MINISTRY OF ENVIRONMENT PROTECTION OF UKRAINE
STATE GEOLOGICAL SURVEY

STATE GEOLOGICAL MAP OF UKRAINE

Scale 1:200 000

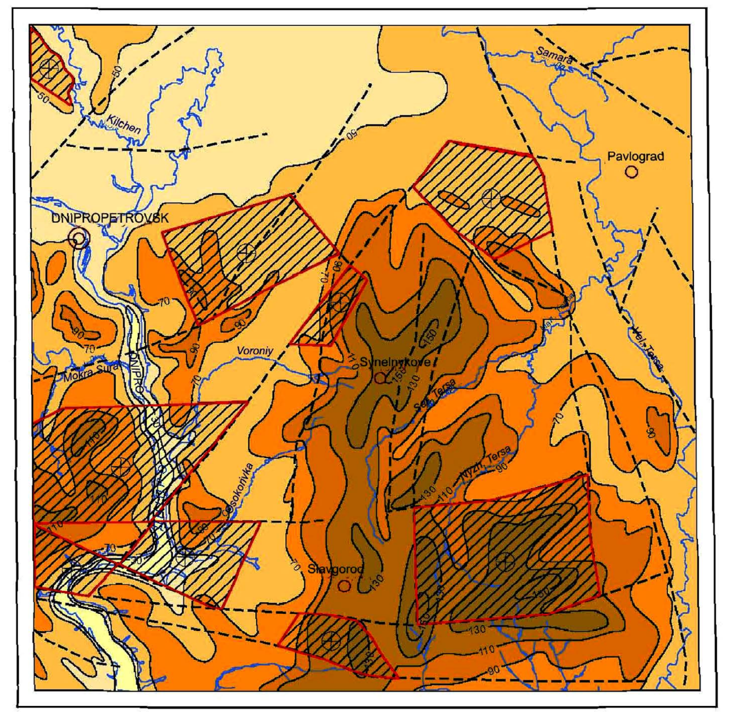
GEOLOGICAL MAP AND MAP OF MINERAL RESOURCES OF QUATERNARY SEDIMENTS

Central-Ukrainian Series

M-36-XXXVI (Dnipropetrovsk)

2006

NEOTECTONIC SCHEME



1 : 500 000
5 kilometres in 1 centimetre

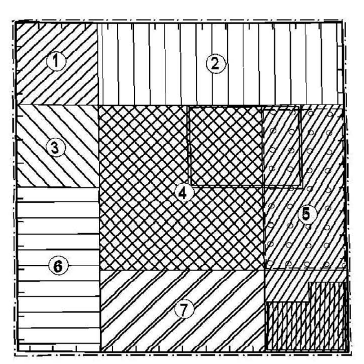
LEGEND

NEOTECTONIC MOTION MAGNITUDE SCALE

0 30 50 70 90 110 130 м more

Neotectonic breaks activated in Neogene-Quaternary time
Neotectonic motion cumulative magnitude isolines
Local newest tectonic uplifts

SCHEME OF MATERIALS USED



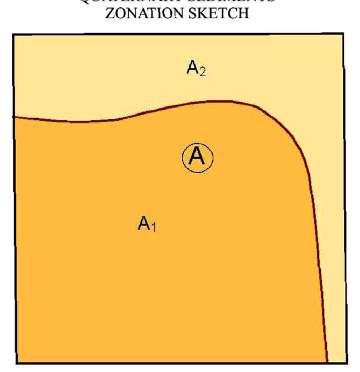
GM - 50 000

1. Yu.D.Shkovyra, 1974
2. M.G.Taran, 1958
3. B.T.Osadchiy, 1962
4. B.Z.Berzenin, 1971
5. O.D.Tymoshenko, 1962
6. O.A.Zaytsev, 1963
7. B.Z.Berzenin, 1973

EGSF - 200

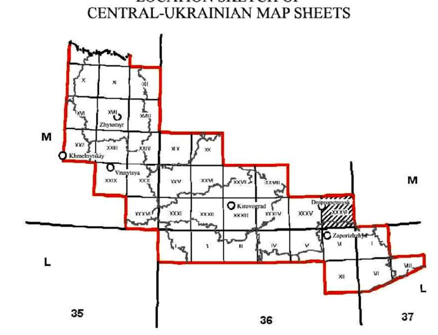
A.I.Nekryach, 2001
V.M.Gladkiy, 1950-1952

