of steam tugs, and numerous freight barges, some of which are believed to be motor powered (Figure 16). The large vessels are estimated to be 230 to 246 feet long and have drafts ranging from 16 to 23 feet. Some of the vessels offer a combination of freight and passenger accomodations.

In addition to the regular merchant fleet, a sizable fishing fleet is operated by the Issyk-Kul' Steamship Line. This fleet operates primarily from fishing settlements along the northern and southern shores of the lake. It consists mainly of medium-sized sailing vessels and large row boats. Some of the newer fishing craft are believed to be motor powered.

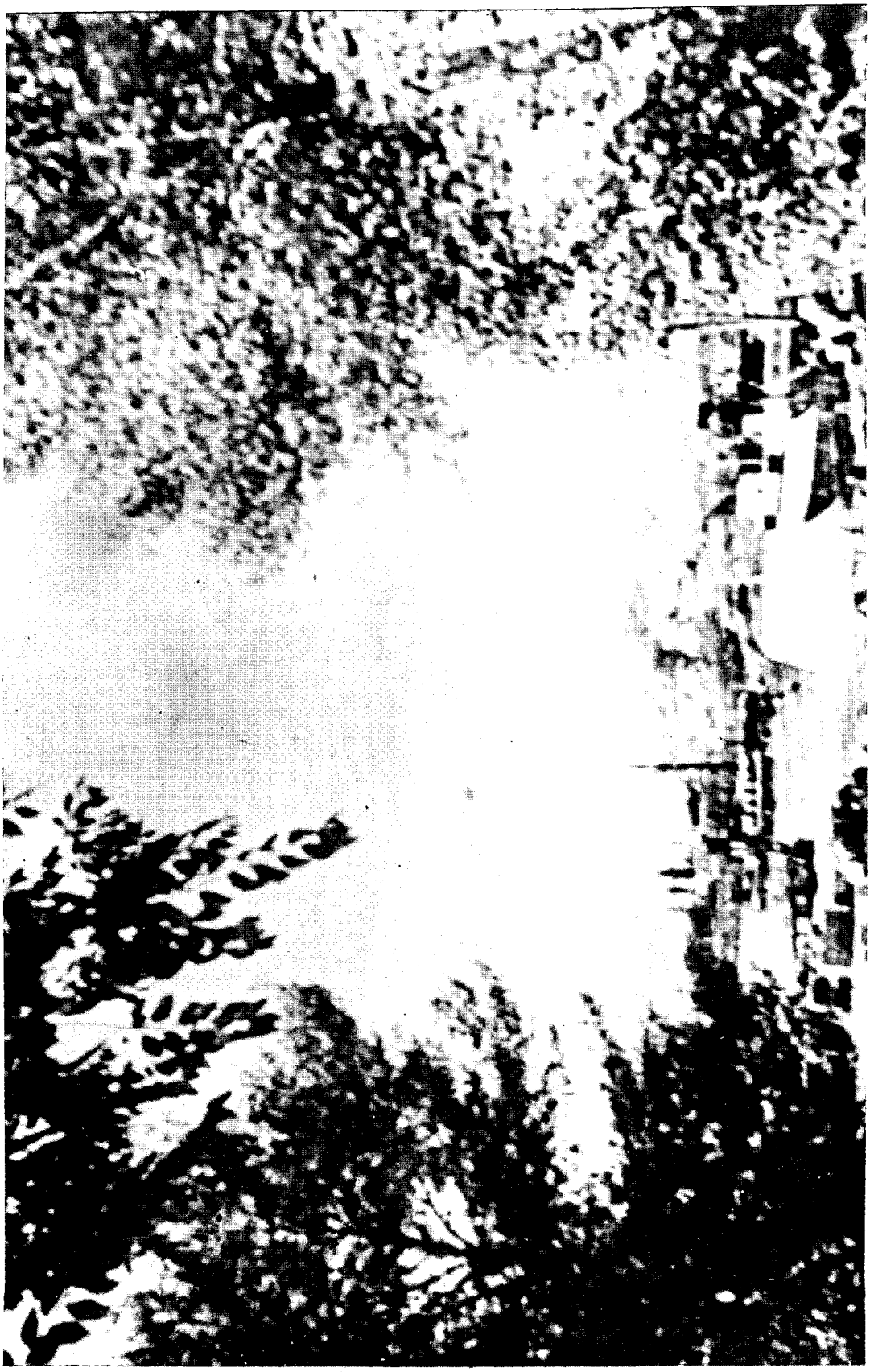

Figure 16. Large steamers at Pristan' Przheval'sk on Lake Issyk-Kul'.

d. Air Transport

Air transport facilities in the Issyk-Kul' Basin are limited to two minor landing fields located at Przheval'sk and Rybach'ye. Only local and nonscheduled flights are maintained between the two fields and with Frunze, the Kirgiz capital. Air traffic, both passenger and freight, is carried only during the summer months. Planes used are of the CI-47 and LI-2 types.

(1) Air Routes

The following air routes are reportedly operating in the Issyk-Kul' Basin:

1) Leaving Przheval'sk

a) Regional and unscheduled route: Przheval'sk-Frunze

b) Regional and unscheduled route: Przheval'sk-Rybach'ye

2) Leaving Rybach'ye

a) Regional and unscheduled route: Rybach'ye-Frunze

b) Regional and unscheduled route: Rybach'ye-Przheval'sk

(2) Airfields

(a) Przheval'sk (Karakol)

The airfield is reported to be located within the town limits and approximately 21 miles east of Lake Issyk-Kul'.

The Przheval'sk field is the terminus of regional and unscheduled commercial air routes from Frunze and Rybach'ye. No military use

of the landing facilities has been reported as yet. The field is accessible from the Rybach'ye-Przheval'sk Highway and also the secondary Saru-Kegen' Road. No information is available as to runway, surface, capacity, or navigation facilities. The field is not classified as the type of airfield capable of supporting operations of light bombers, transports, and reciprocating or jet-engine fighters.

(b) Rybach'ye (Robach'ye)

This relatively unimportant civilian airfield is reportedly located just north of the town of Rybach'ye. The field is accessible from the Frunze-Rybach'ye-Przheval'sk highways skirting the north and south shores of the lake and from railroad facilities in the port of Rybach'ye.

The airfield is estimated to be 3,000 feet long and is oriented in an east-west direction. The field has no runway; the landing surface is of sand. It is capable of accommodating TE-type transports. Open parking facilities are available. Telephone, telegraph, and repair facilities are located within the town of Rybach'ye. There are no hangers on the field, but two barrack-type buildings have been reported.

IV. The Issyk-Kul' Hinterland

A. Physical Characteristics

The Issyk-Kul' hinterland is essentially an area of high mountains. It includes the most rugged part of the Soviet Tien Shan Mountains which, next to the Pamirs, form the most extensive and highest mountain region in the USSR. Except for the Chu Valley and the Alma-Ata Lowland, elevations over the entire area exceed 3,000 feet. South of Lake Issyk-Kul', only the western part of the Naryn Valley is below 7,000 feet.

The physiography is characterized by an alternation of somewhat parallel mountain ranges, extending from west to east and separated by intermontane depressions. Four mountain arcs make up the basic orographic framework. The northern most arc is formed by the Zailiyskiy Ala-Tau and the Chu-Iliyskiye Mountains; the Ketmen' Range, the Kungey Ala-Tau, and the Kirgizskiy Range comprise the second series of ranges. These two arcs dominate the terrain north of Lake Issyk-Kul'. The third linear system, the Terskey Ala-Tau, lies immediately south of Lake Issyk-Kul'. The fourth series of ranges, the Kok Shaal-Tau, forms the southern boundary of the Issyk-Kul' - Central Tien Shan region. Many of the ranges bear the name "ala-tau," a Kirgizian term meaning "mottled mountain," because of the spotty distribution of permanent snow over the mountain crests.

The major intermontane lowlands are: (1) the Chu Valley, between the Chu-Iliyskiye Mountains to the north and the Kirgizskiy Range to

the south, (2) the Karkara-Kegen' Basin, east of the Zailiyskiy-Kungey mountain mass, (3) the Kochkur Valley and the Lower Naryn Valley, south of Lake Issyk-Kul', and (4) the Alma-Ata Lowland, in the extreme northern part of the study area, running westward from Alma-Ata along the northern base of the Zailiyskiy--Chu-Iliyskiye mountain arc. The latter is the southern limit of the vast Ili intermontane depression stretching northward to Lake Balkhash.

1. Terrain

a. Mountains

The arrangement of the mountain ranges north of Lake Issyk-Kul' differs from that to the south. The two northern mountain arcs are joined at their centers, just north of Lake Issyk-Kul', and diverge toward their outer extremities. The highest and most rugged ranges of the arcs comprise the central node and are flanked on the east and west by secondary ranges of lower elevations and by intermontane lowlands. The mountain ranges to the south of Lake Issyk-Kul' converge in the extreme east to form a massive, heavily glaciated mountain knot, the Khan-Tengri node, above which rise some of the loftiest peaks in the entire Soviet Union. West of the Khan-Tengri node, the mountain ranges fan out, elevation declines, and intermontane depressions become wider. The main ranges, the Terskey Ala-Tau and the Kok Shaal-Tau, run along the northern and southern extremities of the area south of Lake Issyk-Kul'. The area between the main ranges, which widens abruptly toward the west, has a number of short secondary ranges

trending in an approximate east-west direction. In this study the entire intermontane area between the Terskey Ala-Tau and the Kok Shaal-Tau is called the Naryn Upland.

(1) North of Lake Issyk-Kul'

The area north of Lake Issyk-Kul' is dominated by the Kungey Ala-Tau and farther north the Zailiyskiy Ala-Tau. The two ranges are joined near their central parts by a short northwest-southeast trending range. Characteristics of the Kungey Ala-Tau, which forms the northern limit of the Issyk-Kul' Basin, are described in Section III.A.1.a. of this report. The low Chu-Iliyskiye Range stretches across the northwest corner of the Issyk-Kul'--Central Tien Shan region. The Ketmen' Range crosses the northeast corner. Due west of Lake Issyk-Kul' lies the eastern extremity of the Kirgizskiy Range. The Zailiyskiy Ala-Tau and the Chu-Iliyskiye mountains form a mountain barrier roughly 360 miles long, with no apparent division between them. The deep Buam Gorge is the only significant break in the mountain wall formed by the Kungey Ala-Tau and the Kirgizskiy Range. The Ketmen' Range is separated from the Kungey and Zailiyskiy systems by an expanse of lowland, the Karkara-Kegen' Basin.

(a) The Zailiyskiy Ala-Tau

The Zailiyskiy Ala-Tau is an asymetrical range, having a long northern slope and short southern slope. It rises about 6,500 feet above the adjacent Alma-Ata Lowland

Within the upper elevations, the northern slope of the Zailiyskiy drops sharply, but at lower levels it descends to the Alma-Ata Lowland in a series of wide terracelike formations. The central part of the range, cut by the meridian of Alma-Ata, is known as the Kebin (Kemin) Mountain node. It is the highest and most rugged area, with a mass of sharp ridges and very steep slopes, which often appear almost perpendicular. Most valleys are gorges, some as deep as 1,500 feet. Several snow-capped peaks rise above the general level of the watershed crest, which reaches approximately 12,500 feet. Talgar Peak, the best known peak in the area, has an elevation of 14,500 feet.

To the east and west of the central node, elevations gradually decrease. In the eastern part of the Zailiyskiy Ala-Tau, the summit zone also widens considerably and loses some of its alpine appearance. From a distance, the eastern area appears to consist of a group of elongated, tabular uplands separated by deep valleys. Although these uplands appear level, they are actually quite rough as the relief is in excess of 500 feet. The general elevation of the watershed crest is 11,000 feet. The range proper ends abruptly at the Chilik River. Beyond the Chilik, the Zailiyskiy Ala-Tau continues in the form of low outliers. To the west of the Kebin node, the Zailiyskiy Ala-Tau remains narrow, and the rugged alpine features continue.

A considerable part of the summit of the Zailiyskiy Ala-Tau is covered with glaciers and permanent snow. Maximum glaciation occurs in the vicinity of the Kebin node, where tongues of ice creep down most of the valleys. From the Kebin node the glaciers decrease in thickness and number to the extremities of the range where they disappear. The glaciers are not large and carry only a small amount of detrital material. The largest, the Korzhenevskiy glacier, is 4 miles long. Many glaciers end as hanging glaciers, a few hundred feet above the floor of larger, ice-free valleys. In the region of the headwaters of the Turgan River sheet ice covers some summit areas. The permanent snowline ranges between 11,200 and 11,900 feet.

The Zailiyskiy Ala-Tau is separated from the Kungey Ala-Tau by the deep, narrow valleys of the Bol'shoy Kebin (Bol'shaya Kemin') and Chilik rivers. These rivers originate in the Kebin node and flow in opposite directions, the Bol'shoy Kebin to the west and the Chilik to the east.

(b) The Chu-Iliyskiye Mountains

The Chu-Iliyskiye Mountains, trending northwest-southeast across the northwest corner of the Issyk-Kul'--Central Tien Shan region, are essentially a low, unglaciated extension of the Zailiyskiy Ala-Tau Range. The Chu-Iliyskiye, unlike the Zailiyskiy Ala-Tau, are fairly well dissected and seem to be an agglomeration of small ranges.

The most contiguous as well as the highest and steepest part of the range is at the southeastern end near the Kastek Pass, which is considered as the break between the Zailiyskiy and the Chu-Iliyskiye. Here, the average crestal elevation is approximately 9,000 feet, and the highest point reaches 9,300 feet. The crestal zone rises 5,800 feet above the eastern part of the Chu Valley. Along this whole eastern part of the Chu-Iliyskiye, the southern slope is quite steep and is cut by deep valleys. On the northern front there is a steep drop to 4,300 feet; from 4,300 feet the descent to the Alma-Ata Lowland is terracelike.

Northwestward, elevations decrease, mountain slopes broaden out considerably and become less steep, particularly in the south, and the dissection of the Chu-Iliyskiye into a number of small mountains becomes much more evident. The highest elevations rise to 7,000 feet. West of the meridian of Tokmak, the Chu-Iliyskiye are broken up into foothills, and the range finally merges with the level steppe lands of Kazakh.

(c) The Ketmen' Range

The Ketmen' Range is located in the extreme northeast corner of the Issyk-Kul'—Central Tien Shan region. It is the western end of a mountain system that crosses the international boundary into Sinkiang. The range is separated by the lowland expanse of the Karkara-Kegen' Basin from both the Khan-Tengri mountain node and the Zailiyskiy-Kungey mountain mass. The length of the range is about 90 miles, and the width of the crestal zone varies between 275 and 675 feet. The average altitude

is about 8,500 feet and the highest points rise to 11,500 feet. The southern slope is steep, but the northern one is gradual. At the international border the Kara-Tau Range, a branch of the Ketmen' proper, strikes off southwestward toward the Khan-Tengri region.

(d) The Kirgizskiy Range

The Kirgizskiy Range (also known as the Aleksandrovskiy Range) stretches for many miles west of Lake Issyk-Kul' to Dzhambul (42°55'N, 71°23'E). Only its eastern extent, which is also the highest and most rugged part, falls within the Issyk-Kul'—Central Tien Shan region. The Kirgizskiy Range is separated from the Kungey Ala-Tau by the very deep Buam Gorge. Within the hinterland, the altitude of the crestal zone ranges from 9,000 to about 14,500 feet. In form, the eastern part of the Kirgizskiy Range resembles the eastern part of the Zailiyskiy Ala-Tau, as it is composed of a group of mountain uplands with somewhat level summit zones separated by deeply incised valleys. Much of the watershed crest is covered by short valley glaciers, most of which move down the southern slope.

(2) South of Lake Issyk-Kul'

The entire area south of Lake Issyk-Kul' is essentially mountain country. Elevations are less than 7,000 feet only in the Kochkur and the Naryn Valleys, west of the settlement of Naryn.

The principal mountain ranges are the Terskey Ala-Tau, immediately south of the lake, and the Kok Shaal-Tau, which follows the international

border with China. These ranges converge at the extreme eastern part of the Issyk-Kul' Central Tien Shan region to become part of the Khan-Tengri mountain node. A number of small ranges trending in a general east-west direction, extend over the vast Naryn Upland between the Terskey Ala-Tau and the Kok Shaal-Tau. The Terskey Ala-Tau are described in Section III.A.1.b. of this report.

(a) The Khan-Tengri Area

The Khan-Tengri area, the highest and most inaccessible part of the Soviet Tien Shan mountain system, is located at the extreme southeastern corner of the Issyk-Kul'-- Central Tien Shan region, at the USSR-China border. From the boundary, the area extends westward for roughly 70 miles to the Ak-Shiyryak Range, which is crossed by the meridian at the eastern end of Lake Issyk-Kul'. This range runs in a northeast-southwest direction, counter to the neighboring ranges.

Physiographically the Khan-Tengri consists of a series of narrow, closely spaced, east-west trending ranges, each bisected by the gorge of the north-south flowing Sary-Dzhaz River. The intervening valleys are steep-sided and narrow. From north to south, the principal ranges of the Khan-Tengri are: (1) the eastern extremity of the Terskey Ala-Tau, (2) the Sary-Dzhas Range and its continuation west of the river, the Kuylyu-Tau Range, (3) The Inyl'chek Range and its western extension, the Terekty Range, (4) the Kaindy and Ishigard ranges, and (5) the eastern end of the Kok Shaal-Tau. The ranges east of the Sary-Dzhaz are exceptionally rugged, having very steep slopes and narrow, jagged crestal zones with numerous distinct peaks. Many of these peaks

exceed 15,000 feet in elevation. The highest points are Peak Khan-Tengri, 22,950 feet, and 10 miles south, Peak Pobeda, 24,400 feet. The slopes of the ranges are cut by numerous short, sometimes impassable gorges. Experienced alpine explorers report great difficulties in traversing the area.

Snowfields are widespread, and small valley glaciers, 2 or 3 miles long, are countless. The most intense glaciation extends for a distance of 35 miles west of the international boundary, but several larger glaciers attain considerable length. The 37-mile Kuyl'shek Glacier, immediately south of the Sary-Dzhaz Range, is the longest. Although often regarded as single, it is actually two glaciers separated by the short, linear Stalin Range above which Peak Khan-Tengri majestically towers (Figure 17). The glaciers generally carry a large amount of morainic material that hides the ice surface in many places.

West of the Sary-Dzhaz River, the mountain ranges are much lower and less rough and craggy. The summits flatten out to produce wide crestal zones surmounted by only a few sharp peaks. Snow cover and glaciation decrease markedly but still are prominent, particularly in the Terskey, the Kok Shaal-Tau, and Kuylyu-Tau ranges. Crestal elevations are above 12,000 feet, and a few peaks rise as high as 15,000 feet. The crests of the ranges tower about 3,000 to 3,500 feet above the adjacent valleys, which are much wider than those east of the Sary-Dzhaz River. The streams crossing the relatively wide and level valley bottoms are usually fordable. These streams

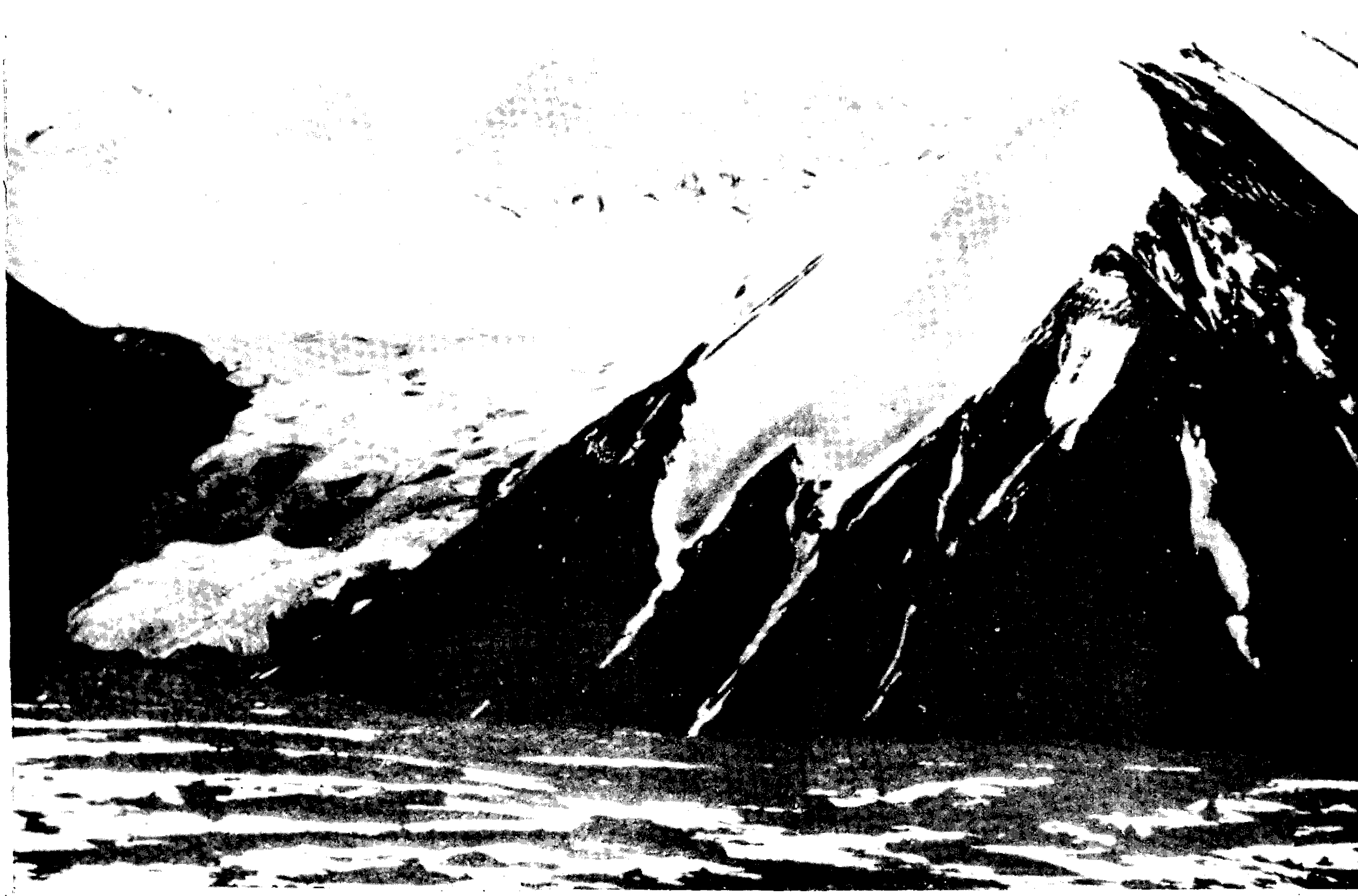

Figure 37. Peak Khan-Tengri with the Inyl'chek Glacier in the Foreground.

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branch into several shallow channels and decrease markedly in velocity as they leave the mountain slopes and hit the valley lowlands.

(b) The Kok Shaal-Tau

The Kok Shaal-Tau is the southernmost range system of the Issyk-Kul' - Central Tien Shan region. It extends from the Khan-Tengri node southwestward to Lake Chatyr-Kul'. The international boundary between the USSR and China (Sinkiang) follows its watershed crest.

The Kok Shaal-Tau comprises short parallel ranges arranged in echelon. It is an area of alpine relief, with steep slopes and craggy summits. Rivers cut steep-walled, narrow valleys to a depth of 1,000 to 2,000 feet. There are secondary hanging valleys from the sides of which streams cascade for perhaps 50 feet to the stream coursing through a main valley. Elevations in the western part of the Kok Shaal-Tau go up to 13,000 or 14,000 feet; in the east elevations are higher, with a few peaks slightly exceeding 18,000 feet.

(c) The Naryn Upland

The Naryn Upland is a region of secondary ranges. It is bounded by the Terskey Ala-Tau on the north and the Kok Shaal-Tau on the south. The area widens considerably from east to west. At the eastern limit, the Ak-Shiyryak Range, the width is roughly 40 miles and at the western limit of the study area, roughly 100 miles. Almost the whole length of the region is traversed by the westward-flowing Naryn River.

According to surface features the Naryn Upland has a mountainuous structure, but in profile it resembles an extensive high plateau above which rise a number of relatively low, short, east-west trending ranges. Some of the larger secondary ranges are: the Dzhetym-Bel', the Karka-Tau, the Dzhungol-Tau, the Borkolday, the Dzhetym-Tau, the Naryn-Tau, and the At-Bashi. The secondary mountain ranges are flat-topped. Viewed from a distance, the summit of each range appears to follow an unusually even line, and only rarely do towering peaks break the regularity of the crestal zone. The ranges are well dissected by deep, short (2 to 6 miles long), gorgelike valleys. A cap of permanent snowfields and glaciers is characteristic of most of the ranges.

Separating the secondary ranges are broad undulating valleys called syrts, which are used as grazing lands by the native nomads (Figure 18). The syrts are the most striking feature of the landscape. They lie at a level of 10,000 to 12,000 feet; the mountain ranges rise above the syrt levels to heights of 13,000 to 15,000 feet. The relative elevations between the syrts and the summit zones of the Terskey Ala-Tau and the Kok Shaal-Tau are similar. Most of the syrts are less than 15 miles wide, and each is crossed by a wide, sluggish, meandering stream. Local relief seldom exceeds 150 feet. There are two kinds of syrt landscapes in the Naryn Upland. At the base of the Terskey Ala-Tau the syrts have much wet and marshy land and are dotted with small, lakelike bodies of water. Sizable boulders are also very common. The majority of syrts are located in the south, and are dry. Marshes

Figure 18. A small cyrk on the Naryn Upland.

are practically nonexistent, vegetation is sparse, and the ground surface is clayey. During periods of strong winds, blowing fine particles of soil cause a dust haze. The numerous small, oval-shaped, flat-bottomed depressions become muddy or water-filled in spring, and are dry, hard, and cracked in summer.

