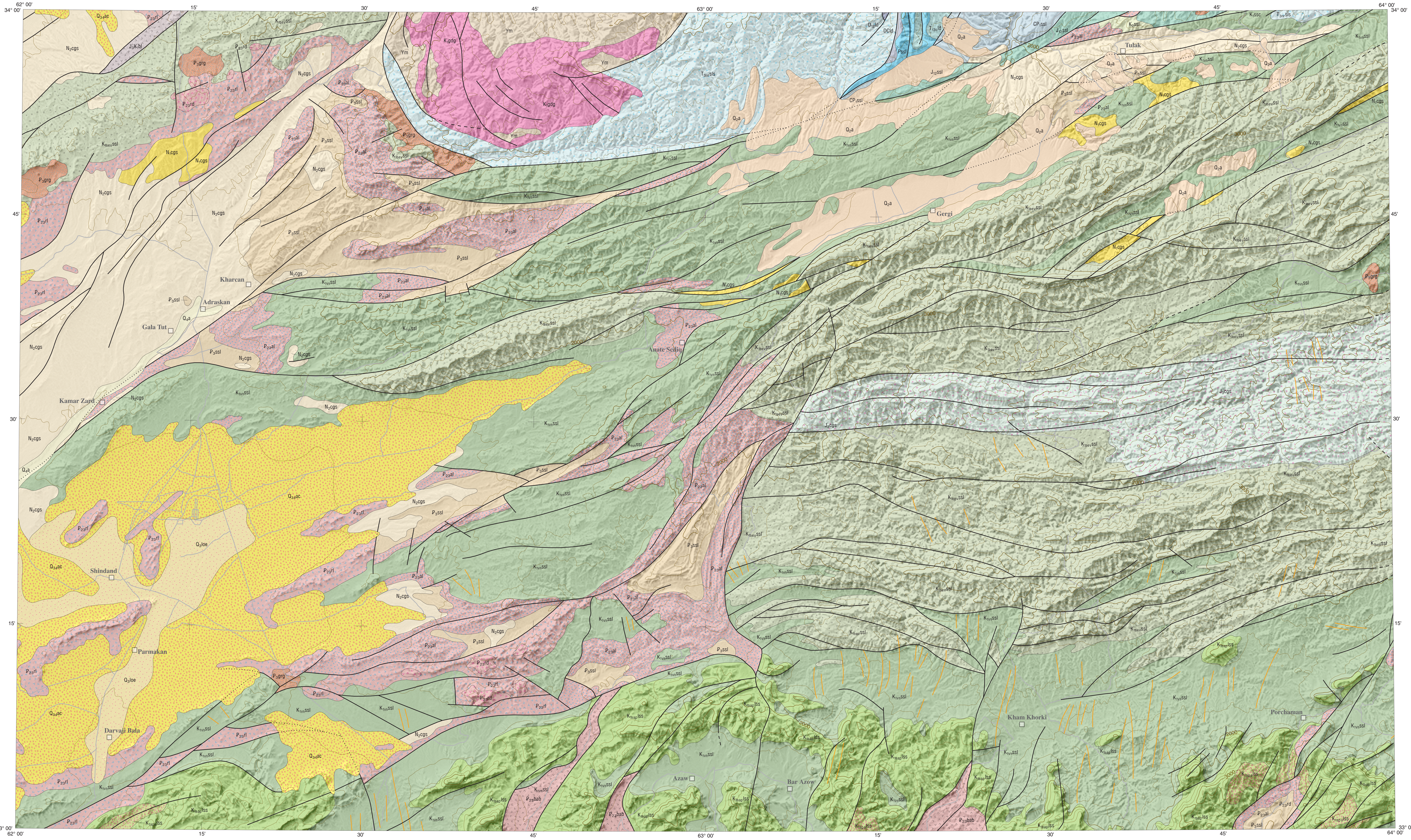
AFGHAN GEOLOGICAL SURVEY
Prepared in cooperation with the U.S. Geological Survey and the Afghanistan Geodesy and Cartography Head Office
Under the auspices of the U.S. Agency for International Development and the U.S. Trade and Development Agency

USGS OPEN-FILE REPORT 2005-1109-A
AGS OPEN-FILE REPORT (415/416) 2005-1109-A
USGS Afghanistan Project Product No. 031



Base from Shuttle Radar Topography Mission (SRTM) 85-meter digital data
Cultural data from digital files from AIMS Web site (http://www.aims.org.af)
Projection: Universal Transverse Mercator, zone 41, WGS 84 Datum