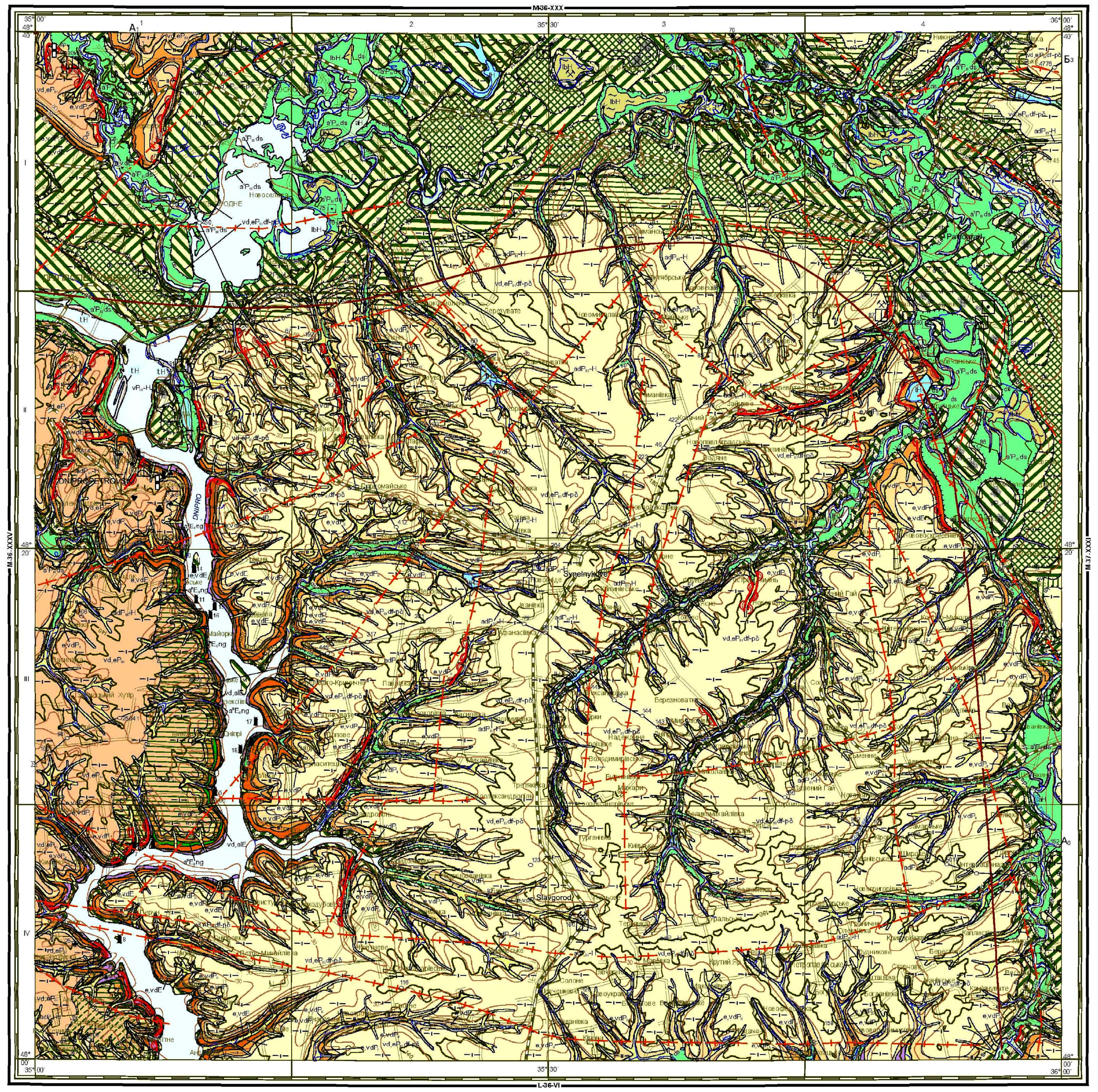
QUATERNARY SEDIMENTS ZONATION SKETCH



(A) North loess region of back-glacier zone:
A1 Prydniprovsko-Zaporizka sub-region of loess region with limited development of sub-aqueous sediments
A2 Poltavsko-Orilska sub-region with terrace sub-aqueous sediments predomination
Sub-region boundaries

LOCATION SKETCH OF CENTRAL-UKRAINIAN MAP SHEETS





The map is created in the State Enterprise "Pivdengeologiya" (Dnipropetrovska Complex Geological Group) to order of the State Geological Survey of the Ministry of Environment Protection of Ukraine

Authors: V.V.Manyuk, V.O.Shpylchak
Editor: I.M.Barg

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English translation: B.I.Malyuk

1 : 200 000

2 kilometres in 1 centimetre

Solid horizontals are put through 40 metres

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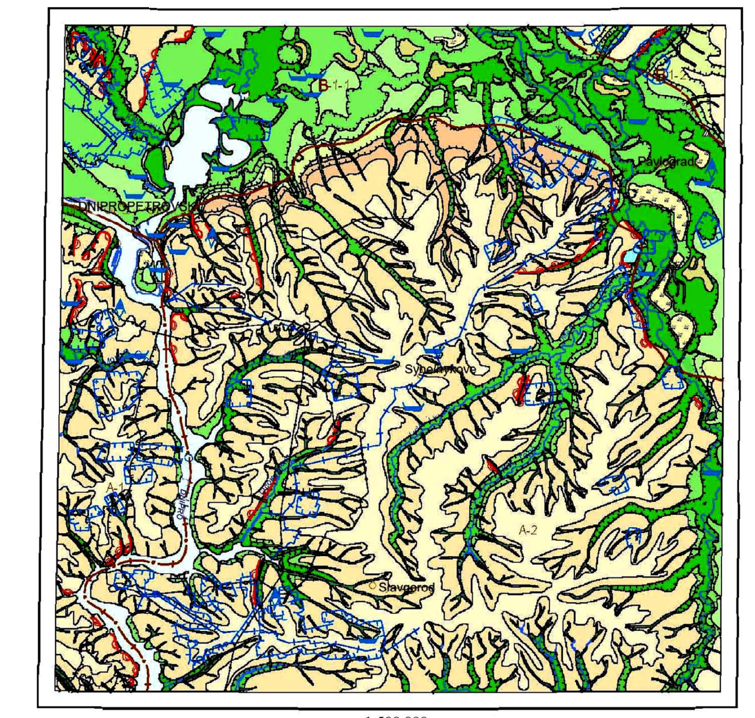
GEOMORPHOLOGICAL SCHEME



