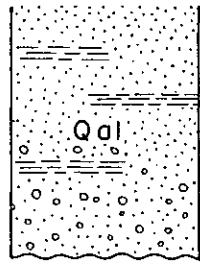
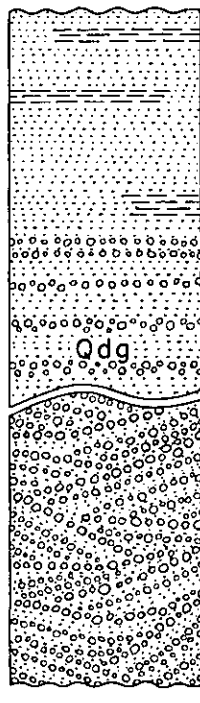
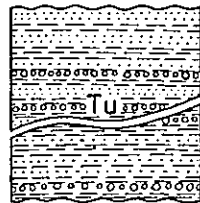
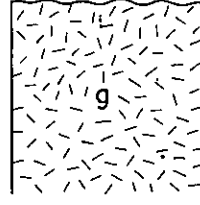


GEOLOGIC COLUMN AND UNIT DESCRIPTION

AGE	ROCK UNIT	LITHOLOGY; THICKNESS WHERE KNOWN	UNIT DESCRIPTION																																																																			
QUATERNARY	Alluvium	 Sandy clay, clayey sand and gravel, thickness 5 meters at San-tao-chen	Alluvium is a terrestrial deposit consisting of yellowish-brown sandy clay and clayey sand, accompanied by some gravel. It is widely distributed in the drainage basins of the Yin-ching Ho (印京河), the Shuang-yang Ho (双阳河), the Tung-k'en Ho (通肯河) and its tributaries, as well as the Hei-ni Ho (黑泥河), the Ni-ni Ho (泥泥河), the Hei-erh-ken Ho (黑尔根河), the Ou-ken Ho (欧肯河) and the I-chi-mi Ho (伊西密河). Alluvium at San-tao-chen (三道坎) west of Hai-lun (海林) consists of sand and quartzite pebbles of 1 cm in diameter, and is approximately 5 m thick. The areas where the alluvial beds are distributed have a gentle gradient and poor drainage, resulting in marshes that are covered by black peaty mud. A marsh in front of Yang-chia (杨家) station, in the north central part of the map, produces workable peat.																																																																			
	Diluvium	 Clay, sand and gravel; thickness less than 100 m	Diluvium consists chiefly of clay, sand and gravel, and occupies the greater portion of the map area, forming flat hilly lands about 50 m to 100 m or more in relative height. Clay and sand predominate in the upper part, whereas the lower part is marked with crossbedded gravel. The drilling records of water wells reveal the following sequence in descending order: <table style="width: 100%; border: none;"> <tr> <td style="width: 25%;">Li-chia (李家) station</td> <td style="width: 25%;">Yang-chia (杨家) station</td> <td style="width: 25%;">Hai-pei (海北) station</td> <td style="width: 25%;">Hai-lun station</td> </tr> <tr> <td>Black soil 1.5 m</td> <td>Black soil 1.5 m</td> <td>Black soil 1.0 m</td> <td>Black soil 0.9 m</td> </tr> <tr> <td>Black mud 3.5</td> <td>Black clay 5.0</td> <td>Black mud 10.3</td> <td>Yellowish-brown clay 22.1</td> </tr> <tr> <td>Blue clay 5.8</td> <td>Gravel 1.5</td> <td>Black clay 14.3</td> <td>Gray clay 1.0</td> </tr> <tr> <td>Reddish-brown clay 3.9</td> <td>Blue clay 30.8</td> <td>Sand 0.5</td> <td>Light yellow mud 4.8</td> </tr> <tr> <td>Blue clay 17.5</td> <td>Sand 0.7</td> <td>White clay 7.7</td> <td>Grayish-black clay 6.9</td> </tr> <tr> <td>Yellow clay 9.0</td> <td>Blue clay 31.3</td> <td>Yellow clay 3.5</td> <td>Gravel 3.0</td> </tr> <tr> <td>Total thickness 41.2 m</td> <td>Total thickness 70.8 m</td> <td>Blue clay 2.9</td> <td>Light blue soft clay 8.2</td> </tr> <tr> <td></td> <td></td> <td>Sand 0.5</td> <td>Hard gray clay 13.6</td> </tr> <tr> <td></td> <td></td> <td>White clay 12.8</td> <td>Gray shale 1.5</td> </tr> <tr> <td></td> <td></td> <td>Blue clay 20.8</td> <td>Clay 10.0</td> </tr> <tr> <td></td> <td></td> <td>Sand 0.5</td> <td>Total thickness 72.0 m</td> </tr> <tr> <td></td> <td></td> <td>Reddish-blue clay 3.6</td> <td></td> </tr> <tr> <td></td> <td></td> <td>Gravel 4.0</td> <td></td> </tr> <tr> <td></td> <td></td> <td>Sandy mud 2.1</td> <td></td> </tr> <tr> <td></td> <td></td> <td>Blue clay 3.6</td> <td></td> </tr> <tr> <td></td> <td></td> <td>Total thickness 88.1 m</td> <td></td> </tr> </table>	Li-chia (李家) station	Yang-chia (杨家) station	Hai-pei (海北) station	Hai-lun station	Black soil 1.5 m	Black soil 1.5 m	Black soil 1.0 m	Black soil 0.9 m	Black mud 3.5	Black clay 5.0	Black mud 10.3	Yellowish-brown clay 22.1	Blue clay 5.8	Gravel 1.5	Black clay 14.3	Gray clay 1.0	Reddish-brown clay 3.9	Blue clay 30.8	Sand 0.5	Light yellow mud 4.8	Blue clay 17.5	Sand 0.7	White clay 7.7	Grayish-black clay 6.9	Yellow clay 9.0	Blue clay 31.3	Yellow clay 3.5	Gravel 3.0	Total thickness 41.2 m	Total thickness 70.8 m	Blue clay 2.9	Light blue soft clay 8.2			Sand 0.5	Hard gray clay 13.6			White clay 12.8	Gray shale 1.5			Blue clay 20.8	Clay 10.0			Sand 0.5	Total thickness 72.0 m			Reddish-blue clay 3.6				Gravel 4.0				Sandy mud 2.1				Blue clay 3.6				Total thickness 88.1 m
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TERTIARY	Neogene formation	 Sand, clay and gravel; thickness unknown	The Neogene formation of the map area was formerly reported as a Pleistocene deposit in the Geology and Geography of Northern Manchuria by S. USHIMARU and others (1937), but was later partially assigned to the Neogene formation along the Hei-lung Chiang (黑龙江) by R. SAITO (1940). The formation seems to consist chiefly of an alternation of sand, clay and gravel, intercalated with bentonitic shale.																																																																			
AGE UNKNOWN	Granite	 Hornblende granite (Column not drawn to scale)	Granite of unknown age is exposed in the vicinity of Ha-la-pa Shan (哈拉巴山), overlain by the Neogene formation (U). The granite is generally grayish-white or partially reddish-gray, medium- to coarse-grained, subequigranular and holocrystalline, consisting of quartz, orthoclase, hornblende and mica. It is being quarried as a building stone.																																																																			

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