Movement through the Naryn Upland is not particularly difficult. The level syrts, except in marshy areas, are suitable even for motor traffic. Passes across the many short ranges are numerous, easy to negotiate. They lie only a few thousand feet higher than the syrts. Many are free of snow, and only a few have glaciers. Native nomadic herders regularly drive their animals through most of the passes. With a little clearing many could be made suitable for roads.

Movement across the Ak-Shiyryak Range to the Khan-Tengri country is difficult. Only one pass cuts the range and its approaches are blocked by huge morainic deposits. A few foot trails also provide routes of travel for persons familiar with mountain travel.

b. Lowlands

The greatest concentrations of population and economic activity are in the intermontane lowlands.

(1) The Alma-Ata Lowland

The entire lowland sloping away from the northern base of the Zailiyskiy Ala-Tau and Chu-Iliyskiye mountain ranges is arbitrarily termed the Alma-Ata Lowland. Two types of relief are evident. Between Alma-Ata and Uzun-Agach the rise toward the

Zailiyskiy Ala-Tau is rolling. Elevations near Alma-Ata range between 2,000 and 2,500 feet; at the mountain base they increase to 2,800-3,300 feet. West of Uzun-Agach, the lowland descends from the Chu-Iliyskiye Mountains in several very wide level terraces, and about half the area lies above 3,000 feet. Elevations at the base of the mountains reach 4,500 feet.

(2) The Chu Valley

The Chu Valley lies between the Chu-Iliyskiye Mountains to the north and the Kirgizskiy Range to the south. The Buam Gorge at the narrow eastern end of the valley provides the principal and easiest passage to mountain-ringed Lake Issyk-Kul'. Westward from the Buam Gorge to Frunze the valley widens to about 60 miles. The elevation of the Chu River decreases from approximately 4,500 feet at the eastern extremity of the valley to 2,000 feet near Georgiyevka, in the west.

The Chu Valley has little local relief and slopes very gradually to the northwest. At the base of the Kirgizskiy Range the numerous mountain streams have built up a series of alluvial fans producing a rolling type of terrain with a maximum local relief of 175 feet. An extensive net of irrigation canals and ditches crisscrosses these alluvial fans. The terrain of the narrow strip between the Chu-Iliyskiye Mountains and the Chu River consists of slight swells. Strips of marshland border the Chu River near Tokmak, north of Ivankova, and south of Georgiyevka. The largest belt of swampland stretches for about 8 miles along the north bank of the Chu near Ivankova.

(3) The Karkara-Kegen' Basin

The Karkara-Kegen' Basin is bounded on the south by the Terskey Ala-Tau and Kungey Ala-Tau ranges and on the north by the Ketmen' and the low Kuuluk-Tau ranges. The elevation of the basin, 6,200 feet, is approximately 850 feet above that of Lake Issyk-Kul'. An important caravan route from the Issyk-Kul' Basin follows the southern part of the Karkara-Kegen' Basin.

With the exception of the low Chul'-Adyr Mountain, at the center of the basin, the terrain is almost flat with a very gradual slope toward the Kegen' River. The Chul'-Adyr juts about 850 feet above the surrounding lowland. It has subdued and rounded forms of mountain relief and is not difficult to cross. In fact, one of the principal roads through the Karkara-Kegen' Basin cuts directly across the Chul'-Adyr. Two rivers flow rather slowly through the basin: (1) the Kegen' River, which flows in a general east-west direction across the entire northern extent of the basin, and (2) the Karkara River, a north-south flowing tributary of the Kegen' which crosses only the western part. Both rivers are bordered by marshland. The marsh near the confluence of the Kegen' and Karkara rivers, west of the town of Kegen' is extensive. Moist meadows and marshes also occupy much of the valley of the upper course of the Kegen'. A small expanse of desert, known as Peski Kum-Tekey, is located roughly 3 miles north of the western part of the Chul'-Adyr Mountain.

South of the Kegen' Valley and beyond the lower foothills of the Terskey Ala-Tau, there is a much smaller basin, the Tekes Basin, with

characteristics similar to those of the Karkara-Kegen' Basin.

(4) The Kochkur Valley

The long, narrow Kochkur Valley is the easternmost intermontane depression between the Kirgizskiy Range and the Terskey Ala-Tau. It is separated from the southwestern part of the Issyk-Kul' Basin by a gorge cut by the upper course of the Chu River between the Kirgizskiy Range and the secondary ranges of the Terskey Ala-Tau. The Kochkur Valley is about 30 miles long and 5 miles wide. The elevation along the axis of the depression is 5,200 feet and at the base of the mountain slopes 6,500 feet. This valley also has a very gradual general slope from west to east. The numerous streams flowing from the short, steep valleys dissecting the Kirgizskiy and Terskey slopes merge in the Kochkur Valley to form the Chu River where their waters leave the valley. At many places along the streams, there are wide belts of boggy meadows. Important routes of travel from the Issyk-Kul' Basin to the Fergana Valley and southward across the Naryn Upland toward Sinkiang go through the Kochkur Valley.

(5) The Lower Naryn Valley

The lower part of the Naryn Valley, west of the settlement of Naryn, is similar to the syrts of the Naryn Upland but lies at a lower elevation and is somewhat more complexly dissected. The valley is over 50 miles long, and its bottom has a maximum width of 5 miles. At its narrowest part, Naryn, it is only a mile wide. The elevation of the easternmost point, the town of Naryn, is 6,800

feet; in the west it lowers to 4,600 feet. The land rises away from the river toward the mountains in a series of distinct low river terraces (Figure 19).

The valley walls are quite steep in the vicinity of Naryn, but to the west, where the crests of bordering mountains recede from the valley bottom, their slopes become progressively more gradual. The mountain crests in the western prat of the valley, 3 to 5 miles from the Naryn River, rise to an altitude of about 11,000 feet, with peaks exceeding 12,500 feet. The Naryn Valley serves as one of the major gateways to the Naryn Upland, and the town of Naryn is its economic hub.

2. Climate

The climate of the Issyk-Kul' hinterland is difficult to describe, since it is marked by great diversity, due chiefly to the mountainous relief. Climatic conditions vary with altitude and exposure. The climate of an exposed peak differs from that of an enclosed valley; north-facing slopes, away from the sun, are dissimilar climatically to those facing south; and, climatic conditions along windward slopes are not the same as along the leeward flanks. In addition, available meteorological data permit only broad generalizations. These are for four stations: Alma-Ata, Frunze, Naryn, and the Tien Shan Observatory. Data from the Alma-Ata station give an approximation of the climate of the Alma-Ata Lowland; the Frunze data serve the same purpose for the Chu Valley; the Naryn data are useful for the intermontane valleys at the western extremity of the

Figure 19. A view of the Naryn Valley showing the river terraces.

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Naryn Upland; and the data of the Tien Shan Observatory give a rough idea of climate in the interior of the Naryn Upland. Direct interpolations from observed data must be made with caution because of the effects of purely local conditions.

a. Temperature

The hinterland has a continental temperature, with great variations between winter and summer and between day and night. The highest average temperatures are recorded in the intermontane lowland areas along the northern part of the hinterland. The lowest temperatures occur deep in the mountains of the Naryn Upland and Khan-Tengri areas, in the central and southeastern parts of the hinterland. Temperatures in the valleys at the western extremity of the area south of Lake Issyk-Kul' are somewhat lower than those of the northern lowlands but considerably higher than temperatures toward the Khan-Tengri area. Throughout the hinterland temperature inversions occur quite frequently, particularly during winter and on summer nights. With inversions, the temperature on the mountain slope is significantly higher than at the valley bottom. Temperatures also change with altitude. The average change, with both increases and decreases of elevation, is 1.1°F per 330 feet. This figure varies somewhat with the seasons. In winter it is slightly smaller and in summer, somewhat larger.

In the northern lowlands winters (December through February) are cold, and spring brings rapidly rising temperatures and recurrent cold spells. Summers (June through August) are warm to hot, and the

warmth of autumn often gives way to winter cold quite suddenly. Extended periods with freezing or subfreezing temperatures do not set in until late November. At Alma-Ata the average annual temperature is 44.6°F. June is the hottest month with an average temperature of 71°F. January is the coldest month with an average of 15°F. During winter the daily temperature usually ranges between 5°F and 30°F. The absolute winter maximum is 59°F and the absolute minimum, -30°F. Average monthly temperatures are below 25°F from November through March. In summer, a daily temperature range between 55°F and 80°F can be expected. Although the average June temperature slightly exceeds the July level, the highest daily maxima are reached in July. The absolute summer maximum is 100°F and the absolute minimum, 39°F. From May thru September the average monthly temperature exceeds 65°F (Table 5).

At Frunze, in the Chu Valley the average annual temperature is 49°F. The average monthly temperatures range from about 20°F in February to about 76°F in July. The average for winter is 23.2°F, and for each month of winter is below freezing. No specific data are available on the mean of the daily minima and maxima but they approximate those of the Alma-Ata station. The absolute winter maximum is 67°F and the absolute minimum, -37°F. As at Alma-Ata, temperatures rise quickly in the spring. Within the hinterland, the Chu Valley has the hottest summers. The average summer temperature is about 74°F. A dry heat is characteristic. Frunze has recorded summertime

temperatures as high as 100°F and as low as 34°F. Afternoon temperatures of 75°F to 85°F contrast strikingly with night temperatures of 55°F to 65°F (Table 5).

Although the temperatures recorded at Naryn are not characteristic of those in the intermontane valleys in the western Naryn Upland, they serve as an approximate guide. In general, summer temperatures are only slightly lower than in most other valleys, but winter temperatures appear to be noticeably lower. At Naryn the average annual temperature is 37°F. The annual range is wider than for the northern lowlands, owing chiefly to the much more severe winters. January, the coldest month, has a mean temperature of 2°F, whereas July and August, the warmest months have an average of 63°F. The absolute maximum is 94°F and the minimum, -33°F. Cold weather lasts for most of the year. Days with subfreezing minimum temperatures can be expected in early October and continue through May. The months of November through March have average temperatures of about 13°F, and the three coldest months, December through February, are bitterly cold with an average temperature of -2°F. The lowest average daily maximum, 10°F, is in January, but February has the lowest mean daily minimum, -5°F. In winter, the temperature has reached a high of 43°F and a low of -33°F. Summers are usually moderately warm. The means of the daily maxima in July and August, the warmest months, are 74°F and 73°F respectively, and of the minima, 49°F and 48°F. Occasionally the temperature rises to the eighties, and a high of 94°F

has been recorded. In June and July on the other hand, night temperatures occasionally drop to the thirties. The lowest summer minimum recorded is 28°F (Table 5).

In the interior of the Naryn Upland and Khan-Tengri regions temperatures vary considerably from place to place. For this vast area the only data available are records for a three year period of one meteorological station, the Tien Shan Observatory (45°11'N, 78°14'E; elevation 11,800 feet). These data cannot be regarded as characteristic of the Naryn Upland and Khan-Tengri regions, but with proper allowances for local conditions reasonable estimates of expected temperatures can be made. Average temperatures should become lower from east to west, at least on broad intermontane depressions (syrts), with the general decrease in elevation. The temperatures should fall between Naryn, on the west and at a lower altitude, and the Tien Shan Observatory. Toward the Khan-Tengri mountain node temperatures should decrease. Even in the vicinity of the observatory temperatures on the lower wide flat syrts should be a few degrees, in summer as much as 5°, warmer than at the observatory, which is located in a narrow glacial valley only about 4 miles from the Petrov Glacier.

The Naryn Upland--Khan-Tengri area is a region of excessive and long-continuing cold. In the Soviet Union, analogous temperature conditions are found on the Aretic island of Novaya Zemlya. At the Tien Shan Observatory, during the three years of record average

monthly temperatures were subfreezing from October through May inclusive. September too may be considered a month of freezing temperatures, as its average was only 32.9°F. Night temperatures of freezing or below were normal for the entire year. The average daily minimum rose above 32°F only in July, and even than it stood at a frigid 33.6°F. About two-thirds of the days of the year had below freezing average temperatures. From November through March the average daily maximum was about 17°F. This average rose to about 45°F from May thru September and reached its highest point, 52.3°F, in July.

The months of December, January, and February were intensely cold at the Tien Shan Observatory. The average for the coldest months, January and February, was -4.2°F. Winter cold is better expressed by the range of daily temperatures. In January the daily temperatures ranged from an average minimum of -18.8°F to an average maximum of 10.9°F. The lowest temperature recorded was -36.6°F. Summer afternoons were somewhat chilly but nights were definitely cold with temperatures near freezing. A contrast in sensible temperatures was also noted between sunny and shaded places. The maximum temperature observed was 67.1°F, and the minimum 7.7°F (Table 5).

The temperature difference between Naryn and the observatory amounted to 5° to 10° during the coldest months and increased to 20° to 25° in summer.

Table 5. Temperature of the Issyk-Kul' Hinterland a/
(in Degrees Fahrenheit)

A. Average Monthly Temperatures

Month	Station			
	Alma-Ata	Frunze	Naryn	Tien Shan Observatory
January	15.0	22.3	2.0	-4.2
February	16.0	19.8	5.6	-4.2
March	30.5	36.7	24.3	11.1
April	46.5	51.6	44.2	22.0
May	59.0	61.5	53.8	29.3
June	71.0	70.1	59.4	37.0
July	70.5	75.5	63.4	41.9
August	68.5	72.6	63.2	38.3
September	59.5	62.8	54.5	32.9
October	44.5	50.6	41.0	20.5
November	31.5	37.0	24.8	10.8
December	22.5	27.5	8.2	2.2
Year	44.6	49.0	37.0	19.8

a. Statistics for Tien Shan Observatory are for a 3-year period only, 1930-1932.

B. Average Daily Maxima and Minima

Month	Station a/ Alma-Ata Max.	Alma-Ata Min.	Naryn Max.	Naryn Min.	Tien Shan Observatory Max.	Tien Shan Observatory Min.
January	23	7	10	-8	11	-19
February	23	9	15	-5	9	-17
March	38	23	32	14	27	-8
April	55	38	51	31	33	5
May	68	50	62	42	41	14
June	76	56	68	46	46	31
July	81	60	74	49	52	34
August	80	57	73	48	45	28
September	71	48	67	41	41	26
October	55	34	51	29	35	3
November	40	23	35	16	22	-1
December	30	15	17	0	14	-16

a. No data are available for Frunze.

C. Absolute Maxima and Minima

Month	Station: Alma-Ata Max.	Alma-Ata Min.	Frunze Max.	Frunze Min.	Naryn Max.	Naryn Min.	Tien Shan Observatory Max.	Tien Shan Observatory Min.
January	53	-30	55	-37	35	-32	14	-37
February	58	-25	62	-13	41	-33	22	-37
March	76	-18	73	1	62	-32	42	-28
April	87	13	82	24	76	-4	46	-19
May	96	31	96	28	89	27	55	-6
June	100	41	93	34	91	28	67	9
July	100	45	100	48	94	37	65	22
August	97	39	99	47	92	33	59	8
September	94	28	93	33	84	25	59	5
October	85	6	83	-17	75	6	68	-14
November	74	-16	74	-4	59	-13	35	-18
December	59	-25	67	-13	43	-30	31	-33
Year	100	-30	100	-37	94	-33	68	-37

b. Precipitation

In the Issyk-Kul' hinterland the distribution of precipitation is directly affected by the complicated mountainous terrain so that moisture conditions, like temperatures, vary considerably in different areas. The whole hinterland is essentially dry. The greatest precipitation is in the area north of Lake Issyk-Kul'. At Alma-Ata the annual total averages slightly more than 20 inches, in the Chu Valley, at Frunze, and in the Karkara-Kegen' depression it is about 15 inches. Over most of the area south of Lake Issyk-Kul' the precipitation is no more than 12 inches. Because of the low evaporation rate associated with the low temperatures, this area is not as dry physiologically as the low precipitation totals might indicate. Field research men have described the climate of some of the syrts near the southern base of the Terskey Ala-Tau as damp despite the low precipitation. The precipitation also increases with altitude and windward slopes are wetter than those facing leeward.

The precipitation also varies from year to year, especially in the summer. This variability is pronounced in the area south of Lake Issyk-Kul'.

The season of maximum precipitation swings from the spring in the northern part of the hinterland to the summer deep in the mountains of the Naryn Upland and Khan-Tengri. In the north a slight secondary maximum is observed toward the end of the year, but no such period occurs south of Lake Issyk-Kul'.

At Alma-Ata 50 percent of the yearly precipitation falls from March to June, inclusive; the rainiest months are April and May, with 3 1/2 inches or more of precipitation. The secondary maximum occurs during October and November. Slightly more than 1 inch of precipitation per month falls during winter and during the late summer and early fall period.

At Frunze 40 percent of the annual total falls during the months of March through May; the monthly maximum, 2.6 inches, occurs in April. A minor secondary maximum comes during November and December. The wet months are followed by a definite dry period.

At Naryn the maximum shifts to the months of May through July when about 5 inches of precipitation, or close to half the annual average, is received. From August through March, precipitation averages only a half inch per month.

Judging by the three years of observations at the Tien Shan Observatory, the interior of the Naryn Upland has a great preponderance of summer precipitation, with 60 percent occurring during the period of June through August. In the eastern part of the Naryn Upland and in the Khan-Tengri area very little precipitation falls from about October through March.

c. Snow Conditions

Snow conditions in the Issyk-Kul' hinterland remain almost totally uninvestigated. Few statistics are available, and descriptive materials by scientists are the primary source of information. Only general approximations of snow conditions can be given.

The pattern of distribution and duration of snow cover and even the period of snowfall are extremely variable and complex because of the mountain structure. Throughout the hinterland most of the precipitation in the cold months falls as snow. The snow particles are small and, over the area south of Issyk-Kul', even powdery. Over the northern lowlands there is an enduring winter cover from the latter part of November to the middle of April. The snow lies at a more-or-less even depth but is thickest apparently over the Alma-Ata Lowland where its depth exceeds 6 inches during most of January and February. The maximum depth of cover in the Chu Valley and the Karkara-Kegen' depression is described as 6 inches in late February.

The snow layer is exceptionally variable in different areas south of Lake Issyk-Kul'. The depth of cover is thickest in late February and early March, and over most of the large valleys probably does not exceed 6 inches. Toward the west, in the Naryn Valley and others that are somewhat open to the west, the depth increases to 12 inches or more. Occasional snowfalls can be expected as late as May or as early as September. In some of the enclosed valleys, such as the Kochkur Valley, on the other hand, the snow cover is sparse and remains on the ground only a few days. Winds blow the snow from the exposed slopes of the mountains to the valley areas. Over the Khan-Tengri area, and also over much of the area east of 77° E, precipitation for the entire year is principally in the form

of snow. Even during the hottest months, July and August, the number of days with snow is apparently greater than the number of days with rain. From May to September precipitation may change from rain to sleet or snow, or vice versa, several times during the course of a day. Snow is absent from the syrt, or lowland, areas from about late April through October.

d. Winds

The general circulation is dominated by westerly winds. Above about 10,000 feet, westerlies prevail throughout the year. At the surface the general pattern of circulation is disrupted by winds of local origin. Mountain and valley breezes are characteristic of the entire hinterland. Nighttime winds blow downslope (mountain breezes), and daytime winds blow upslope (valley breezes). These local winds are most common during the warm half of the year and strongest in the larger and deeper intermontane lowlands north of Lake Issyk-Kul'.

Throughout the year winds attain their highest velocities during late afternoon. Night winds over the whole hinterland are, on the average, probably no more than light breezes with velocities between 2 to 5 miles per hour. Afternoon winds probably reach average velocities close to 10 miles per hour; over the syrts of the Central Tien Shan region these winds sometimes whip up dust. The daily periodicity of wind velocities is less distinct during the cold months. Occasionally winds of gale force, around 32 miles per hour, are experienced, but calms are frequent.

e. Cloudiness and Fog

Normally the atmosphere of the Issyk-Kul' hinterland appears to be semi-clear, with a cloud cover of approximately 50 percent. Minimum cloudiness occurs in August, September, and October, when the cover for about half the days of each month drops to less than 20 percent. The period of maximum cover differs between the areas north and south of Lake Issyk-Kul'. North of the lake the greatest number of cloudy days occurs during December and January when roughly one-third of the days have a mean cloudiness of 80 to 100 percent. South of Lake Issyk-Kul', at Naryn, the period of maximum cloudiness is observed from March through May. Over the remainder of the area the maximum shifts to May and June. Cloudiness is greatest in the middle of the day. Cloud formations are usual near the mountain summits; the crests that carry glaciers are almost continually enveloped by clouds.

Fog is rare and is no particular obstacle to visibility in the intermontane valleys. Light fogs are most likely during the early morning hours from October through April.

3. Vegetation

The cover of natural vegetation over the mountainous hinterland is extremely diverse and arranged roughly in altitudinal zones. There are also variations within each of these zones depending upon local conditions. By far, the larger part of the area is in grassland. The generally high elevations and aridity preclude

extensive development of forests. Forests are almost lacking in the entire area south of the crest of the Terskey Ala-Tau range and are confined largely to the northern slopes of the Zailiyskiy Ala-Tau, Chu-Iliskiye, and Kirgizskiy mountain ranges (Figure 20). Cultivation has significantly disturbed the natural cover only in the Chu Valley and the Alma-Ata lowland.

Vertical zonation of vegetation is best developed over the area north of Lake Issyk-Kul', where relative elevations between mountain crests and intermontane basins are greatest. Along the northern slopes of the mountains four major altitudinal provinces can be distinguished: (1) woodland-grassland, (2) spruce forest, (3) juniper brushwood, and (4) alpine meadow. Above the alpine meadow lies the region of perpetual snow and glaciers where vegetation is scanty and extremely limited in species. The southern slopes of the ranges are grass-covered, and only the deeper valleys are forested. The Ketmen' range is also largely grass-covered. The lowland bottoms of the Chu Valley and the Karkara-Kegen' depression have a cover of shallow-rooted, short grasses. From a distance the ground appears to have a continuous cover, but actually much of it is bare. There are also patches of wormwood shrub. Parts of the stream banks consist of moist meadows with high grass.

Widespread development of the woodland-grassland belt is confined largely to the Zailiyskiy--Chu-Iliskiye mountain wall. The belt rises from the lower elevations to about 5,500 feet. In the Chu Valley, along the Kirgizskiy Range, the belt is largely grassland with a

Figure 20. Forest vegetation on the northern slope of the Zailiyskiy Ala-Tau. Birch and Tien Shan [illegible]

few wild fruit trees and brush thickets, generally near streams. The natural cover is an intermingling of open woodlands, thickets and grasslands. The trees in the woodlands are not closely spaced. Wild apple and apricot are especially numerous. Maple is also common, and stands of aspen and birch grow near the upper limit of the zone. The many thickets include several varieties of thorny bushes, such as the barberry, the buckthorn, and the hawthorn. The grasslands consist primarily of herbaceous plants 3 to 5 feet high. True grasses are most abundant in the upper part of the belt. The beautifully flowering plants of the meadows, such as the iris, peony, crocus, and violet, attract attention in the spring. Birch groves and honeysuckle thickets are found in the valleys of the larger streams.

Westward from Alma-Ata and in the Chu Valley the lower part of the woodland-grassland zone has been substantially modified by agricultural activity. Wheat and barley fields cover much of these areas; sugar beets and hemp are prominent in the Chu Valley, and fruit orchards are widespread in the vicinity of Alma-Ata.

The spruce forest zone is best developed at elevations of 5,500 to 8,500 feet on the northern faces of the Zailiyskiy Ala-Tau and Kungey Ala-Tau. In the same altitudinal belt on the southern slopes of the mountains most of the surface is covered by grasses which grow to a height of 2 feet. Light forests of Tien Shan spruce growing in open parklike fashion are typical (Figure 21).

Figure 21. Tien Shan spruce on the slopes of the Zailiyskiy Alatau. A small mountain lake, Lake Issyk, is in the foreground.

The area between the patches of forest is covered by high grass and brush. Brush is more prevalent in the dense undergrowth of the lower part of the zone, with gooseberry, several varieties of honeysuckle, sweetbrier, and ivies being dominant. Birch, aspen, and mountain ash are also interwoven with the Tien Shan spruce. They are lower in height and too few in number to dominate the forest. At about 7,500 feet the number of trees and bushes in the undergrowth falls sharply leaving high grass as the principal ground cover.

In the 500 to 600 feet above the spruce forest zone (the juniper brushwood zone), squatty juniper bushes are the most striking vegetation feature, although subalpine meadow is more extensive. Of the junipers, the archa (Juniperus turkestanica), indigenous to Central Asia, is by far the commonest. The branches spread horizontally and remain close to the ground forming a low, creeping bush. The archa grows individually and in thickets intergrown with honeysuckle. Herbage of the grasslands grows to about 3 to 5 feet and forms a dense, complete cover. Many flowering plants, such as the aster, geranium, and violet, are represented in the meadows.

The zone of alpine meadows begins at 9,000-9,200 feet and extends to the lower limit of permanent snow. At the lower part of the zone the meadow growth is 8 to 10 inches high and the surface of the ground is fairly completely covered. In the upper limits of the zone much bare ground is visible; on south-facing slopes about half the surface is bare. Plants are short, most of them not over

4 to 6 inches high. The alpine meadows have a high proportion of flowering plants, notably the cowslip, violet, globeflower, and buttercup.