1:500 000
5 kilometres in 1 centimetre

LEGEND

Denudation relief
Sub-horizontal surfaces

- Elevated non-partitioned surface of plateau over Precambrian (A), and over Carboniferous, Triassic and Jurassic (B)
- Slightly partitioned surface of plateau over Precambrian and Neogene

Slopes

- Plateau slopes

Erosion-accumulative relief

- Temporary flow erosion gully bottom
- Flood-land and first over-flood terrace surface combined
- Surface of first and second over-flood terraces combined
- Surface of second, third and fourth over-flood terraces combined
- Surface of the fourth over-flood terrace
- Surface of fifth and sixth over-flood terraces combined

Meso- and micro-relief forms

- Lake dimples
- Hilly aeolian sands ("kuchugury") over terrace alluvium
- Terrace erosion benches
- Slide-dangerous slopes

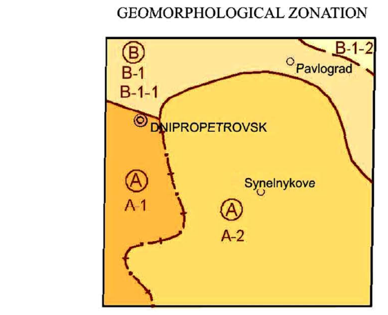
TECNOGENIC RELIEF FORMS

- Technogenic wash forms
- Quarries
- Irrigated lands
- Channels
- Pipelines
- Railroad complexes
- Sevage ponds and facilities
- Municipal landfills