SCALE 1:250 000
5 0 5 10 15 20 25 30 35 40 KILOMETERS
5 0 5 10 15 20 MILES
CONTOUR INTERVAL 250 METERS

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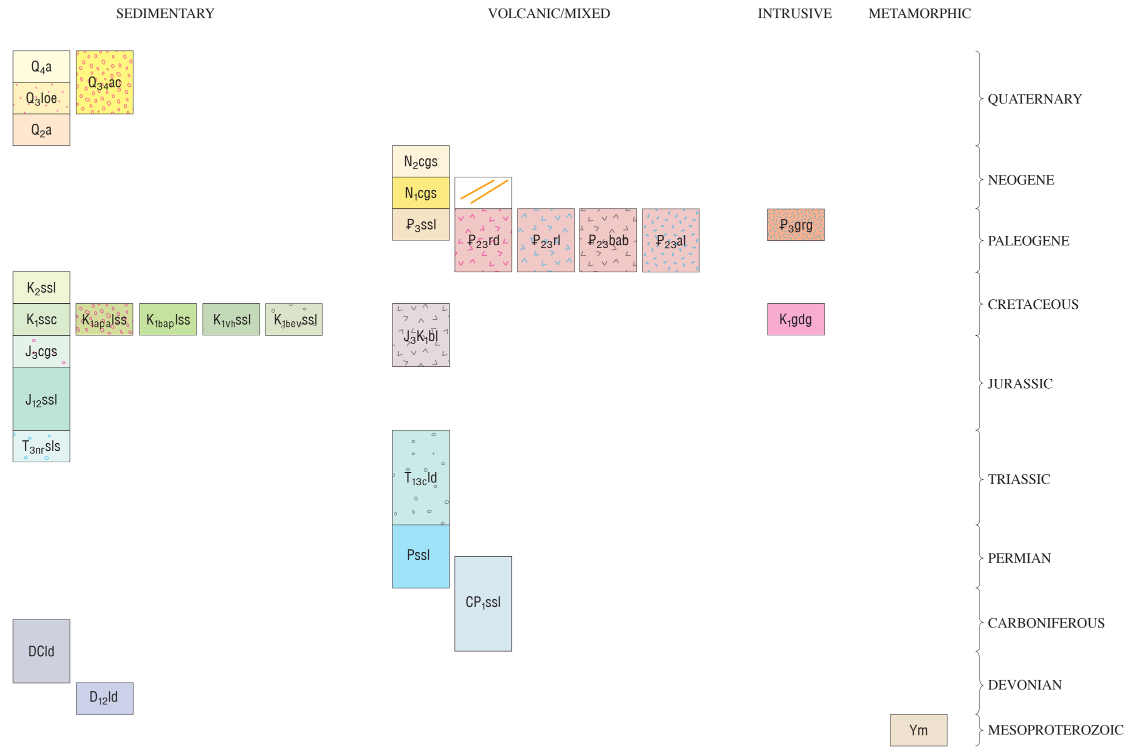
CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Q_4a **Conglomerate and sandstone (Holocene)**—Alluvium: shingly and detrital sediments, gravel, sand more abundant than silt and clay

$Q_{34}ac$ **Fan alluvium and colluvium (Holocene and late Pleistocene)**—Fan alluvium and colluvium: shingly and detrital sediments, gravel, sand, clay

Q_3loe **Loess (late Pleistocene)**—Loess more abundant than sand, clay

Q_2a **Conglomerate and sandstone (middle Pleistocene)**—Alluvium: shingly and detrital sediments, gravel, sand more abundant than silt and clay

N_2cgs **Conglomerate and sandstone (Pliocene)**—Gray conglomerate, sandstone more abundant than siltstone, clay, limestone, marl; gypsum, salt; acid to mafic volcanic rocks

N_1cgs **Conglomerate and sandstone (Miocene)**—Red conglomerate, sandstone more abundant than siltstone, clay; acid and mafic volcanic rocks; limestone, marl; olivine basalt, trachybasalt, andesitic basalt (Taywara Series)

Andesite and diorite (Miocene)—Andesite, diorite more abundant than diabase porphyry dikes (and veins)

₽$_3$grg **Granite and granodiorite (Oligocene)**—Granite, granite porphyry, granodiorite more abundant than quartz syenite, granosyenite

₽$_3$ssl **Sandstone and siltstone (Oligocene)**—Sandstone, siltstone more abundant than clay, conglomerate, limestone, marl; acid and mafic volcanic rocks

₽$_{23}$rd **Rhyolite and dacite (Oligocene and Eocene)**—Rhyolite (liparite) and dacite more abundant than granite porphyry