The vegetation cover south of Lake Issyk-Kul' is largely sparse grass. Forests are very widely scattered and form only small patches in some of the deeper mountain valleys. Only the Lower Naryn Valley has a substantial amount of forest. Much of the valley is overgrown with a mixed forest consisting mostly of spruce, birch, and popular. The level surfaces of the syrts have a dull appearance, with much bare ground, throughout the year. In general, vegetation is patchy and covers only 10 to 15 percent of the ground surface. The dry syrts have grayish, woody wormwood shrublets, about 3 to 4 inches high at the most, intermixed with several varieties of short grasses. Stream courses are usually bordered by a belt of brush growth. Some of the northern syrts also have more moist, extensive tracts with a dense grass cover. Salt incrustations at the surface are common in the dry areas.

4. Animal Life

Most of the animal life is found on the slopes of the mountain ranges north of Lake Issyk-Kul'. South of the lake, the cold climate limits the species as well as the number of animals. Of all the fauna, birds are most prevalent.

Over the northern lowlands and the lower slopes of the Zailiyskiy Ala-Tau, Kirgizskiy, and Chu-Iliyskiye mountains, birds are numerous, particularly the starling, jackdaw, lark, oriole, pigeon, and windhover. Many game birds inhabit the area, particularly the zone of open woodland-grassland at elevations between 3,000 and 4,500 feet; these game birds include the quail, partridge, black grouse, and pheasant. Rodent-type small mammals, such as the porcupine, dormouse, various types of wood and field mice, and the hamster, are also present. These mammals remain at the lower elevations, and even mice are no longer found at an elevation of about 10,000 feet. The carnivores include the weasel, fox, badger and wolf, but are not particularly abundant. The wild boar is also occasionally seen.

Larger animals are confined to the higher elevations, generally above 8,000 feet. The alpine jackdaw, the crow, and the Himalayan mountain turkey are among the commonest birds. The Himalayan mountain turkey is most characteristic in craggy, snowy summit zones. Among the large mammals inhabiting the high elevations are the mountain goat and the wild sheep. In some places, mountain rams are numerous. The wolf and fox also penetrate the alpine meadows. The marten and the ermine, though now scarce, are hunted for their fur. The Tien Shan brown bear and the Siberian roe deer also live at the higher reaches of the mountains. The Tien Shan area is the only place in the USSR where the snow leopard is still plentiful.

On the Naryn Upland, south of Lake Issyk-Kul', animals are not abundant even though hunting is important to the economy of the small population. The snow-covered and glaciated eastern part of the Khan-Tengri is very inhospitable to animals. Here animals, appear to be almost totally absent. Scientists have stated that animals were only rarely seen during the normal course of their field research. On the Naryn Upland probably the commonest animal is the marmot, a short-legged rodent. It is also the animal of greatest commercial value. Colonies of relict suslik (ground squirrels) are scattered through the area. This is not the species of suslik that lives on the plains of Kazakh and European Russia. Foxes, badgers, and panthers also inhabit parts of the area. In general, there are few insects and they do not hamper travel.

The lark, plover, and raven are numbered among the birds. Ducks and mountain geese can be seen above the lakes Chatyr-Kul' and Son-Kul' and over the small lakes along the southern base of the Terskey Ala-Tau.

B. Cultural Features

1. Population

a. Density, Distribution, and Types

The population of the Issyk-Kul' hinterland is estimated at 1,000,000. Approximately 720,000 inhabitants are concentrated in three regions that comprise about one-fourth of the land area. These heavily populated regions are the Chu Valley, the Alma-Ata Lowland, and the Naryn and At-Bash River valleys.

The Chu Valley is the most densely populated area. It has an estimated total of 300,000 inhabitants, settled mainly along the Chu River and the Frunze-Rybach'ye Railroad. The average density is 175 persons per square mile. More than half the population is settled in urban communities, the largest of which are Frunze (140,000), Tokmak (20,000), and Kant (13,000).

The Alma-Ata Lowland has an estimated population of 400,000, but it is less densely populated than the Chu Valley, however, averaging about 95 persons per square mile. Alma-Ata, the capital of the Kazakh SSR has 292,000 inhabitants.

In the Naryn and At-Bash River valleys, the densely populated areas are around the town of Naryn and the settlement of At-Bashi. About 20,000 inhabitants are located here. Naryn, the largest settlement, has a population of 5,000. Within an 80-mile stretch extending east and west of Naryn, the population density averages 45 persons per square mile. The region around At-Bashi is somewhat more densely populated, averaging about 95 persons per square mile.

The remaining three-fourths of the hinterland is very sparsely populated. The interior mountain ranges of the Naryn Upland are largely uninhabited except for isolated nomadic groups in the alpine pastures. The upper reaches of the Kungey and Zailiyskiy Ala-Tau ranges are also bare of habitation. The valleys of mountain rivers provide limited areas suitable for livestock grazing and farming, and are sparsely populated by groups of rural settlers. The valleys of the Cholok-Kapchigay, Irtash, and Ak-Say, all tributaires of the Naryn River, average about 2 persons per square mile. Settlements here are mainly summer or winter quarters of native cattle herders. A similar population density is found throughout the valleys of the Kochkur and Kara-Su Rivers, and in the basins of Lakes Son-Kul' and Chatyr-Kul'. The valleys of the Chilik, Sharyn, and Kegen' Rivers are more heavily populated, averaging about 13 persons per square mile.

Throughout most of the hinterland the rural type of population predominates, consisting to a large extent of pastoral nomads. These people, mainly Kirgizi and Kazakhs, move with their herds between traditionally established pasture grounds, where, as a rule, they live in temporary yurta encampments. Each aul, or encampment, has its traditional grazing lands, usually used jointly by several auls. The seasonal migration is performed in stages, each stage characterized by short daily

advances, the length of which depends on the size of the herds involved and the quality and extent of available grazing land.

The longest period of encampment is during the winter season. Winter quarters are chosen in sheltered areas, such as lowlands or river valleys. With the coming of spring the nomads move from their winter camps toward the mountain pastures. Spring quarters ("kokteus") are generally located in the foothill regions. As the snowline retreats, the herdsmen move into higher mountain zones. They establish their summer camps, or "dzhaylyaus" above the forest zone and in the syrts. Summer camps are maintained for only a short period. With the beginning of fall, the nomads descend into lower mountain zones where they establish fall quarters ("kusen"). These quarters include a number of fields where grass is sown by the poorer members of the tribe. The migration cycle is completed with the approach of winter, when the clans return to their winter quarters.

Under the Soviet regime, some of the nomads in the area have assumed more sedentary characteristics. In place of the traditional yurta encampment used as winter quarters, they have established permanent villages in which the winter season is spent. These villages usually belong to a livestock kolkhoz. Women, children, and older people remain in the villages during the migration season and cultivate food and fodder crops in adjacent fields. Mountain pastures are chosen at relatively close distances from the

villages. Livestock on pasture are often provided with supplementary fodder grown in the village hayfields.

The settled rural population of the hinterland is distributed mainly in the agricultural districts of the Chu Valley and the Alma-Ata Lowland. Small concentrations of rural settlers are also found in the Naryn and At-Bash Valleys. These people are primarily engaged in farming, raising food and industrial crops. Rural settlers are grouped either in individual villages or in kolkhozes and sovkhozes. Russians, Ukrainians, Kirgizi, and Kazakhs predominate among the settled rural population. The Russians and Ukrainians are found in areas where conditions of terrain and climate are similar to those of their homelands. They are mostly irrigation farmers and specialize in growing sugar beets, tobacco, and fiber plants. Most of the Kirgiz rural settlers are in the Chu Valley, where they live to a large extent in kolkhozes and sovkhozes. The Russian and Ukrainian farmers who are frequently found in the Kirgiz settlements are put there by the Soviets to indoctrinate the former nomads in new methods of crop rotation, irrigation, and harvesting. In the northern parts of the hinterland, Kazakhs predominate. They are settled in small villages and collective farms and are mainly engaged in livestock breeding. They still are to a great degree seminomadic. Although their communities (auls) are permanently established, the men still migrate with their livestock to mountain pastures in Zailiyskiy Ala-Tau.

In the vicinity of the Issyk-Kul' Basin the rural population includes smaller numbers of Sart, Taranchi, and Dungan settlers, who are engaged mainly in cultivating fruit orchards, medicinal plants, and rice.

Since World War II, the settled rural population of the hinterland has increased somewhat owing to the resettlement of Volga Germans and North Caucasians in the area. About 20,000 Volga Germans are distributed throughout the Alma-Ata area and in the Chu Valley. Bystrovka (population 5,000) is reported to have a predominantly German population. In the vicinity of Alma-Ata are about 8,000 North Caucasians, mostly Kalmyks, Karachais, and Balkarians, who were accused of collaboratin with the German invaders and were forcibly settled in kolkhozes and sovkhozes. A limited number of Balts (Lithuanians, Latvians, and Estonians) are also found here; they serve mainly as agricultural experts.

The urban population of the hinterland is largely concentrated in the cities of Alma-Ata and Frunze and in the towns of Tokmak, Kant, and Naryn. Other smaller urban settlements are located in the foothill region of the Zailiyskiy Ala-Tau and in the Chilik, Sharyn, and Kegen' River valleys. Most of the urban settlers are Russians or Ukrainians. In Alma-Ata and Frunze there is a large minority of native settlers.

A small portion of the hinterland population consists of forced laborers, but little information is available on penal

labor camps in the area. Prisoner of War Camp # 7040 in Alm-Ata was still in operation in early 1949, housing 300 to 600 German PW's and an unknown number of Japanese. Since January 1950, however, the camp is believed to be used for penal and forced labor. About 3,000 convicts have been reported in the Alma-Ata area. The number of forced laborers in the Chu Valley area is believed to be even greater; such labor gangs have been used to build the railroad extension from Bystrovka to Rybach'ye. Plans for further extension of railroad and road facilities in the Chu and Issyk-Kul' areas undoubtedly include the extensive use of forced labor.

b. Ethnic, Physical, and Social Characteristics

The population of the hinterland is characterized by a great diversity of ethnic groups, each with its individual social customs and physical traits. Historical, political, physical, and economic influences are responsible for this conglomeration of peoples. Representative groups are Russians, Ukrainians, Kirgizi, Sarts, Taranchis, Kalmyks, and Dungans. Their cultural characteristics are the same as those of the corresponding groups in the Issyk-Kul' Basin. The Kirgizi, many of whom are still nomadic, represent the largest group. Additional ethnic groups found mainly in the Issyk-Kul' hinterland are Kazakhs and smaller numbers of Uzbeks, Volga Germans, and Balts. A negligible number of North Caucasians are also found in the area.

(1) Kazakhs

The area north of the Kazakh- Kirgiz boundary is predominantly inhabited by Kazakhs. The Kazakhs are of Turkic origin. They are Mongoloid in physical appearance, with medium stature and stocky build. Ethnically, they are closely related to the Kirgizi and Kara-Kalpaks. Their most striking features are small black, almond-shaped eyes, broad flat noses, high cheek bones, flat faces, and a relatively dark complexion. (Figure 22)

Kazakh social structure is based on an elaborate family system, which prevails in spite of Soviet efforts to break the strong family ties. Class distinction among the Kazakhs is determined first on the basis of hereditary caste and secondly by economic position within the community. Although private ownership on a large scale is illegal by Soviet standards, wealth among the Kazakhs is still often based on ownership of cattle, yurtas, and size of winter quarters and garden plots.

According to ancient Kazakh tradition, a passing traveler is entitled to stop at any man's hut (kibitka) and remain indefinitely. The host is responsible for the welfare of any stranger who succumbs to starvation or exhaustion within the vicinity of the camp or village. Theoretically even enemies have the right to hospitality. In order to avoid the burden of this obligation, Kazakh camp sites are generally located at a distance from frequently traveled routes. As a rule travelers take advantage of this custom only when forced to by necessity.

Figure 22. Kazakh herdsman in conventional dress.

(2) Uzbeks

Uzbek settlers are encountered in the Chu Valley, where they live in mixed villages and kolkhozes. The Uzbeks are not a clearly defined ethnic group, although they are generally considered as being of the Turko-Tatar strain, mixed with Persian stock. Uzbeks are well built and average about 5 feet 6 inches tall. They have oval heads and yellowish faces with fairly prominent cheek bones, dark eyes, and jet-black hair. Most of the men have completely shaven heads, and the women wear their hair in tresses wrapped around their heads.

Most of the older women are veiled, and it is considered an insult for a stranger to look upon a woman's unveiled face or to unveil it. The women and children have to do most of the work. They farm and make carpets while the fathers and husbands remain idle or do some hunting or sheep breeding. The people are very hospitable. To refuse an invitation to a home is taken as evidence of animosity. Women usually have to leave the room when a guest enters. The master of the house entertains the visitor, while the wife or wives prepare tea and food, which are served through the room curtains. The Uzbeks are fond of music.

(3) Volga Germans and North Caucasians

Volga Germans are tall, blond, and robust. North

Caucasians, including Kalmyks, Karachais, and Balkarians, are hybrids of Mongolian, Turkic, and Japhetic-speaking peoples. They are of medium stature with round heads, broad, flat faces, and slanted eyes. Some of the North Caucasians are Sunnite Moslems and are traditionally hostile to Christians. Socially, these people are very backward. Women have inferior status in the family and are responsible for all of the heavy work. The Balkarians are considered friendly and gay, but may be reduced to brigandage in periods of poverty.

(4) Balts

Balts are generally of medium to tall stature and heavy build, with long bodies and well-developed arms and shoulders. As a rule they have light hair. All are very nationalistic and cohesive.

c. Language and Religion

The languages and religions of the various ethnic groups in the hinterland correspond to those of the same groups found in the Issyk-Kul' Basin. Kirgiz, Russian, and Kazakh are the Predominate languages, with Kirgiz spoken over most of the area. The Kazakhs speak a Turkic dialect related to Kirgiz and to Osman Turkish. The Latin alphabet originally introduced by the Soviets was replaced in 1940 by a Cyrillic alphabet. Although Moslems, the Kazakhs are less strict in observing the practices of Islam, a laxity attributed partly to nomadic living.

The Uzbeks also speak a Turkic dialect and have an orthography based on the Cyrillic alphabet. Most Uzbeks are Moslems of the Sunnite Mohammedan group and are influenced by mysticism.

The Germans and Balts have maintained the languages and religions.

d. Political Attitudes

The political attitudes of the population of the Issyk-Kul' hinterland are identical with those prevailing in the Issyk-Kul' Basin. The Kazakhs in the northern hinterland share the general Moslem attitude toward the Soviets; however, manifestations of political unrest have been more strongly expressed by this group. A political body called "Centkom Legpartgrup" (Central Committee of Political Groups), with headquarters at Alma-Ata, has the task of pacifying Kazakh agitation.

2. Settlements

a. Types and Distribution

Two basic types of settlements are found in the hinterland. Slav cities, towns, and villages comprise the first and more important group. In organization and type of construction they resemble Russian and Ukrainian settlements in the European USSR. Soviet improvements and architectural influences are most dominant in these settlements. The second group of settlements consists of native towns, villages, and yurta encampments. The towns and villages, in particular, are similar to the Moslem settlements throughout Soviet Central Asia and large areas of the Near East. In addition to these two basic groups, there are in the area a number of kolkhozes (collective farms) and sovkhozes (state farms), which developed with the introduction of Soviet collective agriculture. Kolkhozes consist of one or several villages with either a Russian, Ukrainian, or native population. Sovkhozes also include one or more rural settlements, but frequently are of a mixed population.

(1) Russian Cities and Towns

Most of the Russian urban settlements are located in the Chu Valley and in the Alma-Ata Lowland. They are usually of square or rectangular shape. Streets are generally wide and bordered by rows of poplars. Mostly not surfaced, they turn into mud tracks and ruts during rainy seasons. Individual dwellings are mostly constructed of clay or mud bricks, often

colorfully painted, houses are separated from each other by low mud walls enclosing fairly large garden plots. In commercial districts and along main thoroughfares, stone, tile, or brick structures are common. These generally include the official and cultural buildings of the Soviet Government, the local and municipal administration, and the Communist Party.

Soviet improvements in street building, architectural designs, and public utilities are most noticeable in the cities of Alma-Ata, and Frunze and the towns of Tokmak and Kant, where many of the main streets are paved with asphalt or macadam. Impressive public buildings, such as libraries, schools, theaters, and cultural institutes, are located in the centers of these towns. Large residential sections are comparatively modern and offer facilities of more or less western standards.

New workers' settlements are being constructed near large industrial enterprises, particularly sugar plants as in Kant. According to Soviet claims, some of these settlements already have several thousand inhabitants. The number of skilled workers has increased proportionately. In the early twenties Frunze had only a few hundred industrial workers whereas in 1945 several thousand persons have been reported working in industrial enterprises there.

(2) Russian and Ukrainian Villages

Russian and Ukranian villages also resemble villages of central and southern European Russia. In the narrow sections of the

Chu, Naryn, and Kochkor Valleys, the elongated villages extend along the rivers, the major roads, or the Frunze-Rybach'ye Railroad. In the wide, flat areas of the Alma-Ata Lowland and Chu Valley, the villages are square or rectangular. Southwest of Alma-Ata and Frunze, where Russians and Ukrainians settled in already densely populated areas, their villages are irregular in shape.

Most villages consist of one unimproved dirt street lined with poplar or elm trees, though some villages may have two or three streets. Village characteristics and irrigation systems are the same as those found in the villages of the Issyk Kul' Basin.

During years of Soviet rule, many of the larger Russian villages on the Frunze-Rybach'ye Railroad line and on main roads of the hinterland have developed into rayon centers. Their streets are considerably improved, and new buildings housing schools and village stores are not uncommon. Frequently these villages also have machine-tractor stations as well as other small industrial enterprises. According to Soviet claims some of these villages, such as Voroshilov, have populations larger than 10,000. The formerly unmixed Russian population now contains Turkic elements, such as Kirgizi, Dungans, Uzbeks, and Kazakhs.

(3) Native Towns

There are few native towns in the hinterland. The best examples of native urban settlements are the ancient Moslem sections of

Frunze and Alma-Ata; the towns of Uzun-Agach and Kara Kystak, in the foothills of the Zailyskiy Ala-Tau; Kegen', at the western end of the Ketmen' ranges; and Naryn and Atbashi in the Naryn and At-Bash River Valley.

Towns, as a rule, are larger settlements that have developed near routes of transportation or in productive areas with good natural irrigation. Native towns in general are patterned after Moslem settlements throughout the Near and Middle East. In the center of such towns is usually found the bazaar section, where the main trade routes leading into town intersect. This section comprises a number of badly arranged, narrow, and unsurfaced streets, frequently covered with reeds or planks, and hardly wide enough for two large pack animals to pass. The sides of the streets are lined with artisans' workshops, merchandise vendors' shops, tea-houses, and an occasional bathhouse. Buildings in the bazaar section are generally constructed of fire-resistant materials such as tile, stone, or clay. The bazaar section of some native towns has a large square, usually surrounded by dilapidated buildings used for religious and commercial purposes. Surrounding the bazaar section are the residential areas with large homes and gardens, caravan resting places, burial mosques, and large cemeteries. In some cases, the residential area is encircled by a high clay wall, which was used in the past as fortification.

Some of the larger native towns, such as Naryn, and the Moslem sections of Frunze and Alma-Ata, show signs of Soviet cultural and

architectural influences. Communist cultural centers are located in the busy sections of town. Some public utilities, usually electricity or running water, are available in limited quantities.

(4) Native Villages

Among native villages of the hinterland, the Kirgiz and Kazakh settlements (kishlaks) are predominant. Their location and design depend largely on the availability of water. In lowland areas with adequate irrigation networks (Chu Valley, Alma-Ata Lowland), the numerous Kirgiz or Kazakh villages are of irregular shapes. In the mountain foothills, they are more scattered and are mainly elongated street settlements along mountain streams. In the interior mountain regions, where areas suitable for settlement are considerably restricted, the few existing villages are small and are located on terraces, alluvial fans, and mountain slopes.

Village streets are generally unimproved dirt tracks. During rainy seasons they are extremely muddy and are best traveled on horseback. In mountain villages, the streets frequently have a mixed dirt, rock, and stone surface. Farm quarters in both Kirgiz and Kazakh villages deviate little from those of Moslem villages distributed throughout Soviet Central Asia and described under settlements in the Issyk-Kul' Basin.

Dungan villages are located in the Chu valley and in areas adjacent to the Chinese frontier. Some of the larger villages are Alexandrovka, south of Frunze, and Milyanfan and Yushan'lo,

in the Kantskiy Rayon. Village streets are narrow and unsurfaced. Farm steads are built of sun-baked bricks and enclosed by a high mud wall. Living quarters, utility shacks, and stables are grouped around an interior courtyard. All of the buildings have flat roofs, which are frequently used as garden plots to grow barley and opium poppies. Vegetable gardens and rice paddies of individual farmhouses are located outside the villages. The interior arrangement of Dungan farmhouses is modeled after that of houses in Northern China.

In the Chu Valley also are a small number of Uzbek villages. One of the larger Uzbek settlements is the Iskra Kolkhoz. Uzbek farmhouses are constructed of sun-dried clay and are surrounded by a high mud wall. There are no windows facing the street, and only a small, narrow opening serves as entrance from the outside. Each house has a courtyard which provides daylight to the individual rooms.

(5) Yurta Encampments

Yurta encampments are the dominant form of settlement of nomadic and seminomadic Kirgizi and Kazakhs. The grouping, construction and organization of these encampments follow the same pattern as those described under the Issyk Kul' Basin.

(6) Kolkhozes and Sovkhozes

Most of the kolkhozes in the hinterland are located in the Chu and Naryn Valleys and the Alma-Ata Lowland. They generally consist of one or several larger villages with a predominent

Russian, Kirgiz, or Kazakh population. The Kenesh kolkhoz in the Ivanovskiy Rayon of the Chu Valley is one of the larger collective farms in the area. According to Soviet sources, this kolkhoz (originally the village Oktyabr') is a large ranch-type operation, consisting of three sheep-raising farms, two horse-breeding farms, and one farm each for raising cattle, camels, hogs, and poultry. Collective farmers are engaged mainly in crop cultivation and livestock raising. Their methods of farming and animal breeding are more advanced than those used in noncollective villages. Crop rotation is widely practiced in the kolkhozes.

In mountainous areas, kolkhozes are considerably smaller. As a rule, they consist of a single village with 5 to 10 farmsteads. The population is predominently native and is engaged in animal husbandry.

Sovkhozes are located mainly in the Chu Valley. They consist of several large villages with a mixed population of Russians, Ukrainians, and natives. Sovkhozes serve as experimental farms for newly developed methods in crop cultivation, irrigation, and livestock breeding. They are efficiently operated and are supplied with agricultural machinery.

In the northwestern part of the Chu Valley is located the Novolubtrest Sovkhoz. This is one of the largest sovkhozes in the area and specializes in cultivating fiber plants. It consists of the villages of Dzhanti-Dzher, Dzhanti-Pakhta, Nizhne-Chu, and Vasil'yev. In the foothill region of the Chu Valley are the cattle-raising sovkhozes of Imeni Frunze, Alamedin, Kegety, and

Shanisi, and the sheep-raising sovkhoz of Kzyl-Oktyabr. The Imeni Frunze sovkhoz also specializes in meat packing.

The number of sovkhozes throughout the remainder of the hinterland is extremely small. Noteworthy are two sheep-raising sovkhozes, located in the Kochkur and Dzhumgol River Valleys, and a horse-breeding sovkhoz in the Naryn Valley.

b. Description of Cities and Principal Towns

Alma-Ata and Frunze are the only cities in the hinterland. The most important towns in the area are Tokmak, Kant, and Naryn.

(1) Alma-Ata

The city of Alma-Ata is located near the northern foothills of the Zailiyskiy Ala-Tau, about 48 miles north of Lake Issyk-Kul' (Figure 23). Alma Ata (formerly known as Verny) is the capital of the Kazakh SSR. Its total population is estimated at 300,000. In area, Alma-Ata covers about 54 square miles and is approximately rectangular in shape. The Vesnovka, a small stream, flows through the city area. The Malaya Almatinka River skirts the eastern edge of Alma-Ata, and the Bol'shaya Almatinka (the largest stream in the area) flows along the western outskirts of the town. The Bol'shaya Almatinka and the Vesnovka discharge into a reservoir

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*Alma-Ata in Kazakh means "father of apples." It is so named because of the numerous apple orchards throughout the city. Alma-Ata is considered to be the fruit-growing center of Soviet Central Asia.