OTHER SYMBOLS

Geomorphological zonation boundaries of:
- provinces
- regions
- areas

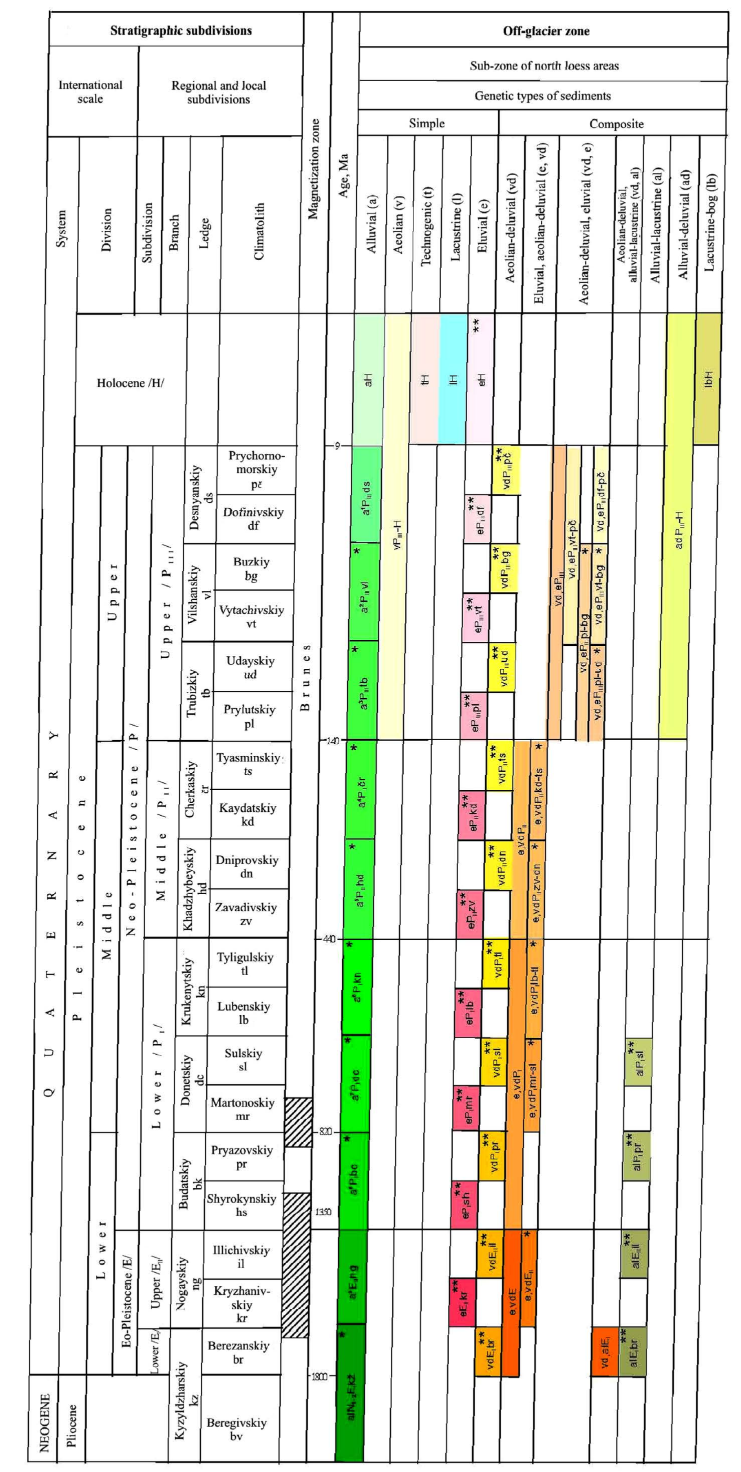
GEOMORPHOLOGICAL ZONATION



(A) Azovo-Prydniprovska height (on Precambrian and Neogene base)
A-1 Prydniprovska height (direct inherited layer-denudation morphostructure)
A-2 Zaporizka plain (restored inherited layer-denudation morphostructure)
(B) Prydniprovska lowland (direct first-order morphostructure)
B-1 Poltavsko-Orilska layer-level denudation plain (on Paleogene-Neogene base)
B-1-1 Volchansko-Samarska erosion-accumulation lowland plain
B-1-2 Myzhnyanska plain (semi-turned on Miocene polygenetic smoothing surface)

B-1-1 Indexes of stratigraphic-paleolandscape zonation subdivisions

CORRELATION SCHEME OF QUATERNARY SEDIMENTS



Notes. (*) only in cross-sections, sketch of internal structure of Quaternary sediments and in litho-stratigraphic columns
(**) in stratigraphic columns only

LEGEND TO THE MAP OF QUATERNARY SEDIMENTS

General stratigraphic scale: System, Division, Subdivision. Regional stratigraphic scale: Section, Branch, Ledge. Local stratigraphic subdivisions.

Holocene /H/

- eH** — Eluvial sediments; modern soils. Humus black soil (0.2-1.3 m)
- aH — River course and low flood-land alluvium. Quartz, grayish-yellow, from fine- to coarse-grained sand (2.5-4.5 m)
- lH — Lake and artificial pond sediments. Grey and dark-grey, mud, irregular loams and clays (0.5-1.8 m). *Includes mineral sludge deposit*
- lbH — Lake-swamp sediments in flood-lands and over-flood terraces. Grey and dark-grey mud, clays and loams with calcareous concretions (0.5-2 m)
- tH — Technogenic sediments. Wash type (1.0-12 m)

Upper Neo-Pleistocene and modern branches undivided

- vP$_{III}$-H — Undivided aeolian sediments of of Upper Eo-Pleistocene and modern branches. Quartz, fine-grained, brown-yellow sands developed above alluvium of 1-4 terraces (0.5-3 m). *Sands are prospective for construction sand deposits*
- adP$_{III}$-H — Undivided alluvial-deluvial gully bottom sediments. Brownish-grey and yellowish-grey, irregular, often sandy loams, turf low-humus black soils (1.5-4 m)

QUATERNARY — Pleistocene — Neo-Pleistocene /P/ — Upper /P$_{III}$/

- vd,eP$_{III}$ — Upper branch undivided aeolian-deluvial and eluvial sediments. Loess-like loams, former soils (2.5-10.5 m)

Desnyanskiy - ds

- a[1]P$_{III}$ds — Alluvial sediments of I over-flood (Desnyanska) terrace. Quartz, grayish-yellow, fine- and medium-grained sands, with gravel at the bottom (2.5-5.5 m). *River course sediments are prospective for construction sand and brick-tile raw material deposit*
- vd,eP$_{III}$vt-pč* — Undivided aeolian-deluvial and eluvial sediments of Vytachivskiy, Buzkiy, Dofinivskiy and Prychornomorskiy climatoliths. Light- and dark-brown with reddish share, pale-yellow loams; grey-brownish former soils (5.5-15 m)
- vd,eP$_{III}$df-pč — Undivided aeolian-deluvial and eluvial sediments of Dofinivskiy and Prychornomorskiy climatoliths. Pale-yellow, grey-brownish loams, former soils (1.8-5.5 m)
- vdP$_{III}$pč** — Prychornomorskiy cimatolith. Aeolian-deluvial sediments. Light- and grayish-brown loess-like loams, humused at the top (1.0-3 m)
- eP$_{III}$df** — Dofinivskiy climatolith. Eluvial sediments. Greyish-brown, light and medium, in places sandy loams (0.8-2.5 m)

