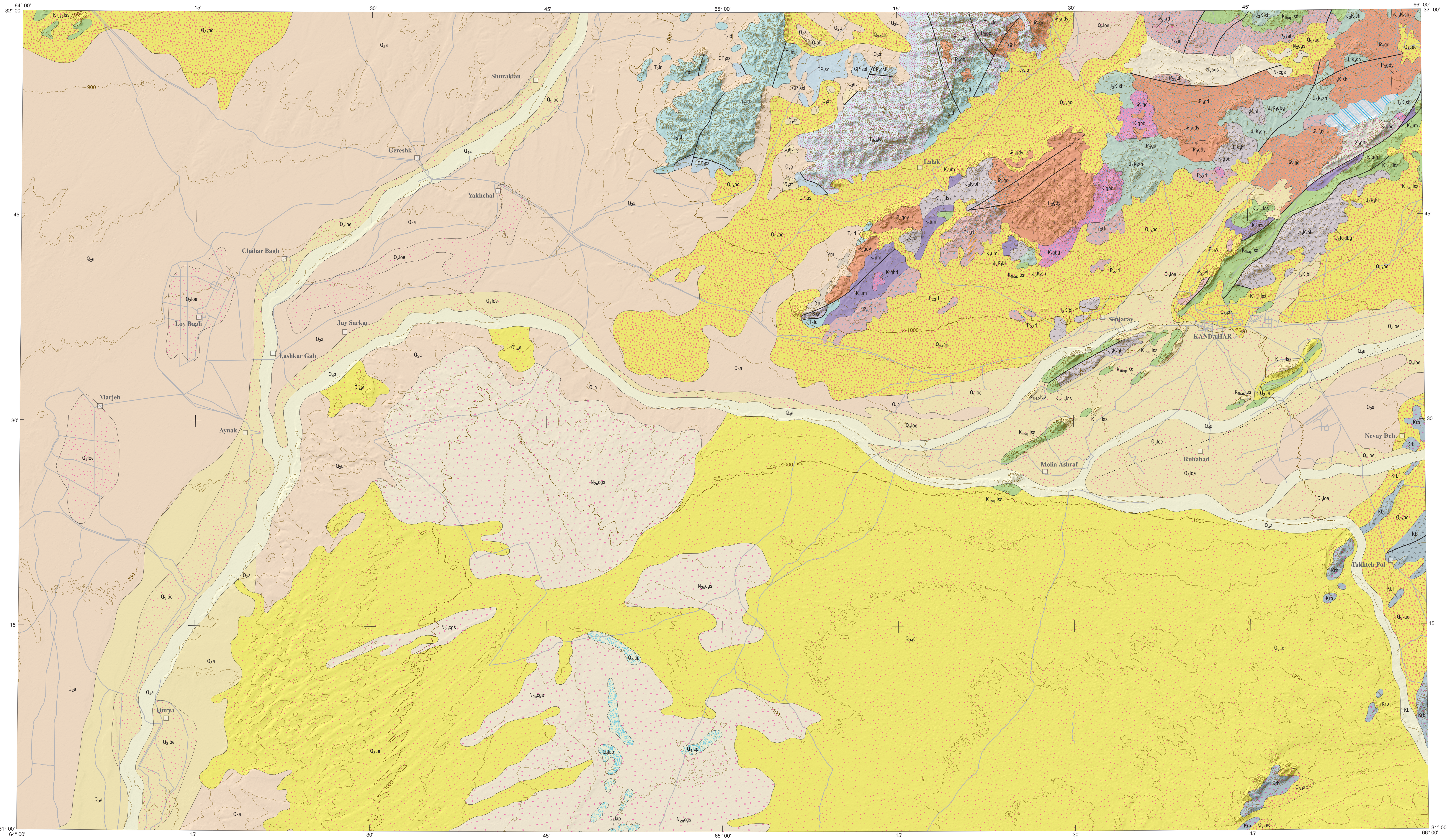
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

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 2005-1119-A
AGS OPEN-FILE REPORT (605/606) 2005-1119-A
USGS Afghanistan Project Product No. 022



