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SHEET 1 of 2
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INTRODUCTION

The geologic map and cross sections are a redrafted and modified version of the *Geologic map and map of mineral resources of the basins of Ghorband, Salang, and Panjsher*, located in the Kapisa, Panjsher, Parwan, and Baghlan Provinces, Afghanistan. The original map and cross sections are contained in an unpublished Soviet report no. 1162A (Shadchinev and others, 1975) prepared in cooperation with the Ministry of Mines and Industries of the Royal Government of Afghanistan, in Kabul during 1975, under contract no. 55–184/17500. This redrafted map consists of parts of quadrangle map sheets 503-F, 504-C, 504-D, 504-E, and 504-F shown on an index map that can be found on the original 1:100,000-scale map by Shadchinev and others (1975). The redrafted map and cross sections illustrate the mineral deposits and geologic structure of the Ghorband, Salang, and Panjsher River Basins. Because there were no location coordinates provided on the original Soviet map, the map was registered to drainage patterns identified by contours from the Global Digital Elevation Model (GDEM). The end result can only be considered a best fit for the map extend, and some features may not be positioned in their correct geographic location.

The redrafted geologic map and cross sections reproduce the topology of rock units, contacts, and faults of the original Soviet map and cross sections, and includes minor modifications based on our examination of the originals. Table 1, provided on both map sheets 1 and 2, shows mineral commodity locations also from the original Soviet map. However, because of the poor quality of the original map, some map features could not be identified and some may be misinterpreted. Further, we have attempted to translate the original Russian terminology and rock classifications into modern English geologic usage as literally as possible without changing any genetic or process-oriented implications in the original rock unit descriptions. We also use the rock-unit age designations from the original maps, however, rock-unit colors and symbols differ from the colors and symbols shown on the original version. Unit colors were selected according to the color and pattern scheme of the Commission for the Geological Map of the World (CGMW) (http://www.cgm.org). Unit symbols were assigned based on the geologic age and unit descriptions provided on the original Soviet map. Elevations on the cross sections are derived from the original topography and may not match the GDEM topography used on the redrafted geologic map of this report.

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Table 1.—Explanation of mineral commodity locations from Shadchinev and others (1975).

Mineral commodity	Industrial deposit	Non-industrial deposit	Ore occurrence	Location of mineralization
Iron	●		●	●
Manganese				◆
Copper			●	●
Lead			●	●
Zinc				●
Tin			●	
Arsenic				○
Silver			●	●
Lithium	●		●	●
Tantalum	●	●	●	●
Niobium	●	●	○	○
Ceramic pegmatite			◆	
Muscovite mica			◆	
Talc			◆	
Raw cement material (limestone)	■			
Sand used for casting			■	
Emerald			◆	

For more detailed information of ore occurrence, see annex 2 and 3 of Shadchinev and others (1975).

DESCRIPTION OF MAP UNITS

LAYERED ROCKS

CENOZOIC

- **Qaf** — **Alluvial deposits (upper Quaternary)**—Floodplain alluvial deposits and above floodplain low terraces (as much as 10 meters (m) thick); diluvial-proluvial deposits; pebbles, sand, loam, and detritus
- **Qapr** — **Proluvial deposits (upper Quaternary)**—Above floodplain alluvial terrace deposits (as thick as 30 m); pebbles, sand, loam, detritus, and limey tufa; glacial deposits and travertine
- **Qat** — **Alluvial terraces (upper Quaternary)**—Landslide deposits; pebbles, sand, loam, detritus, cobbles, and boulders. As much as 100 to 200 m thick
- **Qlo** — **Loess (middle Quaternary)**—Loams
- **NP$_3$c** — **Conglomerate (Neogene to Paleogene)**—Red-colored, conglomerate, sandstone, clay, and siltstone

MESOZOIC

- **Tcsa** — **Conglomerate (Lower Triassic)**—Grey-colored, conglomerate, gravelite, sandstone, and siltstone; with cobbles and boulders; dominated by carbonate rock fragments