Vilshanskiy - vl

- vd,eP$_{III}$pl-bg* — Undivided Prylutskiy, Udayskiy, Vytachivskiy and Buzkiy climatoliths. Aeolian-deluvial and eluvial sediments. Light-pale loams, brown and reddish former soils (6-17.7 m)
- a[2]P$_{III}$vl* — Alluvial sediments of II over-flood (Vilshanska) terrace. Quartz, greish-yellow, medium-grained, oblique-bedded sands (12-18 m)
- vd,eP$_{III}$vt-bg* — Undivided Vytachivskiy and Buzkiy climatoliths. Aeolian-deluvial and eluvial sediments. Yellow-pale, loess-like loams, red-brown former soils (3.7-9.5 m)
- vdP$_{III}$bg** — Buzkiy climatolith. Aeolian-deluvial sediments. Loess and loess-like loams, yellow-pale, light, macro-porous, carbonate (3-6 m)
- eP$_{III}$vt** — Vytachivskiy climatolith. Eluvial sediments. Light- and dark-brown with black shade, medium and heavy loams (0.7-3.5 m)

Trubizkiy - tb

- a[3]P$_{III}$tb* — Alluvial sediments of III over-flood (Trubizka) terrace. Quartz, grayish-yellow and grey, fine-medium-grained sands with gravel at the bottom (8-11 m)
- vd,eP$_{III}$pl-ud* — Undivided Prylutskiy and Udayskiy climatoliths. Aeolian-deluvial and eluvial sediments. Light-pale, loess-like loams and grayish-light-brown former soils (2.3-8.2 m)
- vdP$_{III}$ud** — Udayskiy climatolith. Aeolian-deluvial sediments. Loess, loess-like light-pale, calcareous loams (0.5-4 m)
- eP$_{III}$pl** — Prylutskiy climatolith. Eluvial sediments. Grey and dark-grey with brownish shade, brown-grey, friable loams with clear iluvial horizon (1.8-4.2 m)

Middle /P$_{II}$/

- e,vdP$_{II}$ — Undivided eluvial and aeolian-deluvial sediments of Neo-Pleistocene middle branch. Pale, brown and grey-brown loams (6.1-20.8 m)

Cherkaskiy - čr

- a[4]P$_{II}$čr* — Alluvial sediments of IV over-flood (Cherkaska) terrace. Yellowish-grey and grey, medium-grained, friable sands (7-12 m)
- e,vdP$_{II}$kd-ts* — Undivided Kaydatskiy and Tyasminskiy climatoliths. Eluvial and aeolian-deluvial sediments. Grey and dark-grey, black-soil-like, yellow-pale, calcareous, dense loams (3.3-8.4 m)
- vdP$_{II}$ts** — Tyasminskiy climatolith. Aeolian-deluvial sediments. Pale-yellow, brownish-pale, calcareous, slightly densed loams (1.8-3.7 m)
- eP$_{II}$kd** — Kaydatskiy climatolith. Eluvial sediments. Grey and dark-grey, black-soil-like, in places brown-grey, dense loams (1.5-4.7 m)

Khadzhybeyskiy - hd

- a[5]P$_{II}$hd* — Alluvial sediments of V over-flood (Khadzhybeyska) terrace. Quartz, yellowish-grey, often iron-enriched, fine-medium-grained sands (8-12 m)
- e,vdP$_{II}$zv-dn* — Undivided Zavadivskiy and Dniprovskiy climatoliths. Eluvial and aeolian-deluvial sediments. Dark-brown loams; loess and loess-like loams, yellow-pale, light and medium (2.8-12.4 m)
- vdP$_{II}$dn** — Dniprovskiy climatoliths. Aeolian-deluvial sediments. Loes and loess-like loams, yellow-pale and light-pale, light and medium, calcareous (1.8-8.3 m)
- eP$_{II}$zv** — Zavadivskiy climatolith. Eluvial sediments. Dark-brown with reddish shade, heavy loams (1-4.1 m)

Lower /P$_I$/

- e,vdP$_I$ — Undivided eluvial and aeolian-deluvial sediments of Neo-Pleistocene lower branch. Dark-brown, brown and brown-pale loams (5.7-24.6 m)

Krukenytskiy - kn

- a[6]P$_I$kn* — Alluvial sediments of VI over-flood (Krukenytska) terrace. Grey fine-grained clayey sands (5-7.5 m)
- e,vdP$_I$lb-tl* — Undivided Lubenskiy and Tyligulskiy climatoliths. Eluvial and aeolian-deluvial sediments. Brown and dark-brown loams; brownish-yellow loess and loess-like loams (1.6-8.8 m)
- vdP$_I$tl** — Tyligulskiy climatolith. Aeolian-deluvial sediments. Light and medium, brown-yellow loess and loess-like loams (0.3-4 m)
- eP$_I$lb** — Lubenskiy climatolith. Eluvial sediments. Brown and dark-brown, heavy, dense loams (1.3-4.8 m)

Donetskiy - dc

- a[7]P$_I$dc* — Alluvial sediments of VII over-flood (Donetska) terrace. Quartz, greenish-grey, fine-grained, slightly clayey and iron-enriched sands (5-6 m)
- e,vdP$_I$mr-sl* — Undivided Martonoskiy and Sulskiy climatoliths. Eluvial and aeolian-deluvial sediments. Loess-like, yellow-pale and brown with reddish shade loams (2.3-7.8 m)
- vdP$_I$sl** — Sulskiy climatolith. Aeolian-deluvial sediments. Loess-like, yellow-pale, medium and heavy loams (0.3-2.2 m)
- alP$_I$sl** — Sulskiy climatolith. Alluvial-lacustrine sediments. Brown-grey, yellowish, loams and clays, clayey sands (1.5-3.5 m)
- eP$_I$mr** — Martonoskiy climatolith. Eluvial sediments. Dark-brown with reddish shade, heavy loams (2-5.6 m)