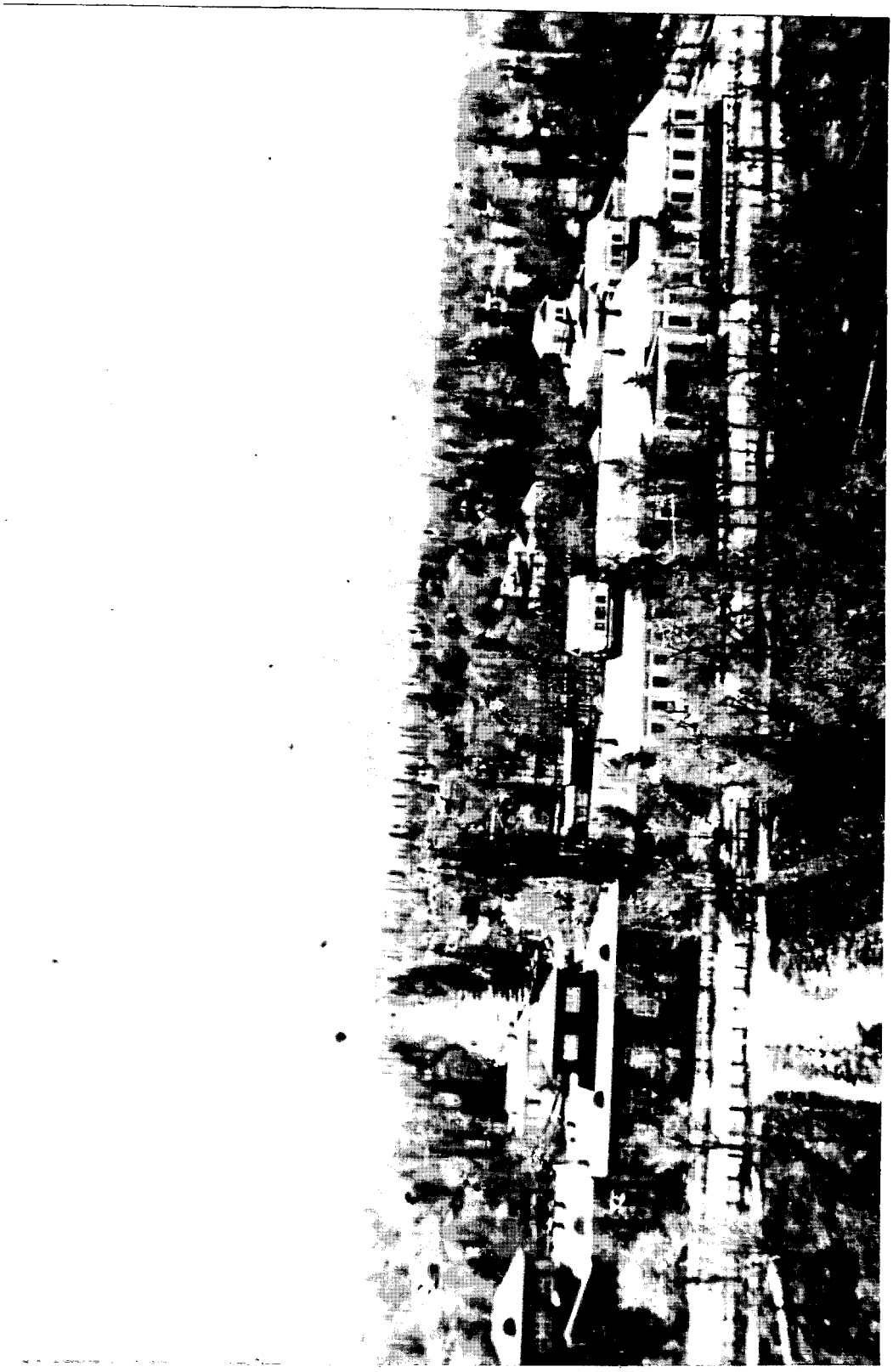

Figure 23. South Alma-Ata, facing the Zailiyskiy Alatau

located about 4 1/2 miles northwest of town. Formerly the city was separated into two parts, the old (southern) and the new (northern) city. The two parts are now connected by housing developments, industries, and a single-track railroad line. The present city was largely build after 1910, when an earthquake almost completely destroyed the old city of Verny. Alma-Ata has a number of impressive public buildings and modern apartment houses constructed of stone or reinforced concrete (Figure 24). Streets, as a rule, are wide (approximately 33 feet) and form almost square city blocks. "Stalin Prospekt" is the main thoroughfare. This avenue is asphalt surfaced and electrically lighted. Other main streets that have asphalt or stone surfaces and electric lights are: Ulitsa Mira (formerly Issyk-Kul'skaya); Ul. Tashkentskaya, which crosses the Vesnovka and Bol'shaya Almatinka Rivers; Ul. Komsomol'skaya, which bridges the Vesnovka River; Ul. Kalinin and Ul. Kirov, business streets; and Ul. Dzerzhinski, Ul. Uspenski, Ul. Furmanski, Ul. Karl Marx, Lenin Prospekt, Ul. Artillereyskaya, Ul. Gogol', and Ul. Maxim Gorki. The main squares in Alma-Ata are the Red Square, located in center of town, the Opera House Square, and the large square located in front of the railroad station known as Alma-Ata II. There are also two large parks, one of which contains the city zoo.

Urban transportation within the city limits is maintained by streetcars, buses, trolley buses, and taxis. Alma-Ata has three

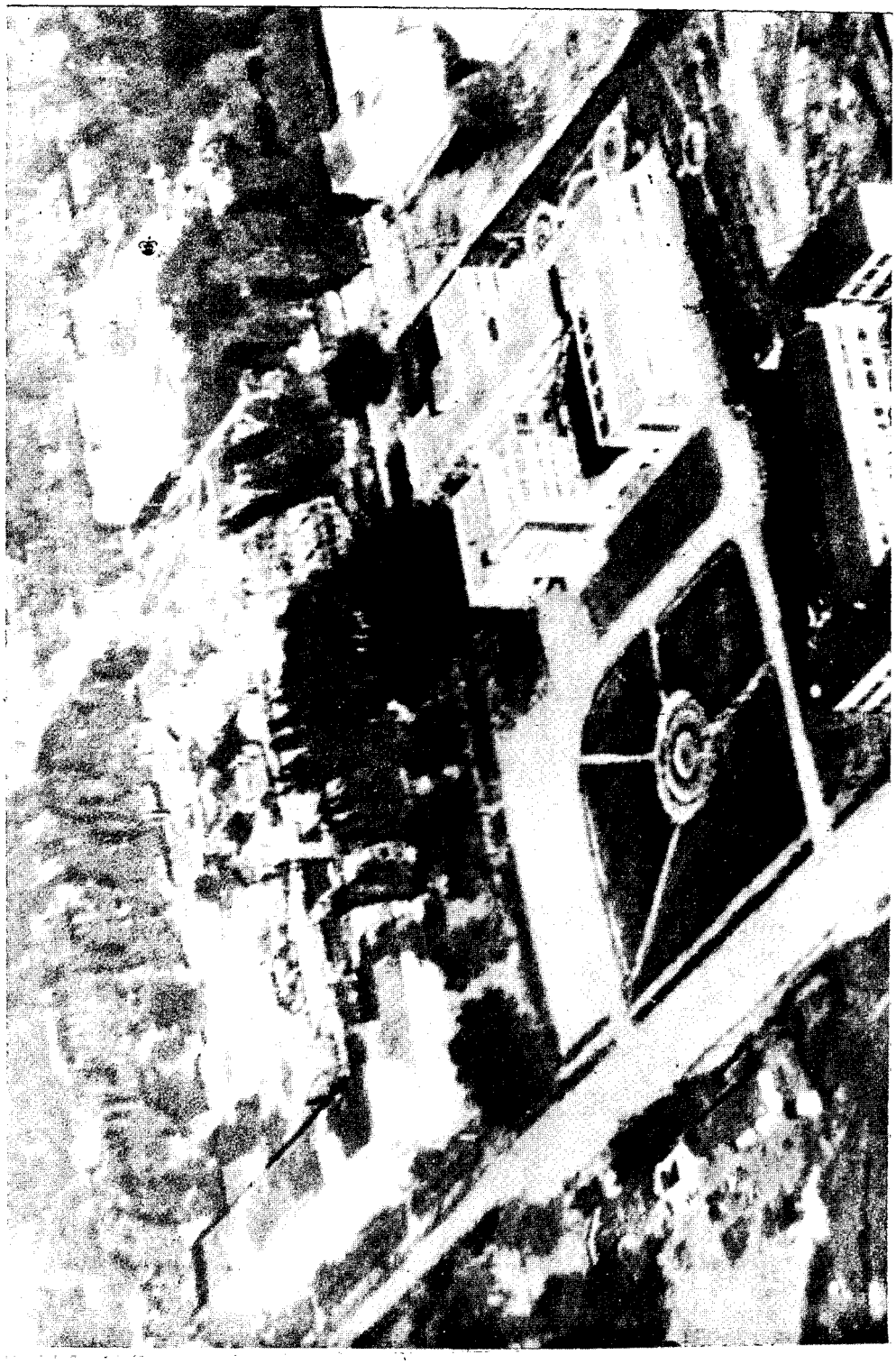

Figure 24. Modern buildings in Alma-Ata.

streetcar lines. The first line begins at Plant No. 175 (Torpedo Plant) and runs to the railroad station, Alma-Ata II, via Komsomolskaya Ulitsa and Ulitsa Karl Marx. Another line, also beginning at Plant No. 175, takes the same route to the railroad station, Alma-Ata II, but it continues to a grain silo located about 1 mile southeast of the railroad station Alma-Ata I. The third streetcar line also starts at the factory, but merely circles the southern part of town. The streetcar depot is located within the compounds of Plant No. 175. One bus line runs every half hour between the railroad stations of Alma-Ata I and II. Three other bus lines operate at regular intervals between Alma-Ata and the towns of Kaskelen, Ili, and Talgar. In addition to the regualar bus lines, there is a trolley-bus line, which circles the center of the city. Numerous taxicabs of the "Pobeda" type have been seen in Alma-Ata since 1949.

Since World War II, Alma-Ata has developed into an important industrial center. This growth is attributed largely to the evacuation of numerous industrial plants from the threatened areas of the European USSR to Alma-Ata. The main industrial area is located in the west-southwest part of the city. The northeast section of town is also being developed into an industrial area. At present Alma-Ata is one of the most important torpedo-manufacturing centers in the Soviet Union. It also contains a heavy machine-building industry (including railroad shops), spinning mills, fruit-preserving and meat-packing plants, a wine distillery, tobacco factories, tanneries,

and sawmills. South of Alma-Ata, several hydroelectric stations and dams have been constructed on the Bolshaya Almatinka River. Sewage and water systems are inadequate, but the city has adequate telephone and telegraph service. Other installations located within Alma-Ata include an electric equipment plant and a series of hydroelectric power stations. Local industry supplies many of the component parts used in the torpedo assembly. Manufactured torpedos are tested at the Przheval'sk testing station on Lake Issyk-Kul'. Industrial workers, numbering approximately 20,000, consist of skilled and semiskilled Russians and Ukrainians, and Mongolian and Kirgiz laborers.

Alma-Ata is also considered the cultural center of the Kazakh SSR. It has a university, established in 1928, and 8 higher educational institutions, 2 specializing in pedagogy, 1 in mining and metallurgy, 1 in medicine, 2 in agriculture, and 1 in law. The city has 19 technical and other special schools, as well as 25 scientific research institutions. The latter function under the supervision of the Academy of Sciences of the Kazakh SSR. In addition, Alma-Ata has a Kazakh branch of the Lenin Academy of Agriculture, a large public library and regional museum, Kazakh and Russian opera houses, theaters, and public parks.

Located on the strategic Turksib Railroad, Alma-Ata is a significant transportation and trade center. The Turksib has greatly facilitated the economic and industrial development of Alma-Ata

by linking the city with the grain- and lumber-producing areas of Western Siberia, the cotton regions of Kazakhstan and Uzbekistan, and the industrial regions of the Central Urals. Raw materials, such as ore, coal, and lumber, are brought into the city by rail from Karaganda. Alma-Ata has a lively trade in such commodities as cattle, meat, butter, livestock products, fruit, and fish. Owing to its proximity to the Chinese border, Alma-Ata is an important trade center between the USSR and the Sinkiang Province of China.

A civilian airfield is located in the northeastern section of the city. Scheduled air routes of the Civil Air Fleet link the city with Moscow, Frunze, Tashkent, Karaganda, and Novosibirsk.

(2) Frunze

Frunze, the capital of the Kirgiz SSR, lies in the center of the Chu Valley on the Lugovoy-Rybach'ye branch of the Turksib Railroad. It spreads over the alluvial fans of the Alarch and Alamedin Rivers (tributaries of the Chu River). Frunze is the fourth largest city in Soviet Central Asia, and has an estimated population of 140,000. The city was built in 1873 as a Russian fortress and named Pishpek. In 1925 the city was renamed for the Bolshevik general, M. V. Frunze.

The city is built around a number of straight streets and avenues, which, as a rule, lead in a north-south or east-west direction. Ulitsa Dzherzhinskogo, one of the main avenues of Frunze, running in a north-south direction, connects the center of the city with

the Frunze railroad station, located about 3 miles south of the main part of town. The avenue consists of two asphalt-paved roadways, each for one-way traffic. The low buildings along the avenue are concealed during summer by rows of poplar trees planted along the sidewalks. Several newer 2- or 3-story buildings facing Ul. Dzerzhinskogo include the Kirgizskiy Filial Akademii Nauk SSR (Kirgiz Branch of the Academy of Sciences of the USSR), the Respublikanskaya Prokuratura (Republic Prosecuting Magistracy), and the Tsentral'nyy Telegraf (Central Telegraph Office). The center of town is modernized, having most of the surfaced streets, a large city square, and the main government buildings, libraries, and theaters (Figure 25).

The main east-west streets of Frunze are the Ul. Lenina, Ul. Frunze, Ul. Stalina (along the main trolley-bus line), Ul. Toktogula, and Ul. Pionerskaya. The main course of the old Semirechenskiy Trakt coincides with the present Ul. Lenina. Ulitsa Frunze is known to be only partly surfaced, dirty, and without electric lighting. Parts of this street are flooded with liquid waste from the Municipal Dairy. Traffic is known to stop at dusk along entire sections of the avenue. In the western and eastern outskirts of Frunze, these streets merge into a motorable highway, which leads to Tashkent to the west and to Lake Issyk-Kul' to the east.

Other streets in Frunze are Ul. Gertsena, Ul. Sovetskaya, Ul. Pervomayskaya, Ul. Voroshilova, Ul. Kaganovicha, Ul. Pushkina, Ul. Zapadnaya, and Ul. L'va Tolstogo.

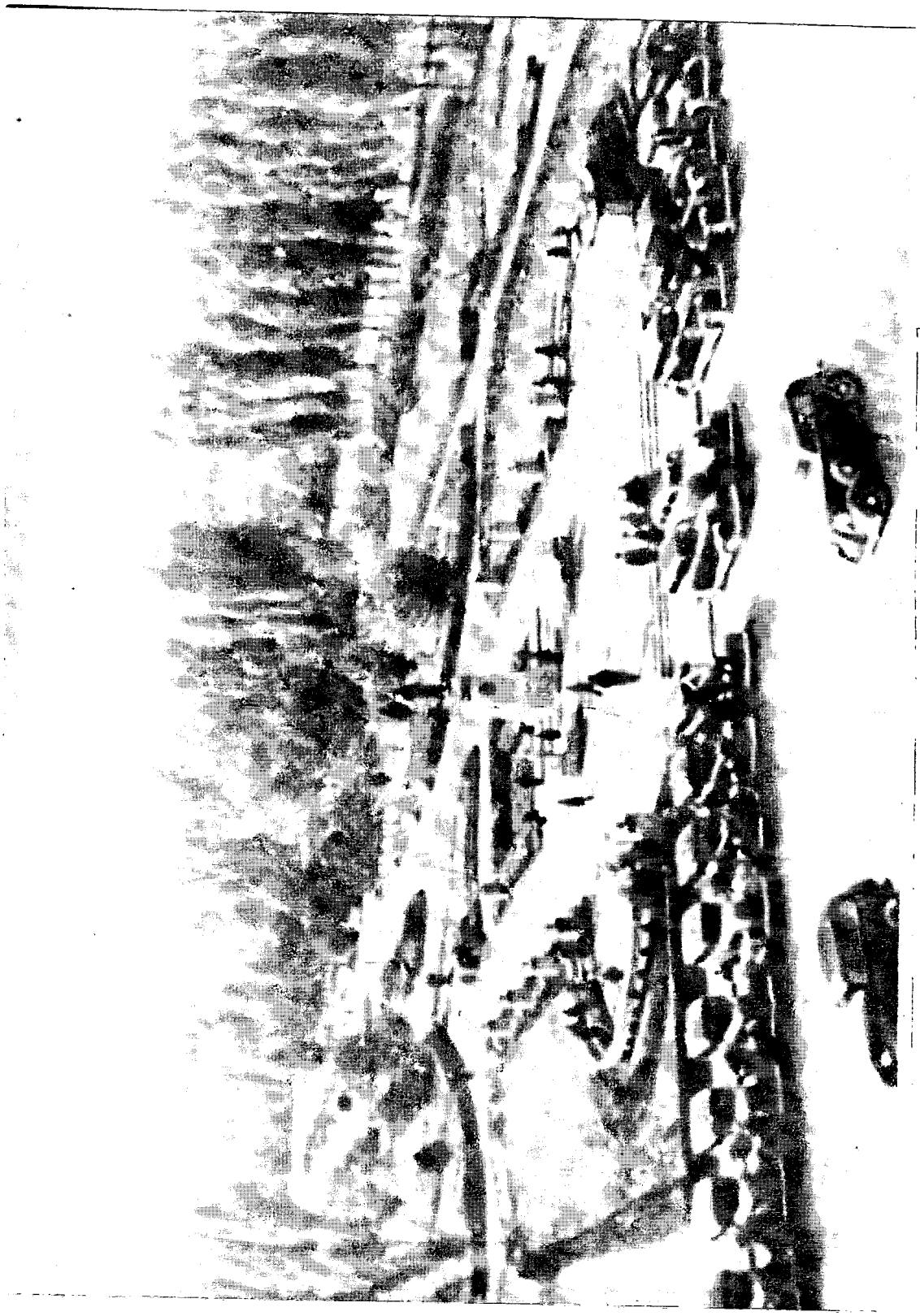

Figure 25. Main square and park in the center of Frunze. Soviet Calendar, Moscow, 1945.

There is a great deal of green vegetation throughout the city. Poplars and oaks are planted along most of the streets. Orchards are located in many sections of town. In the northeastern section are several parks of elm trees.

Frunze has become an important industrial center for the processing of agricultural products from the Chu Valley and other districts of Kirgizia. Frunze accounts for about 65 percent of the total industrial production and has over 30 percent of the total number of industrial workers in the Kirgiz SSR (Figure 26). Industrial enterprises within the city include a large and modern meat combine, a mill combine, a leather plant, a tobacco fermentation plant, a liquor distillery, and a brewery. Metal-working plants produce parts for tractors, machine tools, hydroelectric turbines for kolkhoz electric power stations, and various agricultural machines, implements, and tools. A hemp and jute industry has been established to manufacture rope and fabrics from the fiber plants grown in the Chu Valley. There is also a sewing and clothing factory. Numerous smaller industrial enterprises include the brick plants of Krasniy Stroitel' and Novo-Pavlov.

Frunze is the cultural center of the Kirgiz SSR. It has several higher educational institutions, Russian and Kirgiz theaters, a regional museum, and a number of scientific and cultural research organizations. The latter group includes individual institutes for history, language and literature, biology, geology, epidemiology,

Figure 26. Vertical air view of workers' district at southwest edge of Frunze, showing railroad station (top left) and race track (left). Frunze Publication, 1942.

and microbiology. There are also research agencies working on livestock, fruit, vegetable, and tobacco raising. Most of the scientific institutions are under the jurisdction of the Kirgiz branch of the Academy of Sciences of the USSR.

Frunze is also an important transportation and trade center. The Lugovoy - Rybach'ye sector of the Turksib Railroad crosses the Chu Valley from west to east, passing through Frunze. To the east, the line reaches Lake Issyk-Kul', providing a combined rail-water traffic route from Frunze to Przheval'sk. To the west and southwest, the line connects Frunze by way of Dzhambul, Tashkent, and Kokand with the highly industrial and agricultural Fergana Valley. Trunk highways (partly asphalted or gravel improved) connect Frunze with the principal industrial or cultural centers of Kirgizia, such as Dzhalal-Abad, Osh, Kzyl-Kiya, Kant, Tokmak, Rybach'ye, and Naryn. Scheduled civil air routes lead from Frunze to Alma-Ata, and also to Tashkent and Dzhusaly from which connection can be made for Moscow. Regional and nonscheduled air routes also link Frunze with secondary airfields at Naryn, Rybach'ye, Przheval'sk, Dzhalal-Abad, and Dzhambul.

(3) Tokmak

The town of Tokmak is located near the southern bank of the Chu River approximately 37 miles east of Frunze. An increase in the agricultural activity of the Tokmak area has caused a great influx of Russian, Ukrainian, and some Dungan

people, numbering about 20,000. Tokmak has become the second largest urban settlement in the Chu Valley. Its industries are largely concerned with the processing of fiber plants and wool. A cannery and beet-sugar refinery are located in the suburb of Oktyabrskiy. In addition, there are an auto repair plant and a hydroelectric station (Tokmak GES) within the town limits.

Tokmak has adequate transportation facilities for its beet-sugar and wool trade. The Lugovoy-Frunze-Rybach'ye railroad line, which passes through the southern section of town, handles a sizable volume of the freight traffic moving in or out of Tokmak. The remaining freight traffic is by road. The main highway leading from Frunze to Rybach'ye and Przheval'sk passes through the center of town, where it becomes the main thoroughfare. Improved dirt roads also connect Tokmak with the settlements of Kegety, Kara-Kunuz, Krasnogorka, and the health resort of Issyk-Ata. One of the main streets in town is the Ulitsa Sadovaya. On this street is located the Tokmak Technical School for the Mechanization and Electrification of Agriculture.

(4) Kant

Kant is located some 11 miles east of Frunze. It is a rayon center and has a population of approximately 13,000. Road and railroad facilities connect Kant with Frunze in the west and with the Issyk-Kul' Basin in the east. The economy of the city, like that of Tokmak, is based primarily on the sugar-

beet industry and truck gardening. Two sugar mills have been in operation since 1932. Other industrial installations include a cement plant, a rayon industrial combine, and the main supply and repair shops of the Kirgiz Ministry for Auto Transport (Ministerstvo Avto-transport, Kirgiz SSR). Cultural and medical institutions known to exist in the city are two secondary schools, two workers clubs, a radio receiving and wire relay station ("radio uzel"), a polyclinic, and a hospital. Recent information indicates that a garrison of mountain troops has been stationed in Kant along the Frunze-Rybach'ye highway and railroad.

(5) Naryn

The town of Naryn is located south of the left bank of the Naryn River and approximately 50 miles southwest of Lake Son-Kul'. Naryn has a population of approximately 5,000 and is the administrative center of the Tien Shan Oblast of the Kirgiz SSR.

In the past Naryn was known as the village of Narynsk, located on the trade route from Kashgaria to the Chu Valley. It had considerable importance as a fortress, and a small Cossack detachment was stationed here. After the Revolution, Narynsk was developed into a town and renamed Naryn.

The town consists of several main streets running parallel to the river. The streets are lined with one-story houses, which are surrounded by gardens. The houses have flat roofs and adobe walls. The number of buildings in the city is relatively small.

On many of the numerous open tracts between different parts of the city crops of wheat and barley are grown.

Local industrial activities include sawmilling, brick making, and tanning. There are several small craft artels in town. Located on the strategic auto road linking Rybach'ye, Naryn, and the Sinkiang border, Naryn serves as a supply point and trading center for the seminomadic and nomadic population of the area. An improved dirt road that leads westward from Naryn is suitable for automobile traffic as far as the settlement of Dyul'berdzhin (the administrative center of Aktalinskiy Rayon). The road continues in an unimproved state to Kazarman, center of the Togus-Torausskiy Rayon, but this section is not suitable for motorized traffic.

Naryn is also believed to have a secondary airfield for nonscheduled flights from Frunze.

3. Health and Sanitation

Public health administration and sanitary regulations in the hinterland are highly centralized and relatively modern in concept, but their enforcement is usually inadequate.

Improper diet, poor living conditions, natural conditions favorable to breeding germs, unsanitary practices, and inadequate medical attention facilitate the spread of diseases among the rural and nomadic population.

Rodents, insects, and community wells are the chief carriers of the large number of contagious diseases common to the area.

Malaria is prevalent in the mosquito-infested, swampy flood plains of the Chu, Kegen', Tekes, and Naryn Rivers and near Lake Son-Kul'. Fleas and ticks, which are widespread, are carriers of typhus and relapsing fever. The hinterland is especially noted for tick typhus. Worm infestation is prevalent among the cattle-breeding population. In regions along the Chinese border, cases of plague and cholera have been reported. Kirgiz wheat is claimed to be a source of the plague; the wheat becomes contaminated from the feces of infected rodents, and the disease may be acquired by inhaling dust from such wheat. Dysenteries and diarrheal conditions are commonly caused by head, body, and crab lice, as well as numerous types of bedbugs and cockroaches. The bite of the "Karakute," a poisonous spider found in loamy river-bank areas, produces pains in the abdomen, head, and limbs. It also causes depression, thirst, and chills, and may induce paralysis of the nerves. Unsanitary storage of food and drinking water by nomadic peoples results in numerous intestinal disorders and diseases.

Other contagious and infectious diseases known to exist in the hinterland area are trachoma, scabies, venereral diseases, spotted fever, and leprosy.

Medical services are free, but standards of medical care are at a low level because of inadequacies in personnel, hospitals, and medical supplies. Although the Soviets have raised health standards in the larger populated centers by establishing new

hospitals, sanitariums, and health resorts, their efforts are still far below requirements in the vast rural areas of the hinterland.

Modern hospital facililities are available in Alma-Ata and Frunze. These establishments are provided with adequate medical equipment and qualified staffs of doctors and nurses. Two military-civilian hospitals, a maternity clinic, and a scientific medical research laboratory are located in Alma-Ata. All "workers" are permitted to enter and receive treatment without restrictions. In addition there are reported to be X-ray and prophylactic establishments. According to Soviet claims, Frunze has the following medical institutions: (1) 75 city and republic medical and prophylactic establishments, including an X-ray center; (2) a station for blood transfusions; (3) several hospitals (of unknown size and capacity); and (4) establishments for consultations on mother-child care.

Medical and hospital services are of much poorer quality in smaller towns such as Tokmak, Kant, and Naryn than in Frunze and Alma-Ata. Facilities of this type in the towns usually consist of inadequate and ill-constructed buildings with meager furnishings, little and often poor medical equipment, and a harassed staff handicapped by continued shortages of essential medicines.