PALEOZOIC

- **PCssa** — **Metamorphic and sedimentary rocks (Permian to Carboniferous)**—Quartz-sericite-chlorite schist, quartz-biotite schist, sandstone, and siltstone; with layers and beds of graviellte and conglomerate
- **Cpsq** — **Metamorphic and sedimentary rocks (Carboniferous)**—Siliceous jasper, schist, and quartzite; with fine-grained quartz interlayered with brecciated carbonate rocks and individual fragments of carbonate rocks. The lower part contains albite and actinolite in albite-mica schist derived from volcanic rock of primary composition
- **CSld** — **Limestone (Carboniferous to Silurian)**—Dolomite
- **PCgsm** — **Metamorphic rocks (Pre-Cambrian)**—Garnet-sillimanite-biotite gneiss, cordierite-garnet-biotite gneiss, biotite-amphibole gneiss, amphibolite, schist, marble, and quartzite

Pagman Intrusive Complex

Phase II

- **P$_2$pgr** — **Pegmatite granite (late Paleogene)**—Coarse-grained

Phase I

- **P$_2$grt** — **Granitic rocks (late Paleogene)**—Medium- to coarse-grained, locally porphyritic, tonalite, granodiorite, granite, and granitic gneiss
- **Kgad** — **Gabbro-diorite and diorite (Early Cretaceous)**
- **Tqpo** — **Quartz porphyry (Late Triassic)**—Subvolcanic intrusion

Hindikush Intrusive Complex

- **TPg** — **Pegmatite (Late Triassic to late Permian)**

Phase III

- **TPggr** — **Biotite granite (Early Triassic to late Permian)**—Medium- to coarse-grained, in places porphyritic

Phase II

- **TPgrd** — **Biotite-amphibole granite and granodiorite (Early Triassic to late Permian)**—Fine- to medium-grained

Phase I

- **TPqd** — **Quartz diorite (Early Triassic to late Permian)**

INTRUSIVE ROCKS

- **PCgad** — **Gabbro-diorite (middle to early Permian to Carboniferous)**—Gabbro-diorite, gabbro, and diorite
- **Cse** — **Serpentinite (middle to early Carboniferous)**—Ultramafic intrusion

EXPLANATION OF MAP SYMBOLS

- **Mélange of Hindikush fault zone**—Accumulation of breccia and boulders of carbonate, siliceous and terrigenous rocks, tuffs and extrusives of the same composition, and hyperbasite (serpentinite). The mélange coincides with areas of hematite alteration