₽$_{23}$rl **Rhyolite lava (Oligocene and Eocene)**—Rhyolite lava more abundant than basaltic andesite, basalt, trachyte, dacite, ignimbrite, tuff; conglomerate, sandstone, siltstone, limestone

₽$_{23}$bab **Basaltic andesite and basalt (Oligocene and Eocene)**—Basaltic andesite, basalt more abundant than trachyte, dacite, rhyolite, ignimbrite, tuff; conglomerate, sandstone, siltstone, limestone

₽$_{23}$al **Andesite lava (Oligocene and Eocene)**—Andesite lava more abundant than basaltic andesite, basalt, trachyte, dacite, rhyolite, ignimbrite, tuff; conglomerate, sandstone, siltstone, limestone

K_2ssl **Sandstone and siltstone (Late Cretaceous)**—Limestone (Middle Afghanistan)

K_1gdg **Granodiorite and granite (Early Cretaceous)**—Granodiorite, granite

K_1ssc **Sandstone and conglomerate (Early Cretaceous)**—Red sandstone, conglomerate more abundant than siltstone, gypsum, clay

$K_{1apa}lss$ **Limestone and sandstone (Early Cretaceous (Albian and Aptian))**—Limestone, marl, sandstone more abundant than conglomerate

$K_{1bap}lss$ **Limestone and sandstone (Early Cretaceous (Aptian and Barremian))**—Limestone, marl, sandstone more abundant than conglomerate

$K_{1vh}ssl$ **Sandstone and siltstone (Early Cretaceous (Hauterivian and Valanginian))**—Sandstone, siltstone more abundant than limestone, marl

$K_{1bev}ssl$ **Sandstone and siltstone (Early Cretaceous (Valanginian and Berriasian))**—Sandstone, siltstone more abundant than limestone, marl

J_3K_1bl **Basalt lava (Early Cretaceous (Hauterivian) and Late Jurassic (Tithonian))**—Basalt lava more abundant than shale, siltstone, sandstone, conglomerate, chert, limestone, greenstone, acid volcanic rocks

J_3cgs **Conglomerate and sandstone (Late Jurassic)**—Limestone, marl, sandstone, siltstone (Farah Rod basin; Upper Jurassic (Tithonian))

$J_{12}ssl$ **Sandstone and siltstone (Middle and Early Jurassic)**—Limestone, marl, sandstone, shale, siltstone (Middle Afghanistan)

$T_{3nr}sls$ **Siltstone and sandstone (Late Triassic (Rhaetian and Norian))**—Siltstone, sandstone more abundant than shale, conglomerate

$T_{13c}ld$ **Limestone and dolomite (Late Triassic (Carnian) to Early Triassic)**— Limestone, dolomite more abundant than conglomerate, chert, marl (Middle Afghanistan); limestone, sandstone, shale, conglomerate, chert, mafic volcanic rocks (Khashrud zone)

Pssl **Sandstone and siltstone (Permian)**—Limestone, dolomite, sandstone, siltstone, shale, phyllite, mafic volcanic rocks, bauxite and bauxite-bearing rocks (Middle Afghanistan: Zuri and Kismaran zones)

CP_1ssl **Sandstone and siltstone (Early Permian and Carboniferous)**—Sandstone and siltstone more abundant than slate, andesite to basalt volcanic rocks

DCld **Limestone and dolomite (Early Carboniferous and Late Devonian)**— Limestone and dolomite more abundant than marl, schist

$D_{12}ld$ **Limestone and dolomite (Middle and Early Devonian)**—Limestone and dolomite more abundant than sandstone, siltstone

Ym **Metamorphic rocks, undivided (Mesoproterozoic)**—Greenschist, gneiss, quartzite, marble, amphibolite (metavolcanic lava and sedimentary rocks)

EXPLANATION OF MAP SYMBOLS

Contact

Fault—Dashed where approximately located; dotted where concealed

DATA SUMMARY

This map was produced from several larger digital datasets. Topography was derived from Shuttle Radar Topography Mission (SRTM) 85-meter digital data. Gaps in the original dataset were filled with data digitized from contours on 1:200,000-scale Soviet General Staff Sheets (1978–1997). Contours were generated by cubic convolution averaged over four pixels using TNTmips[1] surface-modeling capabilities. Cultural data were extracted from files downloaded from the Afghanistan Information Management Service (AIMS) Web site (http://www.aims.org.af). The AIMS files were originally derived from maps produced by the Afghanistan Geodesy and Cartography Head Office (AGCHO). Geologic data and the international boundary of Afghanistan were taken directly from Abdullah and Chmyriov (1977).