Several health resorts (Kurorts) and convalescent homes are operated in the hinterland. These are primarily located at mineral

hot springs in the northern foothills of the Kirgizskiy Ala-Tau Mountains. The health resorts of Issyk-Ata and Ak-Su are well known for their snaitariums and rest homes where practically all types of chronic diseases (tuberculosis, rheumatism, nervous disorders) are treated. Other health resorts are being developed at mineral springs in the Tien Shan Oblast; of these the Dzhal Bogoshty mineral springs, located in the northern foothills of the Atbash Mountains, are the most important.

4. Economy

The economic activity of the Issyk-Kul' hinterland includes both agriculture and industry, but agriculture is dominant with respect to area and number of people involved.

a. Agriculture

The Issyk-Kul' hinterland contains three agricultural sub-regions which are: The Chu Valley, The Northern Highlands, and The Southern Highlands.

(1) Crop Cultivation

(a) The Chu Valley Region

The Chu Valley is considered to be one of the best grain-producing areas of the Kirgiz SSR. About 90 percent of the total cultivated area, approximately 250,000 acres, is used for the growing of grain crops. The remainder of the cultivated area (some 28,000 acres) is in industrial crops, such as sugar beets and fiber plants. Irrigation farming predominates throughout most of the cultivated area. Wheat is the principal food grain, and comprises about 70 percent of all the grain crops. The other grains include barley and oats, which are used as fodder crops. Most of the sugar beet farms are located in the Frunze-Kant-Tokmak region, along the Frunze-Rybach'ye railroad. Sugar refineries at Frunze, Kant, Tokmak, and Kaganovich process more than 27,600 short tons of sugar beets per day.

The irrigated regions north and south of the Chu River specialize in growing fiber plants, particularly hemp. The largest

fields under cultivation are located in areas irrigated by the Georgiyevskiy and At-Dashinskiy Canals. Fiber plants are used for the manufacture of ship lines, canvas, fish nets, sugar bags, and fine fabrics. Four large sovkhozes (Vasil'yev, Dzhungi-dzher, Nizhne-Chue, and Dzhanti-Pakhtin) annually cultivate about 15,000 acres of fiber crops. An additional 5,000 acres of fiber crops are planted annually by the Bystrovskiy and Keminskiy kolkhozes located in the eastern part of the Chu River valley.

East of Frunze, rice is an important crop on kolkhozes with a predominantly Dungan population. Frunze and Tokmak are known for large-scale cultivation of fruit orchards, vineyards, and vegetable gardens.

The cultivation of grain and industrial crops will supposedly be increased substantially with the completion of the Great Chu Canal Project. This project includes the Orto-Tokoi Reservoir and a large irrigation-canal system embracing the Western and Eastern Great Chu Canals. The Orto-Tokoi Reservoir is located below the outflow of the Chu River from the Kochkur Valley. According to plans, the reservoir is to irrigate an additional 174,000 acres for the cultivation of industrial crops. The Western Great Chu Canal begins at the village of Ken'-Bulun' south of Tokmak. The total length is to be 90 miles. The first 31 miles have been completed, and the canal reaches approximately to Voroshilov; the remainder is under construction. The Eastern Canal begins near the settlement

of Dzhany-Alysh, above Tokmak, and the total length is estimated at 76 miles. The canal runs south of the Chu River and terminates in the region of Stalinskoye (Delovodski).

(b) The Northern Highlands

The Northern Highland agricultural region is located north of Lake Issyk-Kul'. It covers, in general, the area between the Chu-Iliyskiye Mountains and the Sinkiang frontier, including the small part of the Chu Valley north of the Kirgiz-Kazakh SSR boundary.

The over-all area under cultivation in this region is estimated at 650,000 acres, in the Chu Valley, the Alma-Ata Lowland, and the Chilik and Kegen' Valleys. Some 60 to 70 percent of the cultivated area is sown in grain, winter wheat, barley, oats, and rice. Wheat, barley, and oats are grown up to elevations of 5,300 feet. Wheat is the principal food crop and constitutes about half of the total grain planted. Barley and oats, which occupy about 20 percent of the cultivated areas, are used mainly as concentrated fodder for livestock. In highland areas barley and alfalfa are cultivated up to elevations of 6,000 feet. In addition to these basic crops, rye, millet, pumpkins, rice, and vegetables are grown on irrigated fields, particularly around Alma-Ata. The Alma-Ata Lowland is also famous for its fruit, especially apples, grapes, and watermelons.

The principal industrial crops, raised mainly in the Chu Valley area, are sugar beets and tobacco. Sugar beets are planted on some

32,000 acres and yield approximately 750 bushels per acre. Cultivation of tobacco in the area has been increasing since World War II. Tobacco patches are generally found in conjunction with fields of sugar beets. According to 1948 data, the area cultivated in sugar beets and tobacco in the Alma-Ata Oblast amounted to 5,500 and 9,200 acres, respectively.

Irrigation farming is practiced throughout the river valleys and lowland areas. Postwar Soviet irrigation policy provides that temporary feeder canals be dug each spring before plowing and be filled in each fall after harvesting. This policy is aimed at reducing the number of small garden plots available to farmers (each garden plot usually has access to a feeder canal) and increasing the average size of collective farms.

Dry-farming is practiced at elevations up to 6,000 feet. The principal crop is fodder.

The Soviets are introducing dairy and poultry farms in the more heavily populated areas. A large poultry farm in Tastak, a suburb of Alma-Ata, is claimed to have a yearly capacity of up to 15,000 fowls.

(c) The Southern Highlands

The high mountain area south of Lake Issyk-Kul' is referred to as the Southern Highlands. The difficult terrain features of this region considerably restrict the extent of cultivation. The total cultivated area is estimated

at 183,000 acres. Crop cultivation is limited mainly to the Naryn, Kochkur, At-Bash, and Ak-Say River valleys, and to the basins of Lakes Son-Kul' and Chatry-Kul'.

Crops grown in the area consist primarily of wheat and barley. Both crops are used for human food as well as for supplementary livestock fodder. They are cultivated mainly on irrigated fields in the bottom lands and on the lower slopes of river valleys. The total irrigated area under wheat and barley cultivation is some 170,000 acres.

Dry-farm production of barley, alfalfa, and clover is practiced on mountain slopes and alpine pastures above 6,500 feet in elevation. Above this elevation, however, the barley is undersized or dies before it matures, because of the short growing season. Some dry-farming is also practiced in the bottom lands of river valleys.

Crop cultivation in the eastern half of the Southern Highlands (which includes the Upper Naryn Valley and Inyl'chek Mountain complex) is relatively insignificant. The area is very sparsely populated and used primarily for grazing. The small amount of crops grown by the pastoral population consists mainly of fodder. Recent experiments with growing barley in the Upper Naryn, Terek, and Inyl'chek Valleys have proved successful. Through experimental farms in the Issyk-Kul' Basin, the Soviets are attempting to cultivate fodder crops in the Cholok-Kapchigay, Irtash, Kuylyu, and Inyl'chek River valleys.

(2) Grazing Lands and Animal Husbandry

(a) The Chu Valley Region

The Chu Valley is a significant livestock-raising area. Approximately 60 percent of the 2,200,000 acres of land in the valley is used for grazing. This includes the slopes of the Kirgiz Ala-Tau and Chu-Iliyskiye Gory, as well as large stretches of flatlands that are not under cultivation (Figure 27).

The greater part of the grazing land in the Chu Valley is used for spring and fall pasturing. During the summer and winter seasons, livestock are driven to pastures in the Chu-Iliyskiye and Kirgizskiy Mountains. The most important summer grazing areas are in the Susamyr Valley. Livestock kolkhozes and sovkhozes own most of the pasture lands in the Chu Valley. Pastures in the Susamyr Valley also are frequently used for winter grazing.

The total number of livestock in the Chu Valley is approximately 570,000 animals of which sheep and goats account for 350,000, cattle for 150,000, and horses for 70,000. Over 30,000 head of cattle and more than 60,000 sheep and goats are distributed among the large livestock sovkhozes of Imeni Frunze, Alamedin, Kegetye, Shamsi, and Kzyl-Oktyabr. All of these sovkhozes are located along the northern slopes of the Kirgizskiy Ala-Tau. The sovkhoz Imeni Frunze also has large grazing areas northwest of Frunze.

Figure 27. Herd of Kirgiz horses on pasture in the Chu Valley.

(b) The Northern Highlands

Suitable grazing lands are found on the northern slopes of the Zailiyskiy Ala-Tau and Kungey Ala-Tau, in the bottom lands and on the slopes of the Chilik, Charyn, Kegen', and Tekes River Valleys, and in the upper zones of the Ketmen' Mountains. The Zailiyskiy and Kungey Ala-Tau Ranges have numerous high-altitude pastures ranging from 9,200 to 10,000 feet in elevation.

The grazing period for high-altitude pastures in the Zailiyskiy Ala-Tau ranges from 2 to 5 months. The Great Kebin Valley, sandwiched between the Kungey Ala-Tau to the south and the Zailiyskiy Ala-Tau to the north, provides extensive summer grazing along the bottom lands and lower slopes. The Chilik and Kegen' River valleys are used by native sheep and cattle herders as winter pastures. Yurta encampments are found throughout these valleys.

Animal husbandry is the most important branch of the rural economy of the area. As in the Chu Valley and the Southern Highlands, animal husbandry is based primarily on the breeding of sheep, cattle, and horses. Hog raising has developed increasingly since World War II. To a small degree, camels also are raised, mainly in areas adjacent to the Sinkiang border.

Sheep raising dominates the animal husbandry of the region. The total number of sheep (including goats) is estimated at some 150,000. Special emphasis is given to the development of fine-fleeced and semicoarse-fleeced sheep. By crossing the local Merino sheep with the wild Akhar mountain ram, the Kazakhs developed an

improved breed, the "Akharomerino," which is better adapted for all-year grazing on mountain pastures. This sheep yields high-quality wool and mutton and attains considerable weights.

(c) The Southern Highlands

The Southern Highlands include some of the most important grazing lands of the hinterland. Numerous intermontane valleys (syrts) and mountain meadows provide rich pastures for large herds of livestock. The area supports almost one-fifth of all the sheep, goats, and horses in the Kirgiz SSR.

Grazing lands in the Southern Highlands are basically of two types: (a) high-altitude pastures, which begin at an average elevation of 9,500 feet, and (b) low-altitude pastures, which are usually located in the lower river valleys and lake basins of the area.

High-altitude pastures are mainly used for summer and fall grazing. The richest of these pastures are located in intermontane valleys at elevations above 10,000 feet. The grazing period in these valleys ranges from 2 to 3 months. Many high-altitude pastures are of little use because of their small grazing area and the difficult approach. Some of the high-altitude pastures are generally free of snow cover, and these are also used for winter grazing. Pastures in the valleys of the Tyulek, Karakudzhur, Karasaz, Orchaly, and Bolgart Rivers are widely used for winter grazing. Herds of cattle and horses are also driven to pastures in the Kuylyn, Kaindy, Iryl'chek, Ak-Shiyrak, and Sarydzhas River valleys.

Cattle, horse, and hog breeding is practiced mainly in irrigated areas in the lowlands and on lower mountain slopes. The number of cattle and horses is estimated at 65,000 each. Hogs number approximately 45,000. The Auliye-Ata breed of cattle particularly is common throughout this area. Domestic horses are famous for their stamina and endurance under severe climatic conditions. This hardiness enables native herdsmen to graze their horses on high-altitude winter pastures that are often covered with layers of ice and snow and offer meager quantities of natural fodder.

The Soviets are making an effort to induce collective farms in the area to breed more than one type of livestock. The hope is to increase the number of animals in the area and better utilize natural fodder resources.

The principal low-altitude pastures are located in the Naryn and Kochkur Valleys. Grazing lands in the Naryn Valley are suitable mainly for summer, fall, and spring pasturing. Summer pastures are usually found on the upper slopes of the valley where the meadows are adequate for large-scale grazing. Fall and spring pastures are located on the lower, southern slopes of the valley. Livestock driven onto these consist mainly of horses and sheep. Some winter pastures are also found in the Upper Naryn Valley, but livestock kept in this part of the valley must be supplied with supplementary fodder throughout most of the winter months. Most of the livestock in the Naryn Valley is driven to winter pastures in the high, enclosed valleys of the Tyulek and Karakudzhur Rivers.

The Kochkur Valley has many pastures in the bottom lands or on the lower mountain slopes suitable for summer, fall, and winter grazing.

Other low-altitude pastures are found in the At-Bash, Orpa, and Ak-Say River valleys in the vicinity of Lakes Son-Kul' and Chatry-Kul'. These are suitable fall and winter pastures for horses, sheep, and goats.

At present, livestock in the Southern Highlands total about 840,000. Goats account for an additional 140,000. More than 80 percent of all livestock is owned by kolkhozes and sovkhozes; the remainder is still owned by nomadic herders. There are three large livestock breeding sovkhozes in the area. Two of these are sheep-breeding farms in the Kochkur and Dzhumgol region, and the third is a large horse-breeding farm in the vicinity of Naryn.

b. Industry

Industrial development in the hinterland is concentrated mainly in the cities of Alma-Ata and Frunze. Sparse population and lack of adequate transportation facilities have greatly restricted the expansion of industry throughout most of the region. Minor industrial installations are located in the towns of Tokmak, Kant, and Naryn. In addition, there are several clothing and shoe factories, as well as sugar mills and fruit canneries strung along the Lugovoy-Rybach'ye railroad in the Chu Valley.

(1) Alma-Ata

The city of Alma-Ata has developed into an important industrial center since World War II. The evacuation

of industrial plants from the war-threatened areas of the west contributed largely to the rapid industrial growth of the city. Alma-Ata is one of the most important torpedo-manufacturing centers in the Soviet Union. There are also industrial plants that manufacture munitions and armaments such as artillery shells, bombs, and mortars. Other plants in the metropolitan area produce chemicals (including oxygen and carbonic acid), cement, aircraft, ball bearings, pump motors, woolen textiles, clothing, and shoes. Processing installations include meat-packing combines, a fruit and vegetable combine, sawmills, grain elevators, tobacco factories, an oil refinery, and a sugar refinery (Figure 28). The main industrial section of town is in the west-southwest part of the city, although the northeast section is also gaining in prominence as an industrial area. Information on the principal industrial installations is as follows:

a) Munitions Plant and Torpedo Factory #175--This plant, also known as "Zavod #175," is probably the largest industrial establishment in Alma-Ata. It is located in the northwestern outskirts, 1 mile southwest of the Alma-Ata Railroad Station and Yards II. An 8-foot-high brick wall surrounds the industrial installations, which consist of numerous individual shops rather than one integrated plant. Two separate industries, the Alma-Ata streetcar barn and repair shop and a tobacco plant and machine shop are also located within the over-all compound of Plant #175.

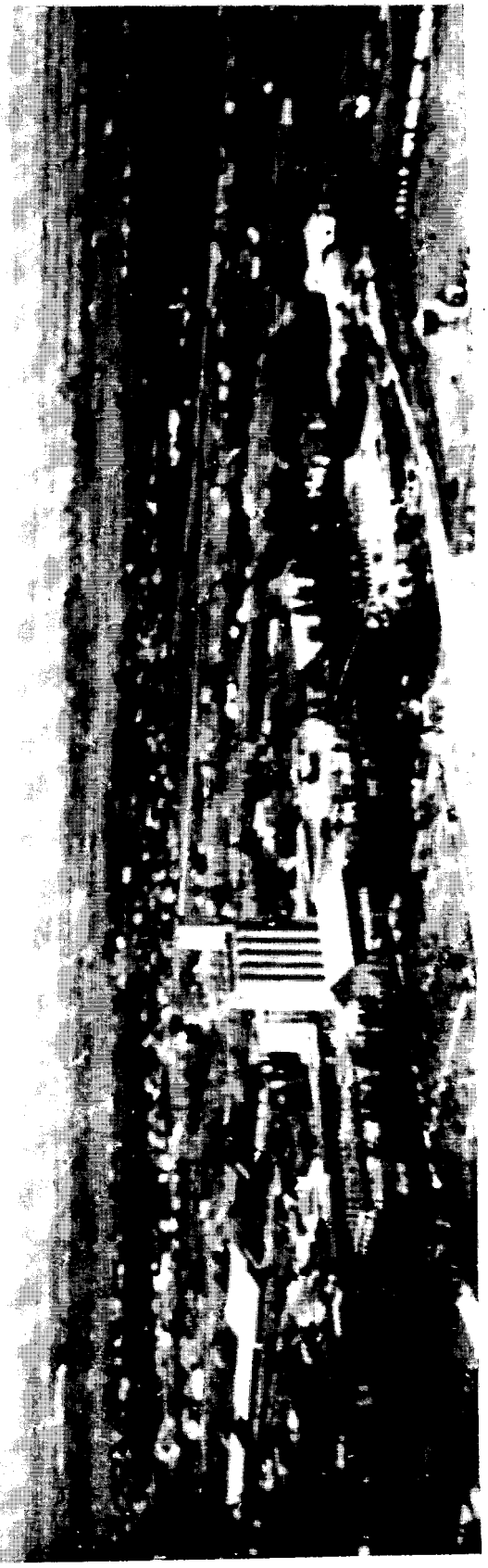

Figure 28. Food-processing and grain-storage facilities in Alma-Ata, 1944.

The plant ranks third in importance among the six torpedo-producing installations in the USSR. Its estimated production is approximately 300 torpedoes annually. Minor items produced include paravanes, parts for gasoline-burner stoves, torpedo parts, buoys, anchors for water mines, aerial bombs (since 1948), and tool sets for torpedo servicing on shipboard. The plant employs approximately 3,500 workers in three 8-hour shifts.

Completely assembled torpedoes, without explosive charges, are reported to be shipped from the Alma-Ata plant to Voroshilov, north of Vladivostok, for the use of the Soviet Fifth and Seventh Fleets. In addition to this primary output, considerable quantities of torpedo parts, particularly torpedo heads, are supplied to the Maldhach Kala Ammunition Plant, "Dvigatel 182," and Torpedo Plant "Dvigatel 181" at Leningrad. Torpedoes are also sent to the testing station of Przheval'sk on Lake Issyk-Kul', which works in close collaboration with Plant #175.

b) Alma-Ata Machinery Plant ("Alma Atinskiy Zavod Tyazhelogo Mashinostroyeniya" (AZTM)—This heavy-machinery plant is located approximately 5 miles northeast of the Alma-Ata Railroad Station and Yard II. The plant is of moderate size. It produced munitions during the last war. Russian civilians and some Japanese prisoners of war were known to be employed on three 8-hour shifts daily. The main installations of the plant are a foundry and casting shop where machinery frames and bases,

tractor parts, farm implements, and meat grinders are cast from scrap iron. Other parts include two machine shops, a blacksmith shop, and a shovel-manufacturing section. The "AZTM" Plant is reportedly also manufacturing an undetermined number of vehicles, tank gears and wheels, entrenching shovels, and numerous small household utilities. Raw materials and finished products are shipped by means of a single-track railroad spur connecting the plant with the Alma-Ata Railroad Station and Yard II.

c) Alma-Ata Electric Equipment Plant ("Trans-signal")--This installation is reportedly one of the larger plants in the Kazakh SSR. Its exact location is not known, but it is most likely situated in the west-southwestern part of town. The plant produces telephone, aircraft, motor-vehicle and railway-signal equipment, as well as electrical appliances and a wide variety of machine tools. During the war it produced parts for military vehicles and army personnel equipment. The plant consists of about 10 brick buildings of assorted sizes, which contain a forging shop and galvanizing and assembly plants. Some 2,000 persons are employed by the Trans-signal Plant.

d) Alma-Ata Locomotive and Coach Repair Shop--This shop is considered to be the main locomotive and coach repair shop for the Turksib Railroad System. Repairs are also undertaken for railroad equipment of other operating railroads. The plant employs some 6,000 workers in three 8-hour shifts.

e) Alma-Ata Municipal Thermal Electric Power Plant--The location of this important installation is known only by its coordinates: 43°17'N, 76°56'E. The installation has an estimated capacity of 24,000 kw, which surpasses the combined capacities of all small hydroelectric power plants in the vicinity of Alma-Ata. Practically all the power requirements of the industrial plants within the city limits are furnished by this plant. The fuel used by the plant is hard coal. It also receives power via underground cables from a transformer station and several smaller hydroelectric power plants on the Bol'shaya Almatinka River.

(2) Frunze

Frunze is one of the largest industrial centers of the Kirgiz SSR. Available statistics indicate that Frunze accounts for 65 percent of the total industrial production and over 30 percent of the industrial workers of the SSR. Its plants and factories are engaged mainly in the processing of agricultural raw materials grown in the Chu Valley Region. Prior to World War II industrial enterprises within the city included a large meat combine, a mill combine, a metal-working plant, sewing and furniture factories, tobacco and cigarette factories, and a leather and clothing plant. During the war, several plants were added to the industrial complex, including one producing cast-iron equipment, an aircraft subassemblies and components plant, two ammunition plants, and several hemp-jute and fabric-processing plants.

The following are the most significant industrial installations in the Frunze area:

a) Frunze Agricultural Machinery Plant (Imeni "Frunze")—This plant is located in the western section of the city. The plant includes an engineering shop, assembly shop, machine shop, and foundry. An additional foundry and a power station are reportedly under construction. Available sources indicate that the plant employs about 1,500 workers, some of whom may be classified as forced laborers. The principal products are harvesters, mowing machines, horse-drawn rakes, and a variety of machine tools and spare parts for agricultural machinery. Finished machine products mainly serve the needs of the Kirgiz rural economy, although many are sent to collective farms throughout Soviet Central Asia. Principal raw materials, such as steel and pig iron, are received by rail from industries in the Urals and the Moscow region. A single-track, broad-gauge spur line connects the plant with the main rail line through Frunze.

b) Frunze Tool Plant ("Instrumental'nyy Zavod")—It is believed that this plant is the same as the one called "Frunze Avtotraktor Zavod." In addition to manufacturing screw-cutting lathes, the plant repairs autos, tractors, and trucks. As of 1939 the plant employed some 1,000 persons, a number which is believed to have increased since World War II. During the war the plant was used as a major tank-repair station. Postwar

production of rifles and cartridges has been attributed to this plant, but has not been confirmed. A single-track, broad-gauge rail spur leads from the plant to the main rail line passing through Frunze.

c) Frunze Meat Combine ("Myasokombinat")—This plant was constructed in 1931 for the processing of agricultural raw materials in the Chu Valley Region. Since that date the combine was expanded into a number of large installations with modern equipment. The combine consists of sausage, meat-canning, and jar plants, as well as a large cold-storage installation. Livestock are sent to the meat-combine from all parts of northern Kirgizia (Figure 29).

d) Aircraft Subassemblies and Components Plant—This factory was evacuated from Moscow in 1942. At that time it was engaged in the manufacture of aircraft subassemblies and aircraft component parts. The last available information indicating its existence in Frunze is dated 1947, and it is not clear whether the plant is still in operation.

e) Voyenni Ammunition Plant (also known as Ogon Armament Plant)—This plant, located south of the railroad stations, produces small-arms and artillery ammunition. Since World War II the plant has expanded in size and productive capacity. Available reports indicate that it was supplied with new machinery in 1945. In 1946 some 3,000 workers were employed. A second munitions plant is located in the western part of town between

Figure 29. Meat-processing plant (Myasokombinat) in Irunea.

the main highway and railroad leading westward to Dzhambul. This plant has not been sufficiently identified, but it appears to be a subsidiary of the Voyenni Ammunition Plant.

Other significant industries in Frunze include a mill combine with a rice-processing plant; a tobacco-curing plant, which processes tobacco grown in the Talas and Fergana Valleys; a liquor distillery and brewery; a leather plant; an antimony-mercury combine; a chemical and pharmaceutical plant that produces camphor, strychnine, caffeine, glucose, arsenic, and calcium chloride; a furniture- and cart-making combine; three brick plants that produce 50 million bricks annually, two of which are identified as the Krasnly Stroitel' and Novo-Pavlov Plants; and a sewing and clothing factory, which supplies clothing to various parts of northern Kirgizia. Frunze has also a number of small local workshops engaged mainly in serving the urban population.

The Moscow "Lebedev" Institute has recently established an atomic research department in Frunze, but its location is not known. The Institute is supervised by the "Yugvost Komplab" (Southeast Complex of Laboratories), Department of the Academy of Science. The Frunze department specializes in mathematical and physical research on atomic energy. It also serves as a central laboratory for the atomic research centers in the Bet-Pakdala and Balkhash Deserts in the Kazakh SSR.

(3) Tokmak

Tokmak, 37 miles east of Frunze, is undergoing an increasing industrialization. Its position on the Lugovoy-Ryback'ye railroad and the increasing agricultural activity surrounding the city has resulted in the development of several industrial installations. Most of the industry located in Tokmak is engaged in processing agricultural materials such as sugar beets, fiber plants, wool, fruits, and vegetables. Installations are, in the main, concentrated in the suburb of Oktyabr'skiy and reportedly include a sugar refinery, a wool-washing plant, a fruit cannery, two machine shops (one of which has been cited for machine-gun production), and an asbestos and peat deposit station. In addition, an auto repair plant and a power station (Tokmak GES) are located within the city limits.

(4) Kant

Industrial installations in Kant, as in Tokmak, are based primarily on sugar-beet processing and truck gardening. Some of the products are transported to Frunze. Two sugar mills have been in operation in Kant since 1932, one of which is believed to be a subsidiary of the Frunze sugar refinery. Other industrial installations known to exist within the town limits include some larger supply and repair shops of the Kirgiz Ministry for Auto Transport, a small thermoelectric power plant, a cement plant (referred to as the Chuvski Plant), and a rayon industrial combine. Three miles east of Kant, in the village of Dmitriyevskoye, is a large sugar refinery that processes large quantities of sugar beets grown in the agricultural region surrounding Kant.