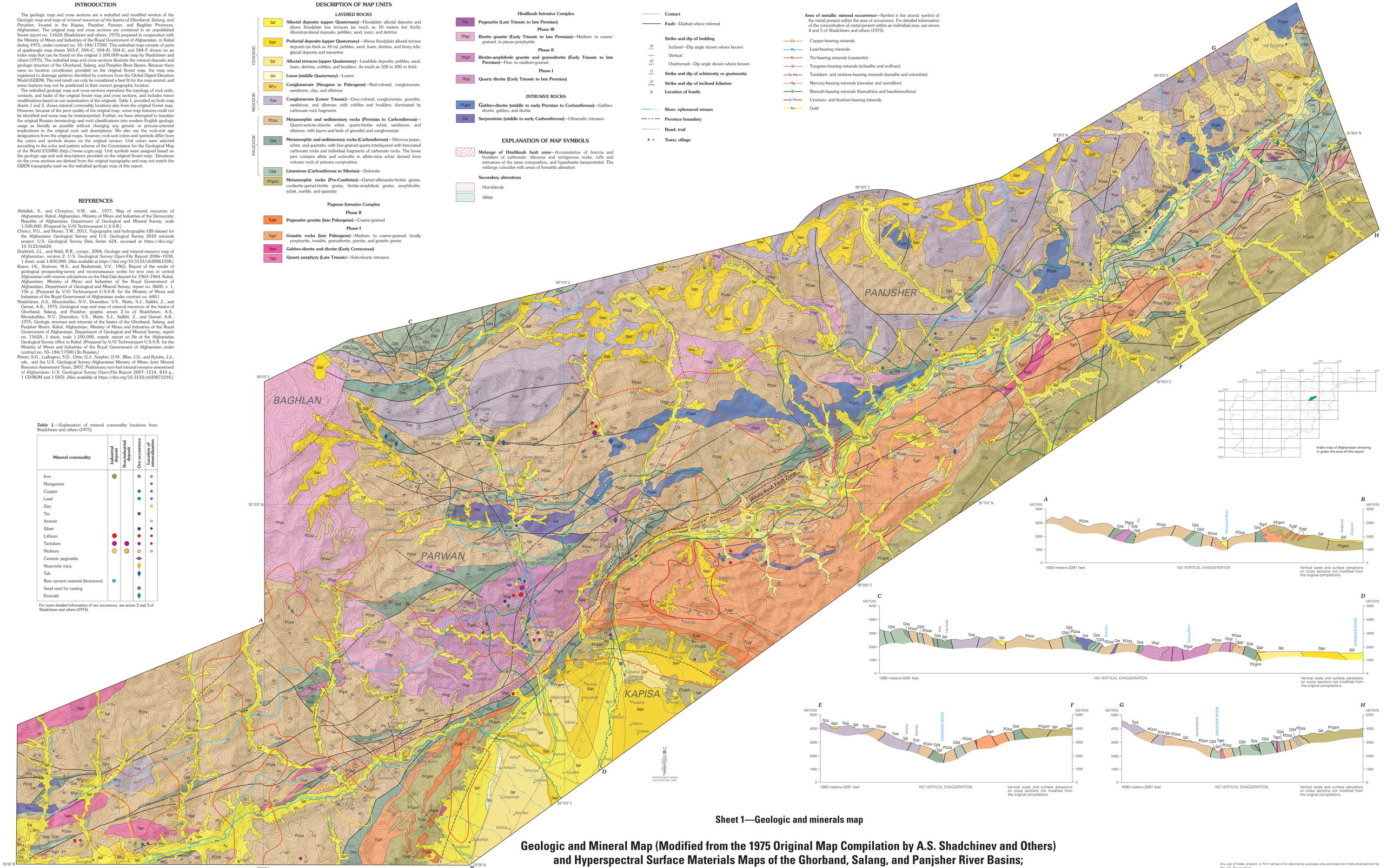
Secondary alterations

- Hornblende
- Albite

- **Contact**
- **Fault**—Dashed where inferred
- **Strike and dip of bedding**
  - 30 — Inclined—Dip angle shown where known
  - Vertical
  - 50 — Overturned—Dip angle shown where known
- 15 — **Strike and dip of schistosity or gneissosity**
- 25 — **Strike and dip of inclined foliation**
- **Location of fossils**
- **River; ephemeral stream**
- **Province boundary**
- **Road; trail**
- **Town; village**

Area of metallic mineral occurrence—Symbol is the atomic symbol of the metal present within the area of occurrence. For detailed information of the concentration of metal present within an individual area, see annex 4 and 5 of Shadchinev and others (1975)

- Cu — Copper-bearing minerals
- Pb — Lead-bearing minerals
- Sn — Tin-bearing minerals (cassiterite)
- W — Tungsten-bearing minerals (scheelite and wolfram)
- Ta–Nb — Tantalum- and niobium-bearing minerals (tantalite and columbite)
- Hg — Mercury-bearing minerals (cinnabar and vermillion)
- Bi — Bismuth-bearing minerals (bismuthine and basobismuthine)
- U–Th — Uranium- and thorium-bearing minerals
- Au — Gold



Index map of Afghanistan showing in green the area of this report.

Sheet 1—Geologic and minerals map

Geologic and Mineral Map (Modified from the 1975 Original Map Compilation by A.S. Shadchinev and Others) and Hyperspectral Surface Materials Maps of the Ghorband, Salang, and Panjsher River Basins; Kapisa, Panjsher, Parwan, and Baghlan Provinces, Afghanistan

Compiled by

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2020

Topography, hydrography, and shaded relief derived from Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) 30-meter Global Digital Elevation Model (GDEM) data, 2009

Projection and grid: Universal Transverse Mercator (UTM), zone 42 north

World Geodetic System (WGS) 1984 Datum

Cultural data from digital files at the Afghanistan Information Management Services (AIMS), accessed 2015, at http://www.aims.org.af

SCALE 1:100 000

1 0 1 2 3 4 5 6 7 8 MILES

1 0 1 2 3 4 5 6 7 8 9 10 KILOMETERS

CONTOUR INTERVAL 100 METERS

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