Budatskiy - bk

- a[8]P$_I$bk* — Alluvial sediments of VIII over-flood (Budatska) terrace. Quartz, grey with greenish shade, fine-grained sands (6-7 m)
- vdP$_I$pr** — Pryazovskiy climatolith. Aeolian-deluvial sediments. Dark-brown-grey and light-brown, heavy, clay-like loams (0.4-3.8 m)
- alP$_I$pr** — Pryazovskiy climatolith. Alluvial-lacustrine sediments. Brown-grey, sandy clays and loams (0.5-2.6 m)
- eP$_I$sh** — Shyrokynskiy climatolith. Eluvial sediments. Dark-brown with reddish shade, red-brown clays and loams (1.4-6 m)

Eo-Pleistocene /E/

- e,vdE — Undivided eluvial and aeolian-deluvial Eo-Pleistocene sediments. Red-brown, dark-brown and grey-brown loams and clays (6.5-16.2 m)

Upper /E$_{II}$/ — Nogayskiy - ng

- e,vdE$_{II}$ — Undivided eluvial and aeolian-deluvial sediments of Kryzhanivskiy and Illichivskiy climatoliths. Red-brown, dark-brown and grey-brown loams and clays (3.5-9.2 m)
- a[9]E$_{II}$ng — Alluvial sediments of IX over-flood (Nogayska) terrace. Quartz fine-grained sands (8-12.5 m)
- vdE$_{II}$il** — Illichivskiy climatolith. Aeolian-deluvial sediments. Grey, greenish- and brownish-grey loams and clays with abundant carbonate blobs (1-3.7 m)
- alE$_{II}$il** — Illichivskiy climatolith. Alluvial-lacustrine sediments. Sandy, grey and dark-grey clays with hydromorphism signs (1-1.7 m)
- eE$_{II}$kr** — Kryzhanivskiy climatolith. Eluvial sediments. Red-brown and dark-brown with reddish shade clays, with manganese oxide oolites (2.5-5.5 m)

Lower /E$_I$/ — Kyzyldzharskiy - kz

- vd,alE$_I$ — Undivided aeolian-deluvial and alluvial-lacustrine sediments of Eo-Pleistocene lower branch. Red-brown, dark-brown and grey-brown loams and clays (3-7 m)
- vdE$_I$br** — Berezanskiy climatolith. Aeolian-deluvial sediments. Greyish-pink and dark-brown, spotty, irregular clays with carbonate blobs and gypsum (1.5-4 m)
- alE$_I$br** — Berezanskiy climatolith. Alluvial-lacustrine sediments. Grey and dark-grey, sandy, irregular clays (1.5-3 m)
- a[10]N$_2$-E$_I$kz* — Alluvial sediments of X over-flood (Kyzyldzharska) terrace. Quartz grey-yellow and parti-colored, fine-grained, clayey sands (7-10 m)