(5) Naryn

Naryn has several small establishments that serve local needs only. A motor-vehicle repair shop services commercial trucks and automobiles that use the Rybach'ye-Kashgar Highway. Other installations reported in Naryn are a dairy-products combine, several sawmills, a tannery, a brickyard, several primitive artels, and a hydroelectric plant with a capacity of 500 kilowatts. Recent information indicates the existence of a wolfram-collecting station.

5. Transportation

a. Railroads

Railroad facilities in the hinterland are limited to the Alma-Ata area and the Chu Valley. In the vicinity of Alma-Ata these facilities consist of the Alma-Ata railroad center and a short railroad connection with the Turksib Trunkline. A branch line of the Turksib Railroad runs through the Chu Valley, from Lugovoy to Rybach'ye. This part of the line, completed after World War II, is vital to the economic development of the hinterland. It goes through Frunze, Tokmak, Kant, and Bystrovka and leads through the narrow Buam Gorge, the only mountain pass between northern Kirgizia and the Issyk-Kul' Basin. The line connects the Chu Valley and the basin with the industrial centers of the Fergana Valley, the Kuznets Basin, and the Ural Mountains.

(1) The Alma-Ata Railroad Center

The Alma-Ata railroad center is one of the principal rail installations along the Turkestan-Siberian Trunkline. It consists of two railroad stations (Alma-Ata I and Alma-Ata II) connected by a single-track railroad line, a medium-sized railroad yard, several engine sheds, and a wheel shop. Numerous spur lines lead from this center to major industrial installations.

Railroad Station Alma-Ata I is located north of the city proper, at the junction between the Turksib and a single-track, broad-gauge line 7.4 miles long that leads south to the city railroad terminal, the Alma-Ata Railroad Station and Yards II. Station Alma-Ata I

is believed to have 8 tracks, 3 of which are used for passenger traffic. It also has several sidings leading to engine sheds and wheel shops. Turksib rail traffic passing through the station is relatively heavy. Freight trains 20 to 25 cars long reportedly pass in each direction about every half-hour. Freight moving in the direction of Novosibirsk includes assembled trucks (Zis and Molotov models), oil, rails, cement, bricks, pig-iron ingots, and food items. Freight consigned to western regions (Tashkent and the European USSR) consists, in the main, of large amounts of wood (mostly logs), brown and hard coal, large quantities of fur, and potatoes. Passenger trains stopping at Alma-Ata I (according to the 1950 Railroad Timetable) are the Moscow Express, which makes one round trip per week, and a slow passenger train operating once daily in each direction. Passenger movement at the station is supervised by civilian guards, whereas armed uniformed guards control freight operations.

The single-track line between Alma-Ata I and Alma-Ata II parallels one of Alma-Ata's main thoroughfares, over which streetcars run to a point about a mile southeast of Station Alma-Ata I. Two passenger trains and 10 to 12 freight trains a day move in each direction over this line.

Railroad Station and Yards Alma-Ata II handles both passenger and freight traffic. It probably has 10 or 11 tracks. Several of these lead to industrial installations in the city, including the Munitions Plant and Torpedo Factory #175, the Machinery Plant "AZTIG"

the railroad locomotive and car repair shop, a powerplant, and others. The terminal railroad station also has locomotive sheds and fueling facilities.

Freight trains arriving at Station Alma-Ata II carry baled cotton, lumber, cement, limestone, tobacco, assembled trucks, coal, saksaul (a dried desert plant widely used as fuel), pig-iron bars and ingots, and iron pipes. Outgoing freight trains carry consignments of cigarettes, canned meats and fruits, cotton textiles, heavy machine parts, flywheels, and other locally manufactured products.

(2) The Frunze-Rybach'ye Railroad Line

The Frunze-Rybach'ye line is one of the most significant transportation routes in the hinterland. Approximately 105 miles long, it is a sector of a single-tracked, broad-gauge line that branches off from the Turksib at Lugovoy. From Lugovoy to Rybach'ye is 201 miles.

The line was completed to Frunze in 1924. In 1932 it was extended to Kant, and the Kant-Bystrovka section was completed by 1941. The final sector, between Bystrovka and Rybach'ye, was reported as completed in 1952. The line has become vital to the economic development of the Chu Valley and the Issyk-Kul' Basin. Grain and lumber shipments from the basin have doubled since the opening of rail traffic, and a lively trade has developed with the industrial centers of the Fergana Valley, the Ural Mountains, and the Moscow area. The Soviets plan to extend the railroad from Rybach'ye to Przheval'sk along the northern shore of the lake.

The principal railroad installations in the Issyk-Kul'-Central Tien Shan Region are located at Frunze. They consist of a locomotive repair shop, engine shed, rolling-stock repair shop, watering and fueling facilities, and a small freight yard. A small engine shed and a modern depot for railroad coaches are located at the suburb of Pishpek. Between Frunze and Ivanovka, a distance of 39 miles, the line runs between the Frunze-Rybach'ye Highway and the Krasnorechenskiy Irrigation Canal. Stops along this stretch are at Kant and Ivanovka. Between Frunze and the Buam Gorge, the main stops are Tokmak, Chimkurgan, and Bystrovka. Station "Post KM 272" between Tokmak and Chimkurgan serves as a flag stop. The railroad station at Bystrovka, 57 miles east of Frunze, is located approximately 2.5 miles east of the settlement. The station building is of stone and there are two sidings in addition to the main line. Through the Buam Gorge, the roadbed is cut deeply into the mountainside and lies at a slightly higher elevation than the Frunze-Rybach'ye Highway. The route has many sharp curves, and up and down grades. The existence of tunnels has been reported between Duyl'-Arys and Kyz-Kiya. Near the latter, the line crosses the Chu River and continues along the right bank to Oko-Meynak and Rybach'ye.

Freight traffic along the line is heaviest between Frunze and Tokmak. Eastbound freight consists largely of manufactured goods and machinery, coal, lumber, construction materials, cement, salt, and water pipes. Westbound freight includes wheat, sugar beets,

fruits and vegetables, fish from Lake Issyk-Kul', and some coal from the Dzhargalan fields. According to 1951 reports, at least one freight train was passing Bystrovka daily in each direction.

Passenger service as listed in the 1950 Soviet Time Table consists of one train a day in each direction between Frunze and Bystrovka. The same service is believed to have been extended to Rybach'ye. Passenger traffic west of Frunze, on the Lugovoy-Frunze sector, is considerably heavier. Daily round-trip service is offered by two slow trains and one fast train.

b. Roads

The road net in the hinterland consists of several highways of various degrees of adequacy, a few short improved dirt roads, and a great number of mountain paths and trails. The best roads are in the vicinities of Alma-Ata and Frunze. Main roads from Alma-Ata lead 1) north to Iliysk, 2) west to Frunze, and 3) east to Kegen' via Talgar and Chilik. A highway passing through Frunze leads eastward through the Chu Valley and Buam Gorge to Rybach'ye, where it branches into three main routes. One of these leads to Kashgar in Sinkiang; the other two skirt the northern and southern shores of Lake Issyk-Kul', respectively, leading to Przheval'sk.

Other improved dirt roads in the area emanate from Frunze, Tolmak, Naryn, and Przheval'sk. Two improved roads lead westward from Kochkorka and Naryn, respectively, to the industrial center of

Dzhalalabad, outside the study area. A third road originating at Przheval'sk cuts across the northeastern part of the hinterland to Charyn, via Kegen' and Podgornoye. Unimproved dirt roads, many of which are little more than winding paths used primarily for driving cattle to pasture or to market, connect outlying communities with economic centers. These primitive roads are found chiefly in mountain valleys.

Narrow trails and paths are the only means of travel over mountain crests or through deep canyons. The degree to which these are used by local traffic depends largely on the difficulty in traversing the associated mountain passes (Figure 30).

Several of the trails in the area are used as caravan routes (Figure 31). The trail running southward via the Ak-Bel', Tozhiko, Ishtyk, and Bedel' Passes is considered an important caravan route to Sinkiang.

(1) Major Roads from Alma-Ata

(a) Alma-Ata - Chilik - Kegen' Highway

Only the eastern and western sections of the Alma-Ata - Chilik - Kegen' Highway are located within the study area. The western section extends from Alma-Ata to Talgar and the eastern section from the settlement of Kegen' to the Sharyn River. The longest stretch, 94 miles, from Talgar to the Sharyn River, lies outside the Issyk-Kul' Basin - Central Tien Shan Region. The section between Alma-Ata and Talgar is 22 miles long. Its

Figure 30. A characteristic mountain trail, showing hazards to movement.

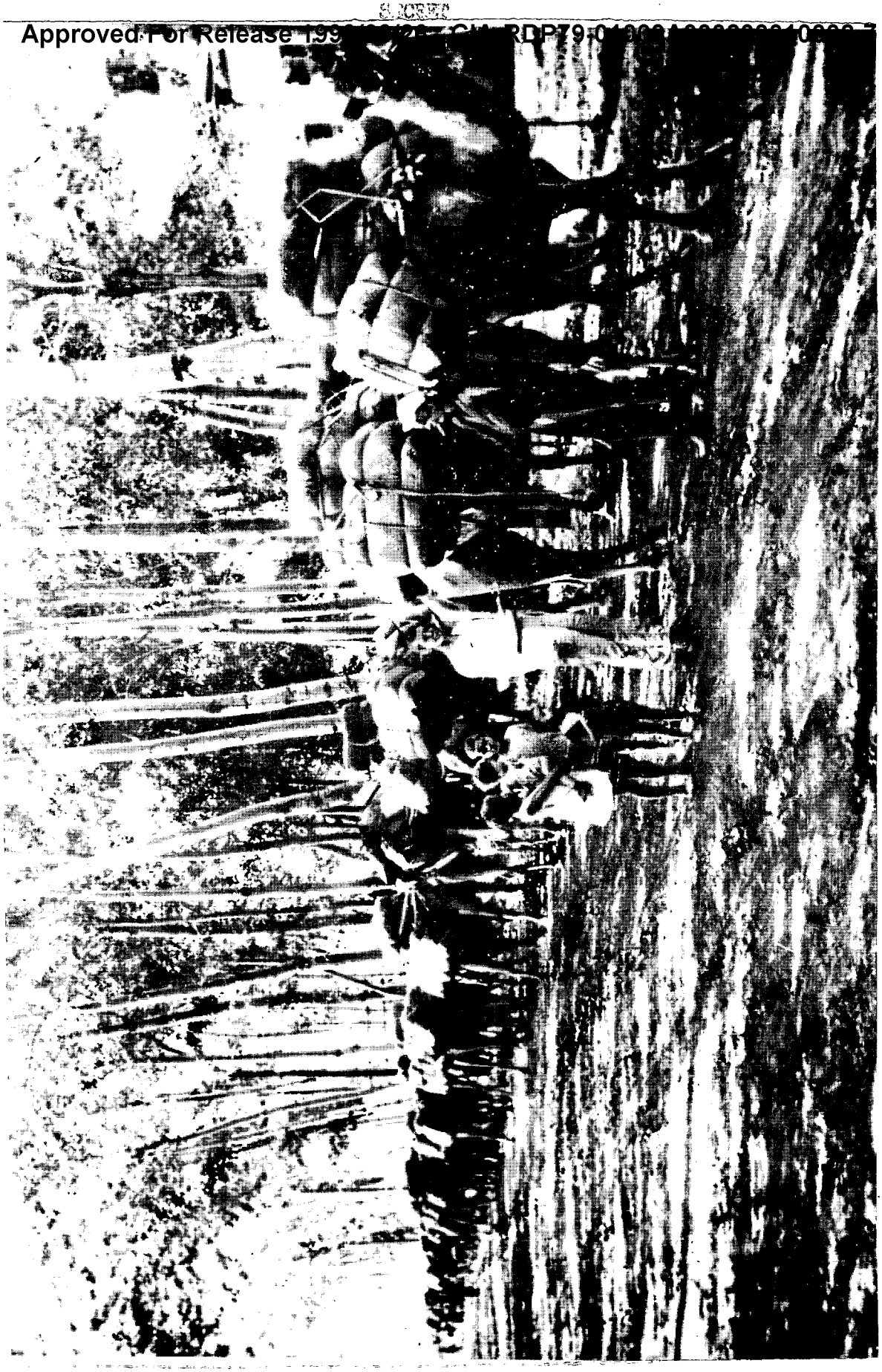

Figure 31. Camel caravan assembled at Alma-Ata for journey across the Tien Shan Mountains.

surface is asphalt, and it is approximately 20 feet wide. About 11 miles east of Alma-Ata, the highway narrows for a short distance to less than 10 feet, and trucks can pass each other here only with extreme difficulty. A drainage ditch parallels the road for a distance of 12 miles from Alma-Ata.

Several important installations are located along this sector of the highway. At the northeastern outskirts of Alma-Ata, military barracks south of the road reportedly house an artillery unit. Approximately 3 miles northeast of Alma-Ata, about 300 feet north of the road, is a motor-vehicle repair shop. A small powerplant and a water reservoir are located 13 miles east of the city.

The highway reenters the hinterland at the Sharyn River (approximately 43°15'N; 78°56'E). From that point it leads due south to the low Kuuluk-Tau Mountains, at the base of which the road turns sharply eastward and continues parallel to the mountains. Near the Termelik River the road crosses the Kuuluk-Tau and leads southward to Kegen'. The distance by road between the Sharyn River and Kegen' is approximately 50 miles. At Kegen', a junction is made with two improved dirt roads, which lead south to Karkara and southeast to Akbent, respectively.

Traffic from Alma-Ata to Kegen' consists mostly of truck movements. Much of the eastbound freight goes beyond Kegen', via Narynkol, to Kuld-zha in Sinkiang Province. Freight westbound to Alma-Ata consists mainly of fruits and vegetables.

(b) Alma-Ata - Iliysk Road

This improved dirt road runs north-northeast from Alma-Ata to Iliysk, a distance of approximately 46 miles. Only an 8-mile stretch of the road lies within the Issyk-Kul' - Central Tien Shan Region. The road parallels the railroad line connecting Stations Alma-Ata I and II. Within Alma-Ata the road is paved with stone; beyond the city limits it is of rolled crushed stone. Its width is approximately 20 feet. Drainage ditches are reported on each side of some sections of the road. A streetcar line follows the road and terminates at a grain silo about a mile southeast of Station Alma-Ata I. On the east side of the road approximately 2 miles north of the outskirts of Alma-Ata are three large, wooden, grain warehouses. About 3.2 miles north of Alma-Ata the railroad crosses the road, and barrier gates are operated manually at the crossing. From this level grade crossing the road parallels the railroad as far as a second level crossing 5.5 miles north of Alma-Ata.

Traffic is heaviest in the section leading from Alma-Ata to the airfields north of the city. Mostly military and civilian vehicles engaged in operations connected with the airfield use this road.

(c) Alma-Ata - Frunze Road

From Alma-Ata a road runs westward, skirting the foothills of the Zailiyskiy Ala-Tau and Chu-Iliyskiye

Mountains. It cuts across the Chu-IliyskiyeRanges over the Chagay Pass (elevation 4,000 feet) and continues southwestward to Frunze. The road is 147 miles long and is the shortest motor route between Alma-Ata and Frunze. The surface is gravel except in the sector from Alma-Ata to Kaskelen, which is paved with stone. It has a width of 23 feet. Heavy truck traffic and poor maintenance have resulted in considerable surface damage, and in 1949 the road was reported to be in bad condition. Plans for reconstruction include asphalt surfacing.

Between Alma-Ata and Kaskelen the road passes over two large bridges. One of these, located 5 miles west of Alma-Ata, can be bypassed, however; available sources indicate that trucks can easily ford the stream about 32 feet north of the bridge by crossing over an artificially built, underwater gravel causeway. The bridge has concrete-reinforced girders. The road surface across the bridge is 23 feet wide, and there is a 3-foot sidewalk on each side.

Westward from Kaskelen the road runs relatively close to the foothills of the Zailiyskiy Ala-Tau. The 46-mile stretch to Targan is bordered on both sides by collective farms. One of these is the Kolkhoz Mayskiy, some 11 miles west of Kaskelen. Fabrichnyy, Uzun-Agach, and Samsy are larger settlements along the route. From Targan to the Chagay Pass the road passes numerous winter quarters of the seminomadic Kirgiz and Kazakh cattle herders. Except for the small villages of Kurday and Otar-Rgayty, there are no permanent settlements along the route. The Chagay Pass (elevation 1,800 feet) is

easily crossed. It is sufficiently wide for the road to maintain its 23-foot width. Crossing the Chu-IliyskiyeMountains, the road follows a southwesterly course as far as the settlement of Syugaty, thence swings southward to Frunze. The road crosses the Chu River at the large settlement of Georgiyevka.

Traffic along the entire Alma-Ata - Frunze sector consists mainly of trucks. Most of these are Zis-5 models (3 tons), Zis-150 (4 tons - 1948 models), and Gaz-150 (1/2 to 2 tons, a new model copied from American Studebaker trucks). Freight carried consists chiefly of agricultural products being distributed to local kolkhozes.

(2) The Frunze-Rybach'ye Highway

This strategic highway is the only motorable route connecting the Chu Valley with the Issyk-Kul' Basin. For its length of approximately 107 miles, the highway parallels the Frunze-Rybach'ye railroad line. Truck and automobile traffic between Frunze and Rybach'ye is extremely heavy.

At Frunze, the highway connects with the Tashkent - Alma-Ata Road. Fron Frunze eastward to Tokmak, along a stretch of about 36 miles, the highway is asphalt surfaced. The road passes through a thickly populated agricultural area. Along the first 9 miles from Frunze, rural settlements merge together in a ribbonlike pattern. Near the town of Kant (11 miles east of Frunze) and beyond, the sugar-beet, alfalfa, and grain fields border the road on both sides. The outlines of the Kirgizskiy Mountains to the south and the Chu-IliyskiyeRanges to the north can be seen, at first faintly, but

more clearly as the highway approaches Tokmak. From Tokmak eastward, the highway is surfaced with gravel and, according to the Soviets, quite suitable for heavy automobile and truck traffic. As the road enters the mountains, cultivated fields are smaller and populated places farther apart. The road ascends the foothills of the Kirgiz Ala-Tau Ranges and enters the narrow and hazardous Buam Gorge between the Chu River to the north and the Frunze-Rybach'ye railroad line to the south and at a slightly higher elevation. The road alignment through the Gorge is highly irregular, with numerous sharp curves and steep grade crossings (Figure 32). At approximately the middle of the Buam Gorge, the road crosses the Chu River by a bridge 33 feet long and 26 feet wide. This appears to be a single-lane bridge of wooden construction with two brick abutments. There are no piers in the river because of the very swift current. The water clearance of the bridge is 6.5 feet. There are catwalks on each side of the roadway. The bridge is closed to night traffic. No road tunnels are reported in the Gorge.

There are some repair and fueling installations along the highway. At Frunze, repair and maintenance of trucks and civilian cars are handled by the Frunze Tool Plant, "Instrumental'nyy Zavod." A motor repair shop is also located in the eastern outskirts of Frunze at Novo-Pokrovka. The main car repair shops of the Ministry of Automobile Transport (Ministerstvo Avtotransport) for the Kirgiz SSR are located at Kant. Another auto repair shop is located in

Figure 32. The Frunze-Rybach'ye Highway leading through the Boam Gorge.

Tokmak. Fueling stations are located at Frunze, Tokmak, Kant, and Rybach'ye. In addition large gasoline tanks are believed to be located near the railroad station in Bystrovka.

Within the Chu Valley, numerous unimproved dirt roads and paths branch off the highway and lead to neighboring sovkhozes, kolkhozes, and winter quarters. Most of the better branch roads radiate southward from Frunze and Tokmak. A Soviet newspaper report indicates that construction of a new motor road leading south from Frunze to the high mountain valley of Susamyr has been completed. The health resort of Arasan, located about 40 miles southeast of Frunze in the narrow valley of the Issyk-Ata River, is connected by a dirt road with Novo Pokrovskoye (a suburb of Frunze) and with Ivanovka. Several dirt roads connect Tokmak with outlying agricultural districts at the Kegety and Shamsi River valleys in the Kirgizskiy Range.

(3) The Rybach'ye - Naryn - Kashgar Highway

This highway is currently the main truck route crossing the Naryn Upland. It connects the railhead of Rybach'ye with the city of Kashgar in Chinese Sinkiang. The distance from Rybach'ye to the Sinkiang border, at the Turugart Pass (elevation 13,307), is approximately 210 miles. The highway surface is gravel or stone up to the Sinkiang Border. In Sinkiang the road is of unimproved dirt construction. The road is open all year for motor traffic and is used by the Russian mountain troops guarding the Chinese Border (Figure 33). The exact width of the road is not known, but it is wide enough to permit two trucks to pass each other.

Figure 33. Mounted patrol on the Kirgiz-Sinkiang Frontier.

Maintenance along the entire route from Rybach'ye to the Sinkiang frontier is good. Huts occupied by personnel of the road-repair service are scattered along various stretches of the road. Native herdsmen also participate in road repairs and help keep traffic lanes open during the winter season.

Improved branch roads meet the main highway only at Kochkorka and Naryn. At Kochkorka an improved dirt road branches off the highway and leads in a southwesterly direction to Dzhalal-Abad, the third largest city of Kirgizia. This branch road is a significant trade route between the Issyk-Kul' Basin and the Fergana Valley. From Kochkorka to Naryn, the road passes through the Gorge of the Dzhuvanaryk River and crosses the Dolonskiy Pass (elevation 10,040 feet). At Naryn a surfaced branch road leads westward to Dyul'berdzhin. From Naryn, the main highway cuts through the Naryn-Tau Mountains and the Atbashin River valley. The route is characterized by steep grades and sharp and hazardous curves. The settlement of Atbash is the largest community between Naryn and the Sinkiang boundary. At Atbash, the highway turns to the southwest, following the course of the Kara-Koyun River. Near the western end of the Atbash Mountain Range the road turns southward and leads to the winter pastures of the Ak-Say Syrt and Lake Chatyr-Kul', passing the lake along its south shore and reaching the Sinkiang border at the Turugart Pass.

(4) The Przheval'sk - Narynkol' Road

This improved motor road is significant because it offers a secondary approach to the Sinkiang Province of

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China. The Przheval'sk - Narynkol' Road has an approximate length of 107 miles, only 75 miles of which are in the hinterland. The road has a loose gravel or stone surface and is believed to have two lanes.

The road enters the hinterland through the Kyzyl-Kiya Pass (approximate elevation 7,200 feet) and leads northeastward to the settlements of Karkara and Akbent. Numerous tombs and burial mounds are found along the route from the Kyzyl-Kiya Pass to Akbent. From Akbent to Narynkol' the road skirts the foothills of the Bas Ogly-Tau Ranges and follows the Tekes Valley to Narynkol'. At Karkara and Akbent improved dirt roads branch off from the Przheval'sk-Narynkol' Road and lead to Kegen'.

c. Inland Waterways

The narrow, swift, and unregulated channels of the principal rivers of the hinterland prevent any type of commercial navigation (Figure 34). A 1947 source states that a planned dam across the Chu River may permit navigation by small commercial craft. Flat-bottom boats or lumber rafts may be used by the native population along certain stretches of the Chu and Naryn Rivers. There are no reports of navigation on Lakes Son-Kul' and Chatyr-Kul'.

d. Air Transport

Air-transport facilities in the study area are centered at Alma-Ata and Frunze. These cities have airfields with scheduled and unscheduled airline traffic. They are also used by the Soviet Air Force for training purposes.

Figure 3b. Typical mountain stream in the Issyk-Kul' - Central Tien Shan Region.

(1) Air Routes

The following "Aeroflot" routes use the air terminals at Alma-Ata: Alma-Ata - Karaganda - Kustanay (alternate route through Akmolinsk); Alma-Ata - Omsk - Sverdlovsk - Moscow; Alma-Ata - Semi-Palatinsk - Novosibirsk (alternate route through Taldy-Kurgan); Alma-Ata - Tashkent. Two unscheduled (or regional) routes also operate from Alma-Ata: Alma-Ata - Ust'-Kamenogorsk - Semi-Palatinsk - Leninogorsk, and Alma-Ata - Panfilov - Taldy-Kurgan - Ayaguzkiy - Bakhty.

"Aeroflot" routes utilizing the Frunze air facilities are: Frunze - Alma-Ata; Frunze - Dzhusaly - Ural'sk - Penza - Moscow; Frunze - Tashkent. The unscheduled (or regional) routes operating from Frunze are: Frunze - Naryn; Frunze - Przheval'sk; Frunze - Rybach'ye - Przheval'sk; Frunze - Osh; Frunze - Dzhalal-Abad; Frunze - Talas.

(2) Airfields

The hinterland area has five airfields. Three are at Alma-Ata, one at Frunze, and a minor landing field, used mostly for local flights, at Naryn.

(a) Alma-Ata

The Alma-Ata (Fort Vernyy) Airfield is located about 6 miles northeast of the Alma-Ata II Railroad Station and approximately 2 miles northeast of Station Alma-Ata I. This field is the terminus of the Moscow - Alma-Ata air route, and

one of the most important airfields in the hinterland. It is also used by the Soviet Air Force and is capable of supporting sustained operations of light transport, reciprocating engine fighters, and possibly limited operations of jet-fighters. Its graded earth runway is approximately 4,500 feet long and is oriented in a north-south direction. The field has a large steel and concrete hangar and several graded taxiways. Communication facilities at the field consist of ground-to-air radio, telephone, telegraph, and a wireless station. Storage facilities, workshops, and several supply sheds are located on the southern part of the field. Access to the field is by the Alma-Ata - Iliysk railroad and road.