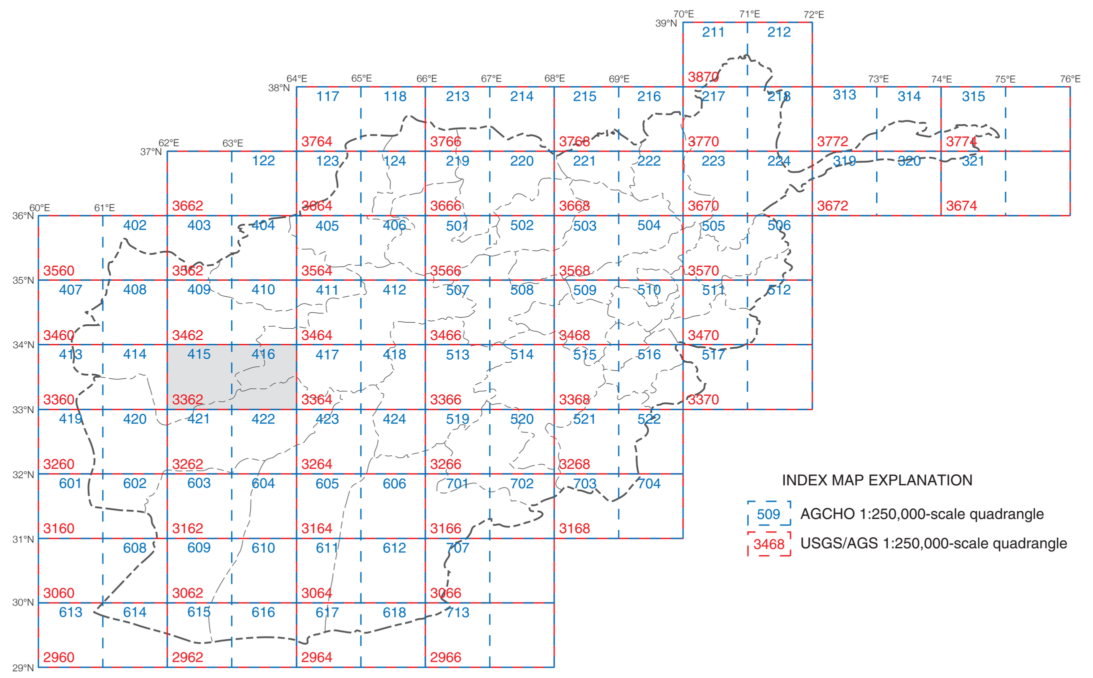
It is the primary intent of the U.S. Geological Survey (USGS) to present the geologic data in a useful format while making them publicly available. These data represent the state of geologic mapping in Afghanistan as of 2005, although the original map was released in the late 1970s (Abdullah and Chmyriov, 1977). The USGS has made no attempt to modify original geologic map-unit boundaries and faults; however, modifications to map-unit symbology, and minor modifications to map-unit descriptions, have been made to clarify lithostratigraphy and to modernize terminology. The generation of a Correlation of Map Units (CMU) diagram required interpretation of the original data, because no CMU diagram was presented by Abdullah and Chmyriov (1977).

This map is part of a series that includes a geologic map, a topographic map, a Landsat natural-color-image map, and a Landsat false-color-image map for the USGS/AGS (Afghan Geological Survey) quadrangles shown on the index map. The maps for any given quadrangle have the same open-file number but a different letter suffix, namely, -A, -B, -C, and -D for the geologic, topographic, Landsat natural-color, and Landsat false-color maps, respectively. The present map series is to be followed by a second series, in which the geology is reinterpreted on the basis of analysis of remote-sensing data, limited fieldwork, and library research. The second series is to be produced by the USGS in cooperation with the AGS and AGCHO.

REFERENCE CITED

Abdullah, Sh., and Chmyriov, V.M., eds., 1977, Map of mineral resources of Afghanistan: Kabul, Ministry of Mines and Industries of the Democratic Republic of Afghanistan, Department of Geological and Mineral Survey, V/O "Technoexport" USSR, scale 1:500,000.

[1]Geospatial analysis software developed by MicroImages, Inc., Lincoln, NE 68508-2010.



INDEX MAP EXPLANATION
AGCHO 1:250,000-scale quadrangle
USGS/AGS 1:250,000-scale quadrangle

GEOLOGIC MAP OF QUADRANGLE 3362, SHIN-DAND (415) AND TULAK (416) QUADRANGLES, AFGHANISTAN

Compiled by
Robert G. Bohannon and Charles R. Lindsay
2005