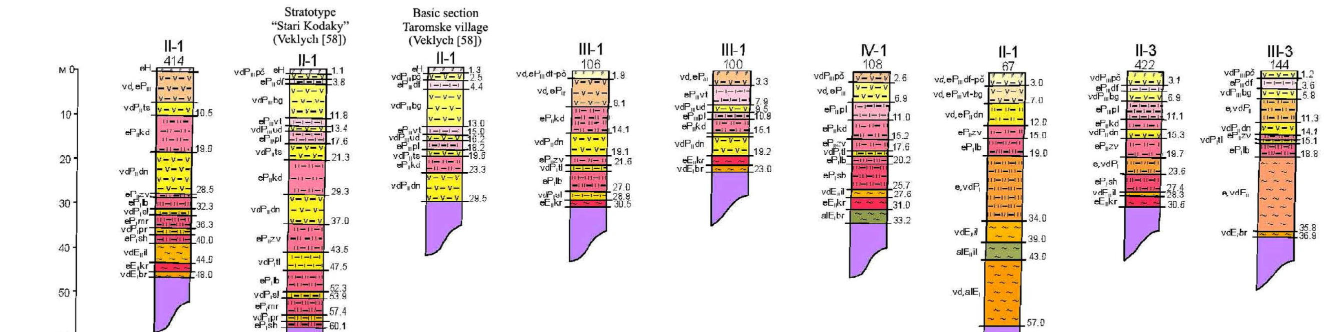
NEOGENE — Pliocene — Upper

Pre-Quaternary sediments

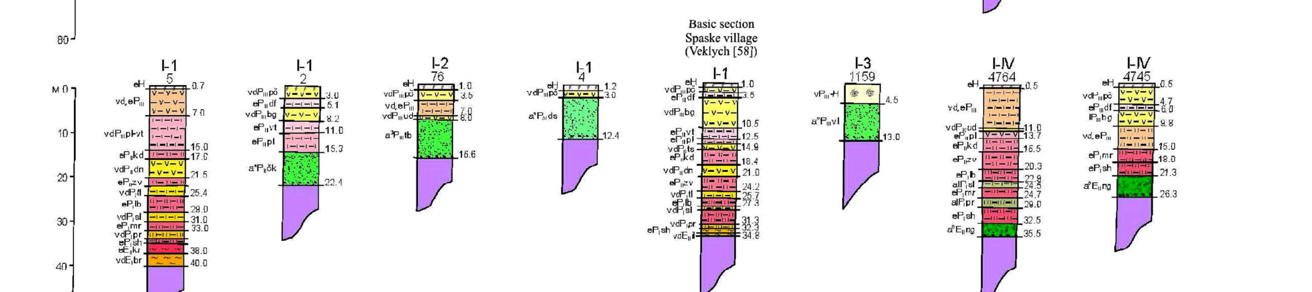
Notes. (*) only in cross-sections, sketch of internal structure of Quaternary sediments and in litho-stratigraphic columns
(**) in stratigraphic columns only

TYPOLOGICAL LITHO-STRATIGRAPHIC COLUMNS

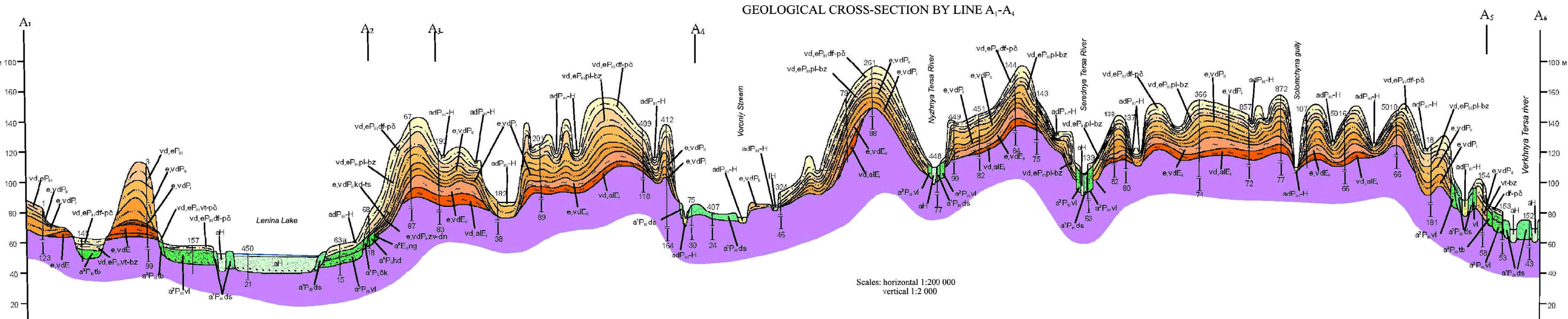
Prydniprovsko-Zaporizka sub-region of loess region with limited development of sub-aqueous sediments