The Alma-Ata North Airfield is located about 7 miles north-northeast of the Railroad Station Alma-Ata II, just west of the Alma-Ata - Iliysk Highway and railroad line. From the Alma-Ata I Station the distance is 2 miles. This is a relatively important military airfield of the Alma-Ata area and has been used for para-troop training. In addition to reciprocating fighters and TE transports, the field may be used for limited jet-fighter operations (Figure 35).

The sodded runway has an estimated length of 4,000 feet and runs in a north-south direction. Open parking is available. Communication facilities consist of air-ground radio and telephone. There are no hangars, but three brick barracks for military personnel, an administrative building, and some underground installations have been reported.

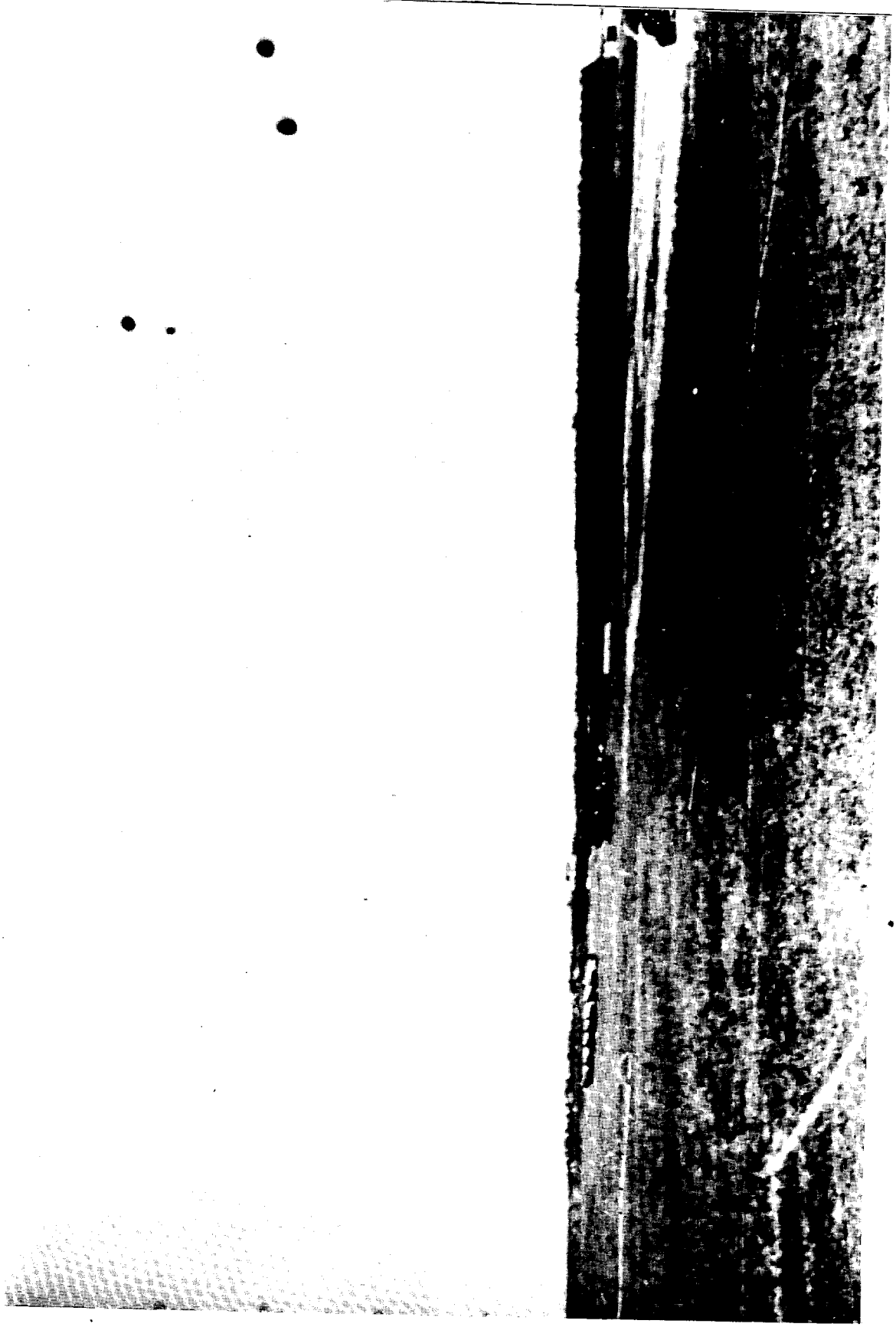

Figure 35. Military airfield -- Alma-Ata North

The Alma-Ata Northwest Airfield is reportedly located 6 miles north of the Alma-Ata II Railroad Station, and 1 mile west of the Alma-Ata - Iliysk road and railroad. The airfield is used exclusively by the Soviet Air Force and has been used in connection with paratroop training in the Alma-Ata area.

No information is available as to the runway except that the surface is sodded. Also no information is available regarding communication facilities, supply, and fixed installations, such as hangars, shops, full depots, and administrative buildings.

(b) Frunze (Pishpek)

This airfield is reported to be 1 or 2 miles south of Frunze. It is the terminal of the Moscow - Lynbertsy Civil Air Route. The airfield was used for pilot training during World War II, but at present it is used chiefly by civilian-type aircraft. The field is capable of supporting sustained operations of light transport, reciprocating engine fighter, and possibly jet fighter planes.

The field has an estimated runway of 4,000 feet. The surface is sodded. Its capacity is limited to planes of types Il-12 and Il-2. Only open parking is available.

Radio facilities at the field consist of an air-ground station where meaasages can be sent in voice or code. Some storage and main organizational facilities are reported, also the existence of a building for passenger traffic and several workshops.

(c) Naryn

The Naryn Airfield is reported to be located within the town limits of Naryn, on the Atbashi-Rybach'ye main motor road. It is the terminus of the passenger and mail air service between Frunze and Naryn. The field has no known military significance. It is used by civilian planes of the Il-2 class and may be capable of supporting operations of light transports and reciprocating engine fighters.

APPENDIXES

A. Gaps in Intelligence

A substantial proportion of the materials used in this study was taken from basic geographic sources. Only a very limited amount of current data concerning peoples, industry, health and sanitation, and transportation is available for the Issyk-Kul' -- Central Tien Shan region, and much of the information was necessarily taken from raw intelligence documents.

Some of the most critical gaps in current intelligence are in population figures and information on the status of people from the European USSR forcibly resettled in the region. Population figures in most cases are no more than rough estimates.

Although the quantity of data available for the waters of Lake Issyk-Kul' is insufficient for a detailed analysis, only those data were included for which the methods and conditions of observation were given in some form.

Climatic data for the Naryn Upland and Khan-Tengri areas are also inadequate. Only short-period observations are available for two meteorological stations. Observations from one of these stations, the Tien Shan Observatory, are for 3 years -- a very short period on which to base averages.

B. Sources and Evaluation of Sources

1. Evaluation of Sources

A large part of the information included in this study has been taken from Russian scientific publications and texts. Scientific publications were used for the bulk of the data on physical characteristics; most of these were published between 1925 and 1935, although a few are as recent as 1950 and some as early as 1904. These publications are considered completely reliable, however, since the physical factors involved have undergone no substantial change over the period covered.

A great deal of the basic information for the sociologic and economic conditions in the region was also taken from scientific publications. For more recent data, however, Soviet texts and semipopular regional studies and documents of U. S. intelligence organizations were used. Raw data from intelligence documents were substantiated wherever possible, but a great deal could not be checked. Although Soviet texts and semipopular regional studies are generally reliable, they tend to overemphasize plans and it is sometimes difficult to determine the exact status of features described.

2. Evaluation of Map Coverage

No uniform large-scale topographic coverage for the entire Issyk-Kul'--Central Tien Shan region is available (see map CIA 12568). Unedited proofs of the Army Map Service series M502 at 1:250,000 are the largest-scale American maps that cover the larger part

of the region. Reproductions of these proofs, at a slightly smaller scale, are included with the report. The AMS N502 series provides no coverage of the Khan-Tengri node nor the area along the Kok Shaal-Tau Range. Coverage at 1:200,000 is available for most of the region through a combination of Russian and German maps. An old Russian series at 1:84,000 gives coverage of the Issyk-Kul' Basin and much of the western part of the Naryn Upland. This series is probably more artistic than accurate, since topographic research undertaken in the area at the time of its publication was not sufficient to provide the amount of detail that the maps portray.

Only one chart showing detailed information for Lake Issyk-Kul' is available. This chart, published in 1937 by the Administration of Naval Communications of the Workers' and Peasants' Red Army (UMS RKKA), is based on information gathered in the years 1894, 1914, 1928, and 1930. Depth information appearing on the map CIA 12545 has been taken from this chart.

The maps listed can be obtained through the CIA Map Library.

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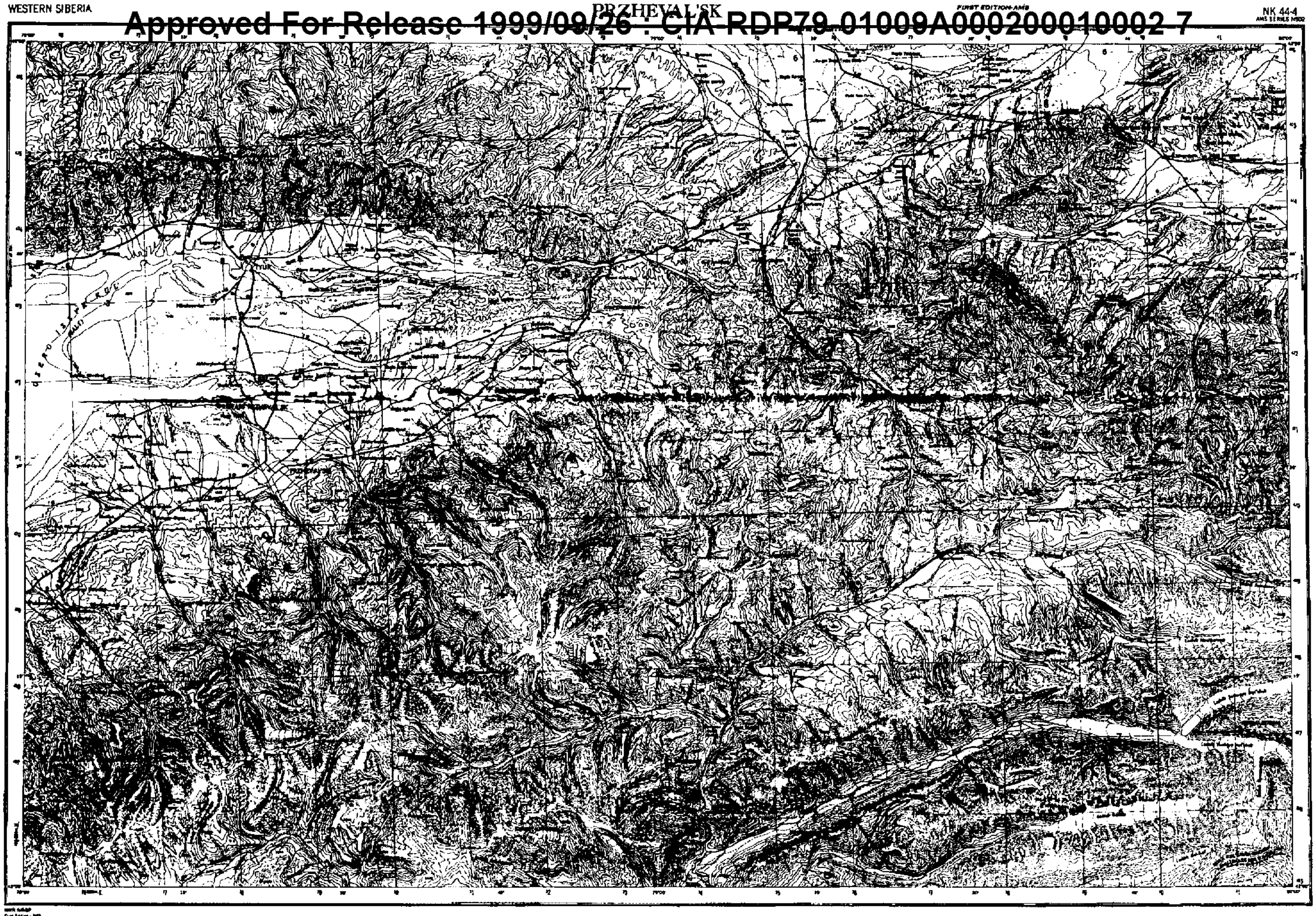
CONFIDENTIAL



GLOSSARY

LEGEND

ALMA-ATA
CHIMKENT
NARGANA

CONTOUR INTERVAL 100 METERS

TRANSVERSE MERCATOR PROJECTION

RELIABILITY DIAGRAM

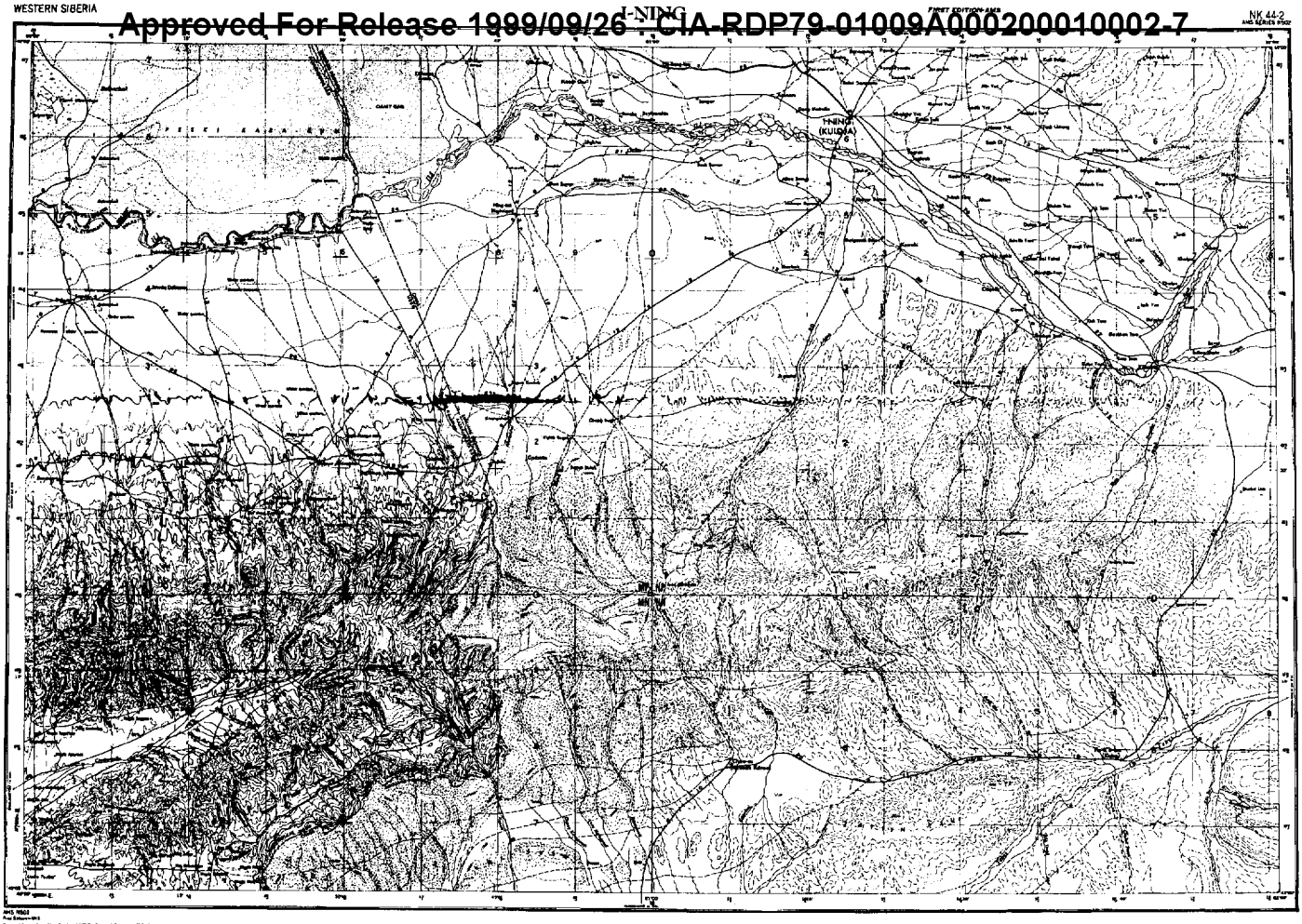
PRZHEVAL'SK L.S.S.R.

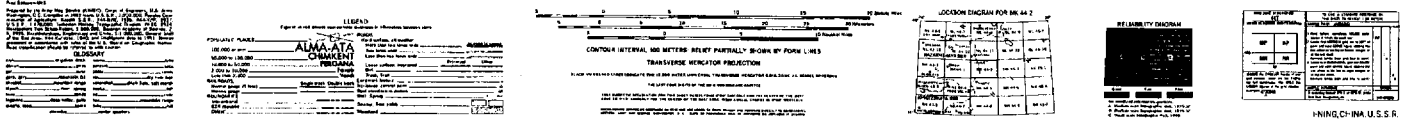
UNEDITED PROOF

WESTERN SIBERIA

I-NING

NK 44-2





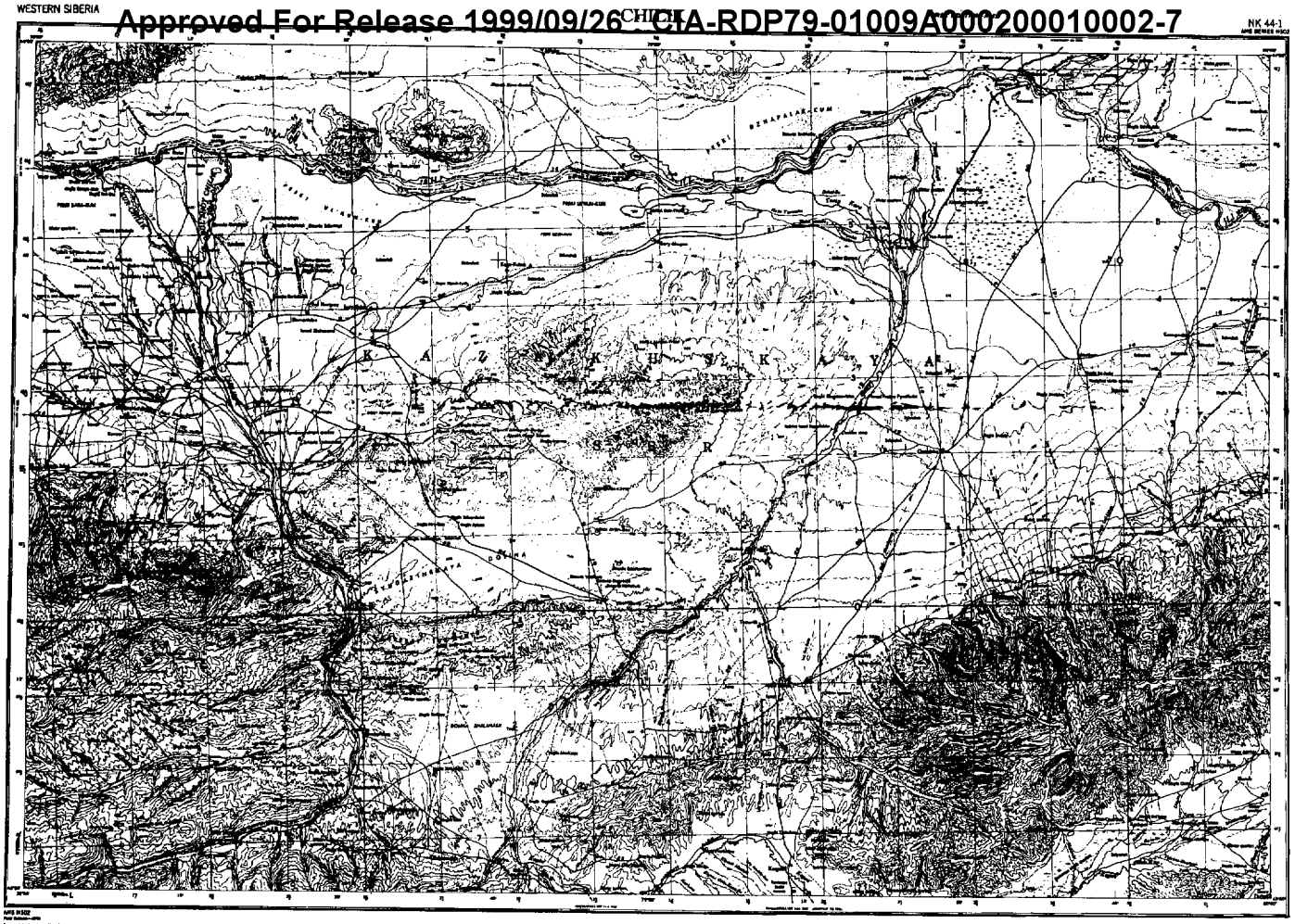
I-NING,CHINA U.S.S.R.

UNEDITED PROOF

WESTERN SIBERIA

CHILIK

NK 44-1



CONTOUR INTERVAL 100 METERS WITH SUPPLEMENTARY CONTOURS AT 50 METER INTERVALS

TRANSVERSE MERCATOR PROJECTION

LOCATION DIAGRAM FOR NK 44-1

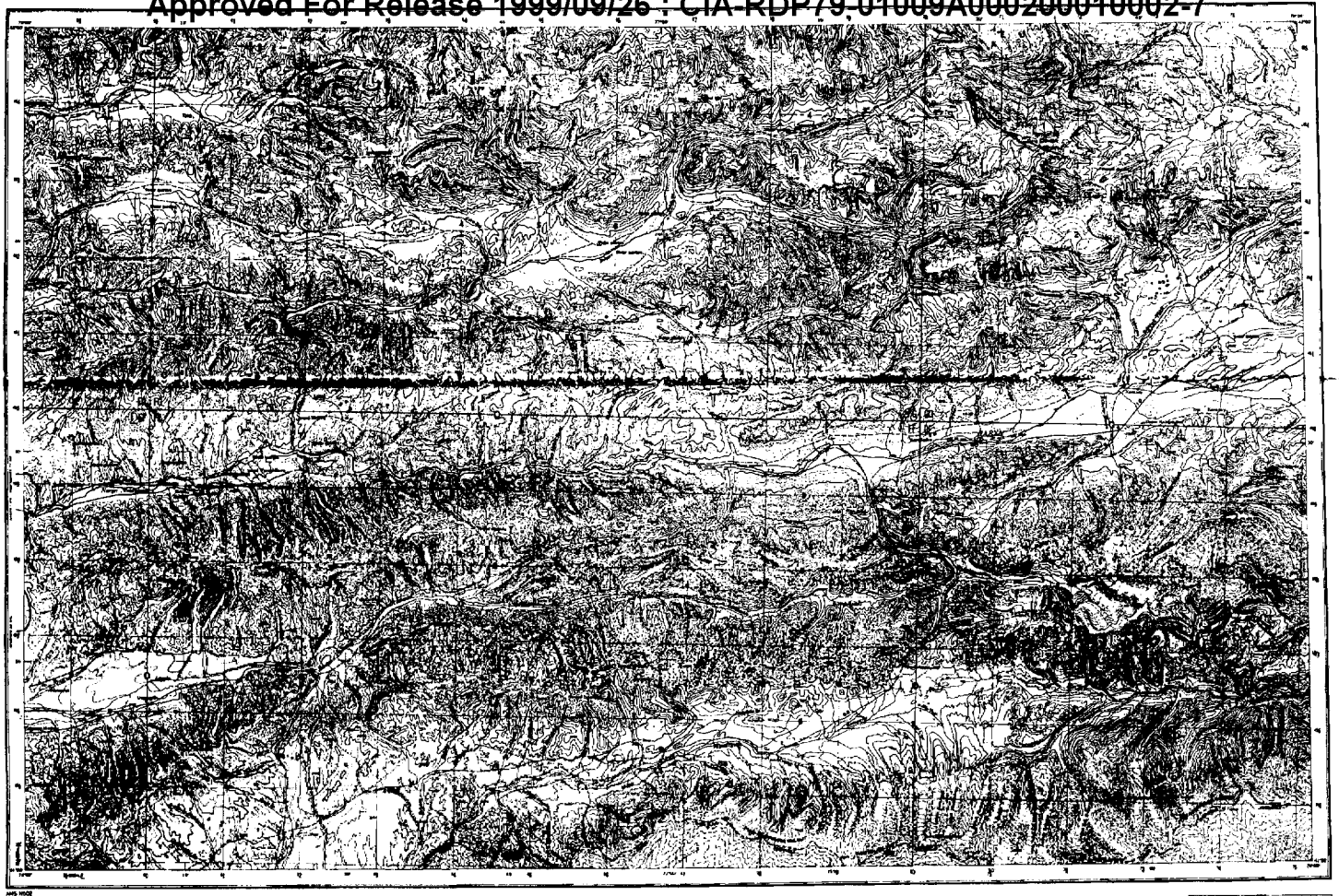
CHILIK, U.S.S.R.

UNEDITED PROOF

WESTERN SIBERIA

IMENI VOROSHILOVA

NK 43-9



LEGEND

ALMA-ATA
CHIMKENT
TASHKENT

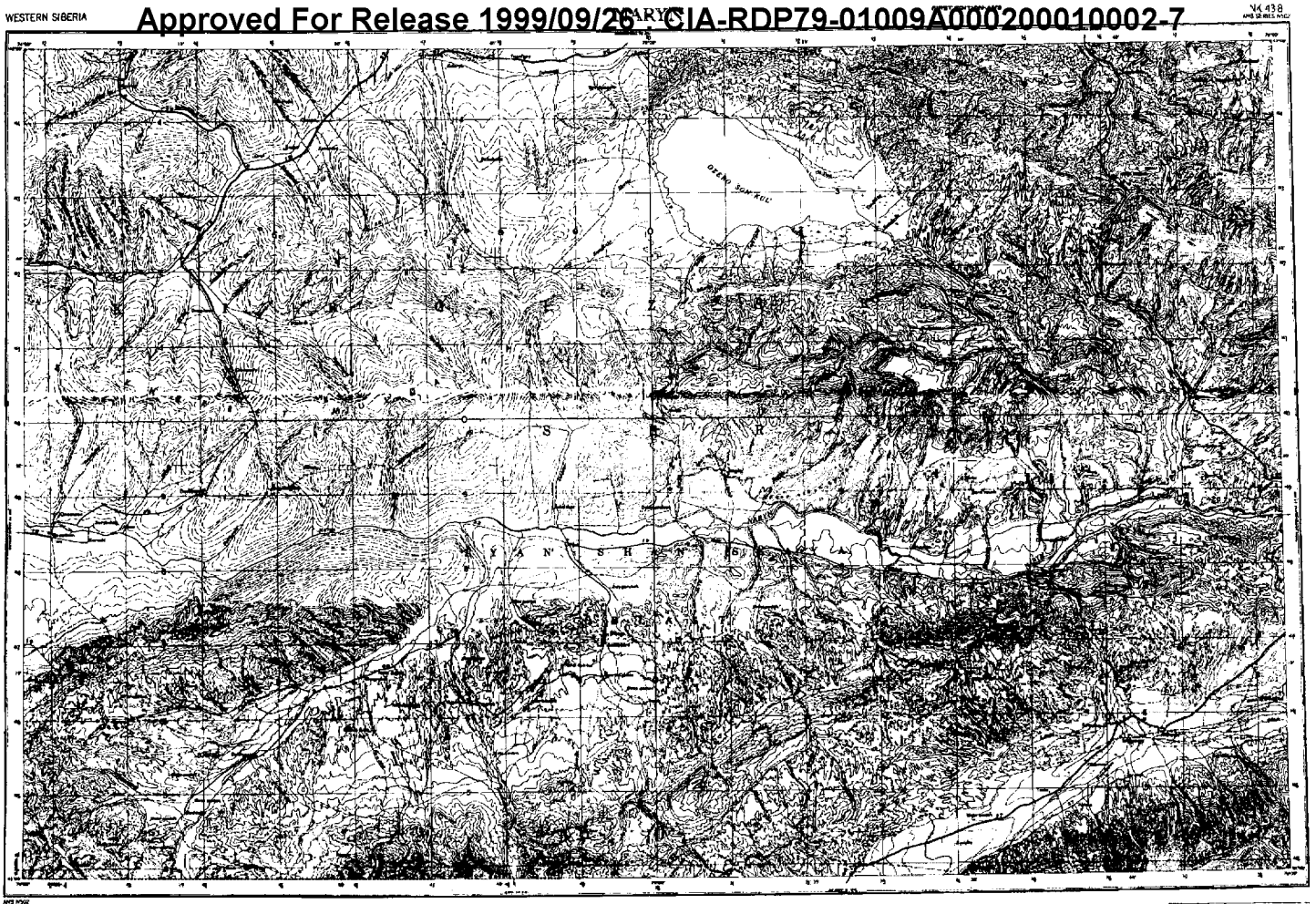
CONTOUR INTERVAL 100 METERS. RELIEF PARTIALLY SHOWN BY FOUR LINES

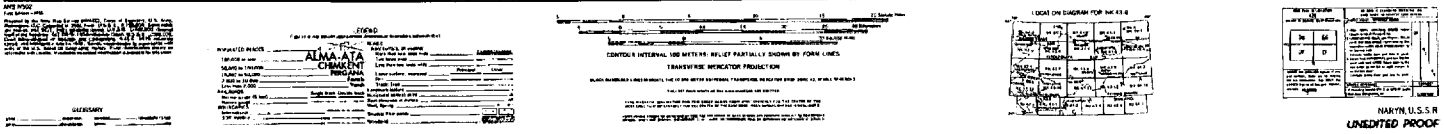
TRANSVERSE MERCATOR PROJECTION

LOCATION DIAGRAM FOR NK 43-9

IMENI VOROSHILOVA, U.S.S.R.

UNEDITED PROOF

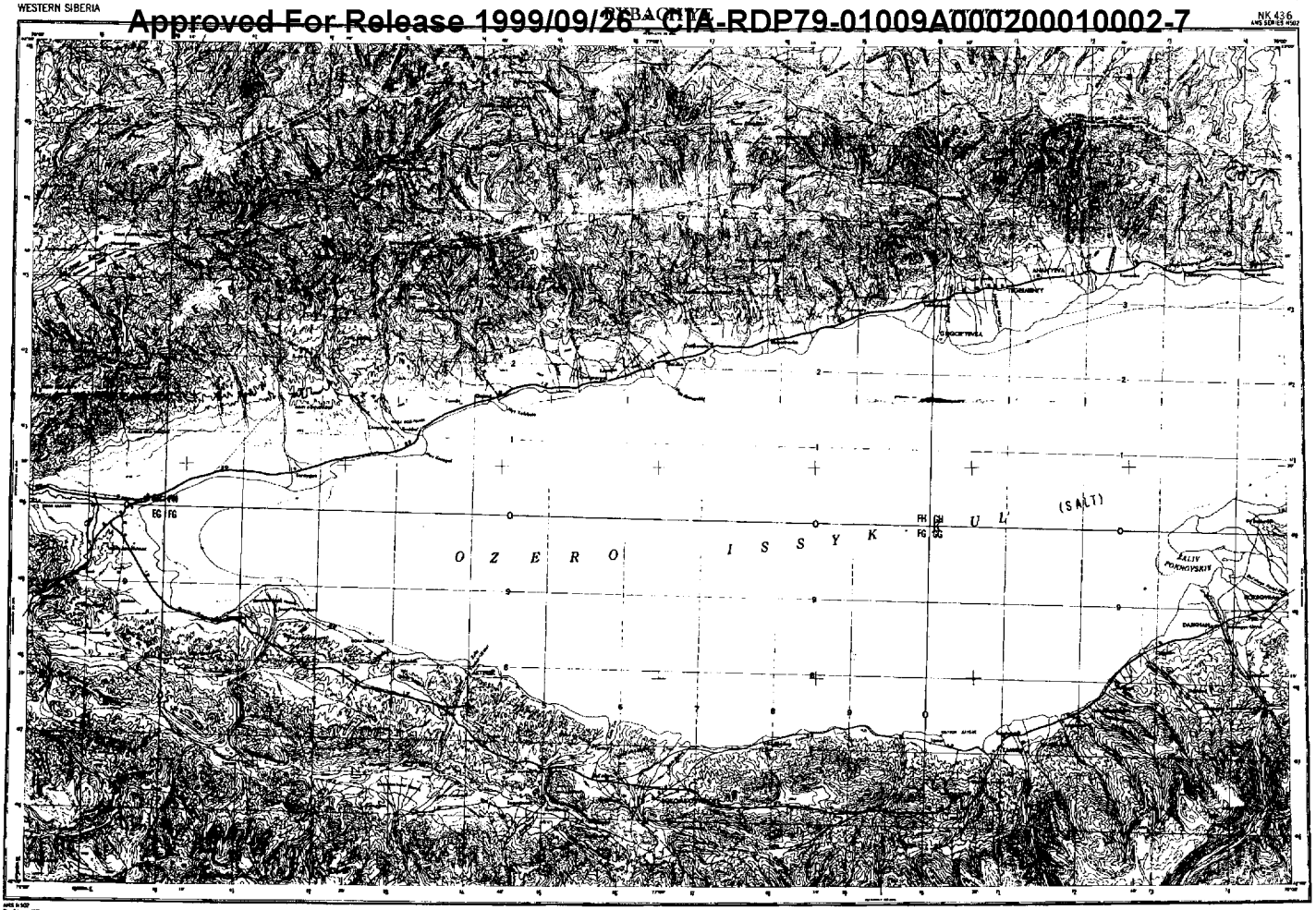




WESTERN SIBERIA

RYBACHYE

NK 43-6



GLOSSARY

CONTOUR INTERVAL 100 METERS; RELIEF PARTIALLY SHOWN BY FORM LINES

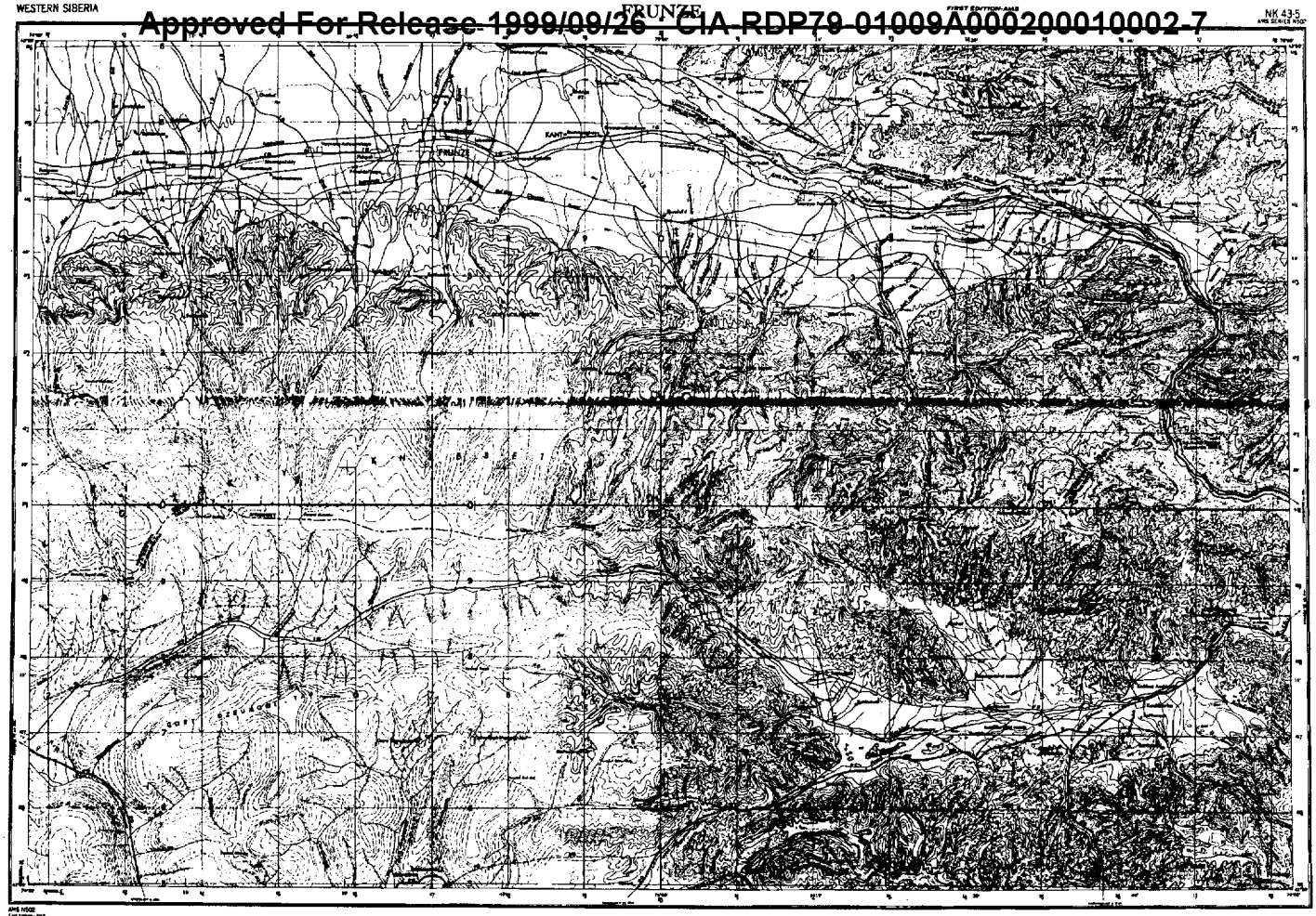
TRANSVERSE MERCATOR PROJECTION

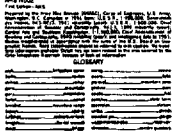
LOCATION DIAGRAM FOR NK 43-6

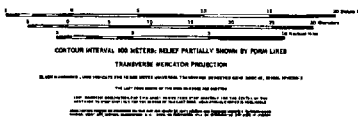
RELIABILITY DIAGRAM

RYBACHYE, U.S.S.R.

UNEDITED PROOF

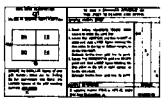






CONTOUR INTERVAL 100 METERS; RELIEF PARTIALLY SHOWN BY FORM LINES

TRANSVERSE MERCATOR PROJECTION



FRUNZE U.S.S.R.

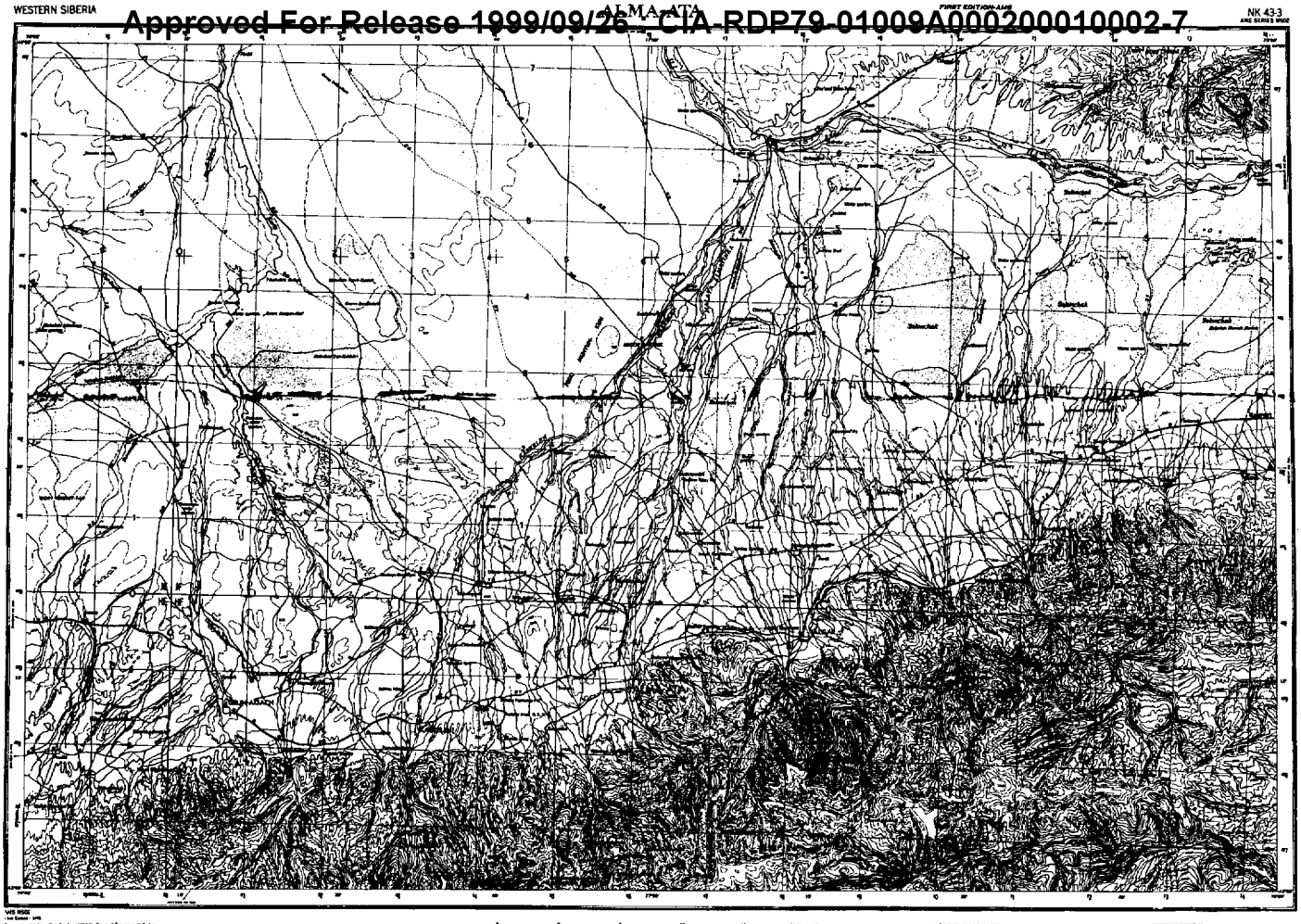
UNEDITED PROOF

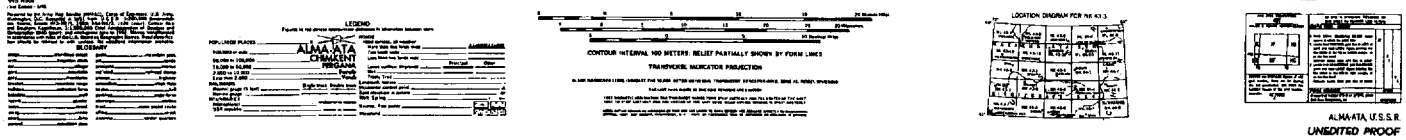
WESTERN SIBERIA

ALMA-ATA

FIRST EDITION-AAF

NK 43-3





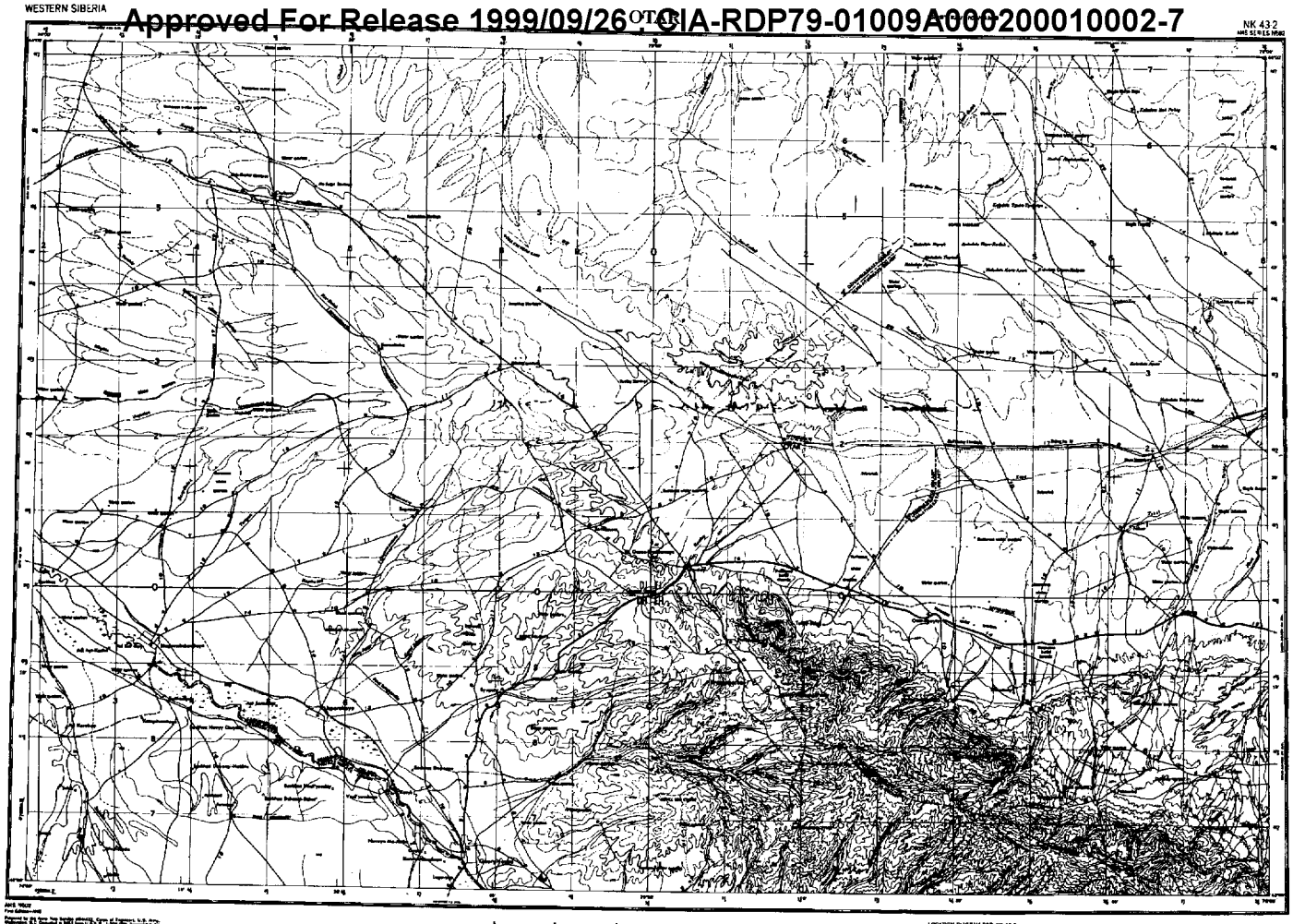
ALMA-ATA, U.S.S.R.

UNEDITED PROOF

WESTERN SIBERIA

OTAR

NK 43-2



GLOSSARY

CONTOUR INTERVAL 100 METERS, RELIEF PARTIALLY SHOWN BY FORM LINES

TRANSVERSE MERCATOR PROJECTION

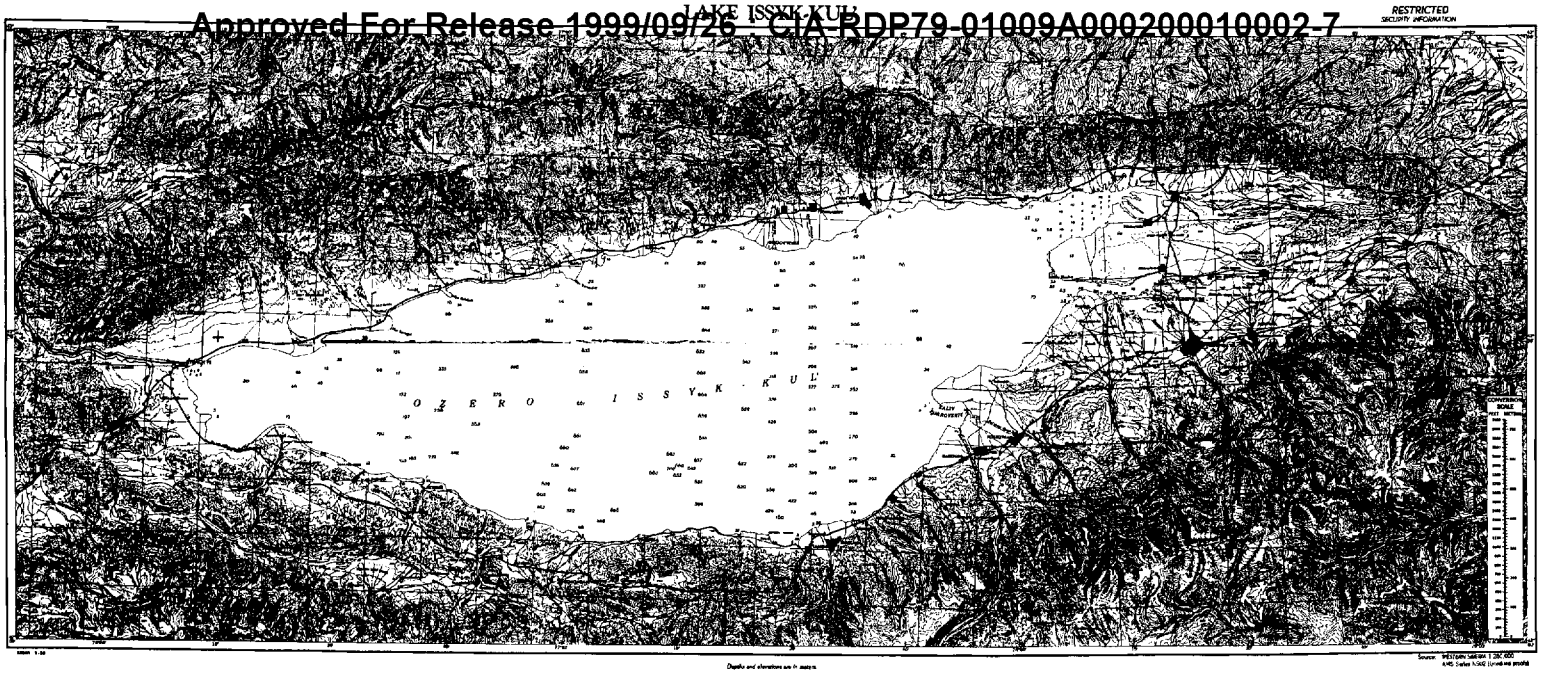
LOCATION DIAGRAM FOR NK 43-2

OTAR, U.S.S.R.

UNEDITED PROOF

LAKE ISSYK KUL

RESTRICTED
SECURITY INFORMATION



RESTRICTED

ALMA-ATA

THE ISSYK-KUL' – CENTRAL TIEN SHAN AREA

SOURCE: *WORLD AERONAUTICAL CHARTS* 1:1,000,000 Nos. 328 and 329 with minor additions.

The international boundaries shown on this map do not necessarily correspond in all cases to the boundaries recognized by the U. S. Government.

0 20 40 60 80
Statute Miles

0 20 40 60 80
Kilometers