Poltavsko-Orilska sub-region with terrace sub-aqueous sediments predomination

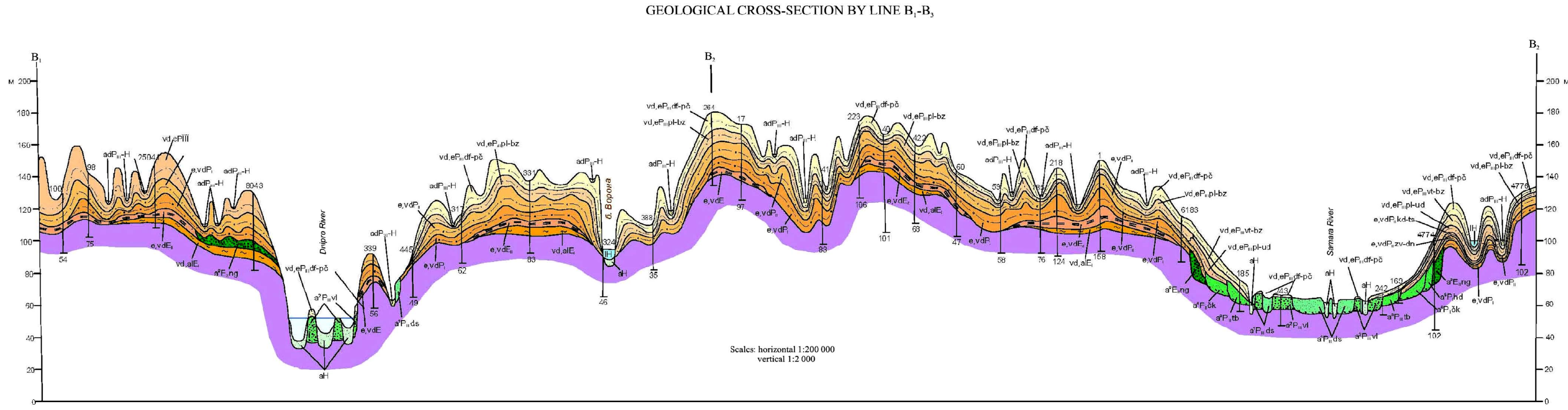


GEOLOGICAL CROSS-SECTION BY LINE A$_1$-A$_4$



Scales: horizontal 1:200 000
vertical 1:2 000

GEOLOGICAL CROSS-SECTION BY LINE B$_1$-B$_2$



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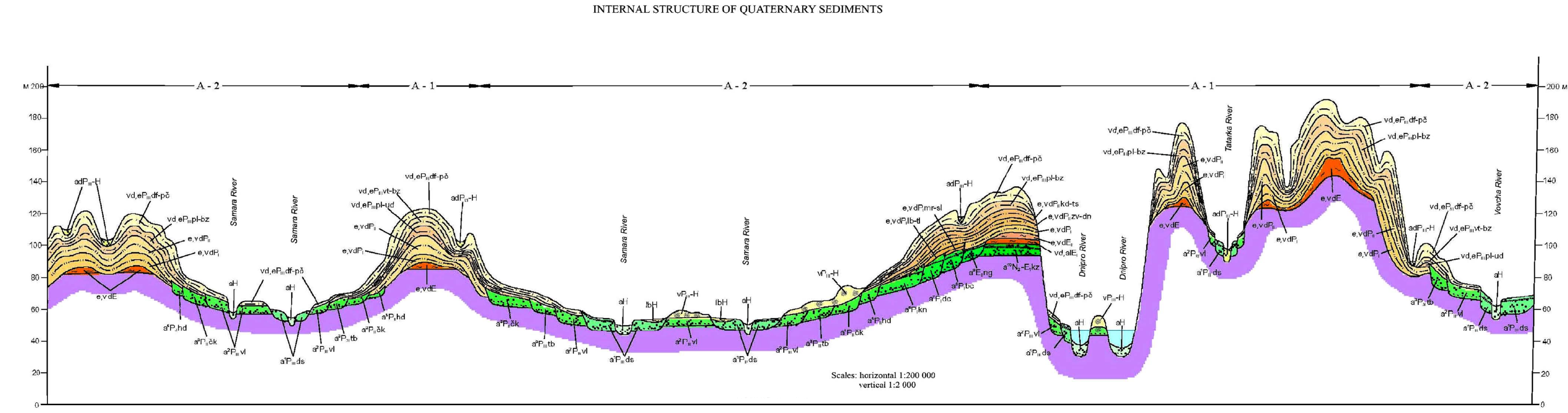
vertical 1:2 000

INTERNAL STRUCTURE OF QUATERNARY SEDIMENTS



Scales: horizontal 1:200 000
vertical 1:2 000

L E G E N D

Geomorphologic

- Terrace benches, their age
- Dams
- Quarries
- Slide-dangerous slopes
- Hilly sands ("kuchugury")
- Dumps
- Fans

Other symbols

- Geological boundaries of stratigraphic-genetic subdivisions: proven (a), possible (b)
- Facial boundaries within stratigraphic subdivisions (in cross-sections only)
- Lineaments thought to be faults
- Sub-region boundary
- Thickness isolines of Quaternary sediments
- Basic drill-holes and their numbers
- Outcrops and their numbers
- Stratotype and basic outcrops and sections
- Geological cross-section lines
- Drill-holes in cross-sections: top - well number, bottom - depth
- Typical sections: vertical scale 1:1000, top - square number in the map, well number, left - stratigraphic-genetic unit index, right - footwall depth in m

Ancient culture landmarks

Archeological landmarks and their numbers:
1-8 Paleolithic
9-12 Mesolithic
13-18 Neolithic

Fauna findings location
- spore and pollen
- fresh-water Invertebrates

LITHOLOGY OF QUATERNARY SEDIMENTS

Gravel (1), sand (2), loess, loess-like, light, porous loams (3-6), heavy loam, clay (7), sandy clay (8), clayey sand (9), modern soil (10)

Notes. (*)in stratigraphic columns only
(**) only in cross-sections and typical litho-stratigraphic columns

ALLUVIAL SEDIMENTS OF OVER-FLOOD TERRACES OVERLAIN BY SUB-AERIAL SEDIMENTS

- Vilshanska a[2]P$_{III}$vl
- Trubizka a[3]P$_{III}$tb
- Cherkaska a[4]P$_{II}$čk
- Khadzhybeyska a[5]P$_{II}$hd
- Krukenytska a[6]P$_I$kn
- Donetska a[7]P$_I$dc
- Budatska a[8]P$_I$bk
- Nogayska a[9]P$_I$ng
- Kyzyldzharska a[10]N$_2$kz

MINERAL RESOURCES

Group	Sub-group		Type	Deposits	Occurrences
Non-metals	Construction materials	Brick-tile raw materials	Clay		
		Sand-gravel raw materials	Sand		
Waters	Ground-water	Drinking		П	
	Mineral sludge and mud			К	

Deposits

93/7 П — Left - deposit number in the map and in the list (numerator), depth (denominator); right - mode of use
Note: П - drinking water; К - operating resorts

Commercial development of deposits

- In production
- Under conservation
- Never been mined