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
CONTOUR INTERVAL 50 METERS

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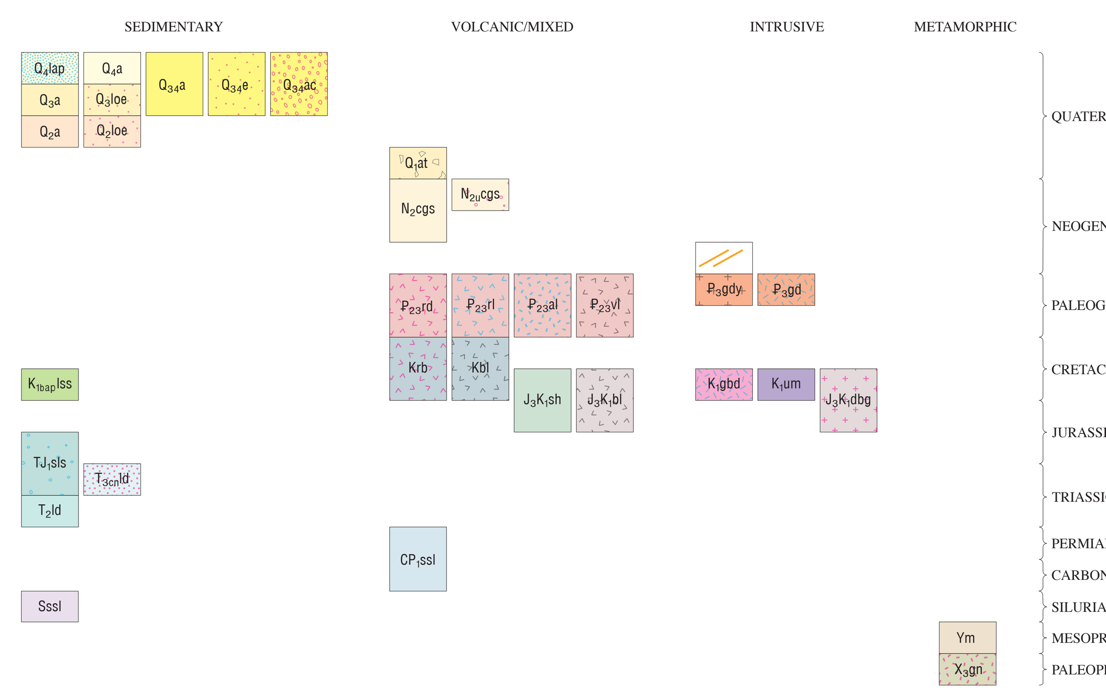
CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

Q_4lap **Playa deposits (Holocene)**—Mud, silt, and clay more abundant than sand; limestone and gypsum

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

$Q_{34}a$ **Conglomerate and sandstone (Holocene and late Pleistocene)**—Alluvium: shingly and detrital sediments, gravel, sand more abundant than silt and clay

$Q_{34}e$ **Eolian deposits (Holocene and late Pleistocene)**—Sand

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

Q_3a **Conglomerate and sandstone (late Pleistocene)**—Alluvium: shingly and detrital sediments, gravel, sand more abundant than silt and 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

Q_2loe **Loess (middle Pleistocene)**—Loess more abundant than sand, clay

Q_1at **Andesite tuff (early Pleistocene)**—Andesite, dacite tuff and welded tuff (Dashtinovar Series)

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

$N_{2u}cgs$ **Conglomerate and sandstone (late Pliocene)**—Gray conglomerate, grit, sandstone more abundant than siltstone, clay, limestone, marl; gypsum, salt; acid to mafic volcanic rocks

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

P_3gdy **Granodiorite and granosyenite (Oligocene)**—Granodiorite, alaskite, granosyenite more abundant than granite (Phase II)

P_3gd **Granodiorite (Oligocene)**—Granodiorite (Phase I)

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

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

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

$P_{23}vl$ **Lava (Oligocene and Eocene)**—Basaltic andesite, basalt, trachyte, dacite, rhyolite, ignimbrite, tuff; conglomerate, sandstone, siltstone, limestone

Krb **Rhyolite and basalt (Cretaceous)**—Rhyolite and basalt mafic volcanic rocks more abundant than chert, fine- and coarse-grained terrigenous rocks, marl, limestone

Kbl **Basalt lava (Cretaceous)**—Basalt mafic volcanic rocks more abundant than rhyolite, chert, fine- and coarse-grained terrigenous rocks, marl, limestone

K_1gbd **Gabbro and diorite (Early Cretaceous)**—Gabbro, diorite more abundant than plagiogranite

K_1um **Ultramafic intrusions (Early Cretaceous)**—Dunite, peridotite, serpentinite

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

J_3K_1dbg **Diabase and gabbrodiabase (Early Cretaceous and Late Jurassic)**—Diabase, gabbrodiabase

J_3K_1sh **Shale and siltstone (Early Cretaceous (Hauterivian) and Late Jurassic (Tithonian))**—Shale more abundant than siltstone, sandstone, conglomerate, chert, limestone, greenstone, acid and mafic volcanic rocks

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

TJ_1sls **Siltstone and sandstone (Early Jurassic and Late Triassic (Rhaetian))**—Siltstone, sandstone more abundant than shale, marl, limestone

$T_{3cn}ld$ **Limestone and dolomite (Late Triassic (Norian and Carnian))**—Limestone, dolomite

T_2ld **Limestone and dolomite (Middle Triassic)**—Limestone, dolomite

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

Sssl **Sandstone and siltstone (Silurian)**—Sandstone, siltstone, shale (Logar and Argandab tectonic zones)

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

X_3gn **Gneiss (late Paleoproterozoic)**—Biotite and garnet-biotite gneiss; schist, quartzite, marble, amphibolite

EXPLANATION OF MAP SYMBOLS

Contact

Fault—Dashed where approximately located; dotted where concealed

Intermittent lake

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).

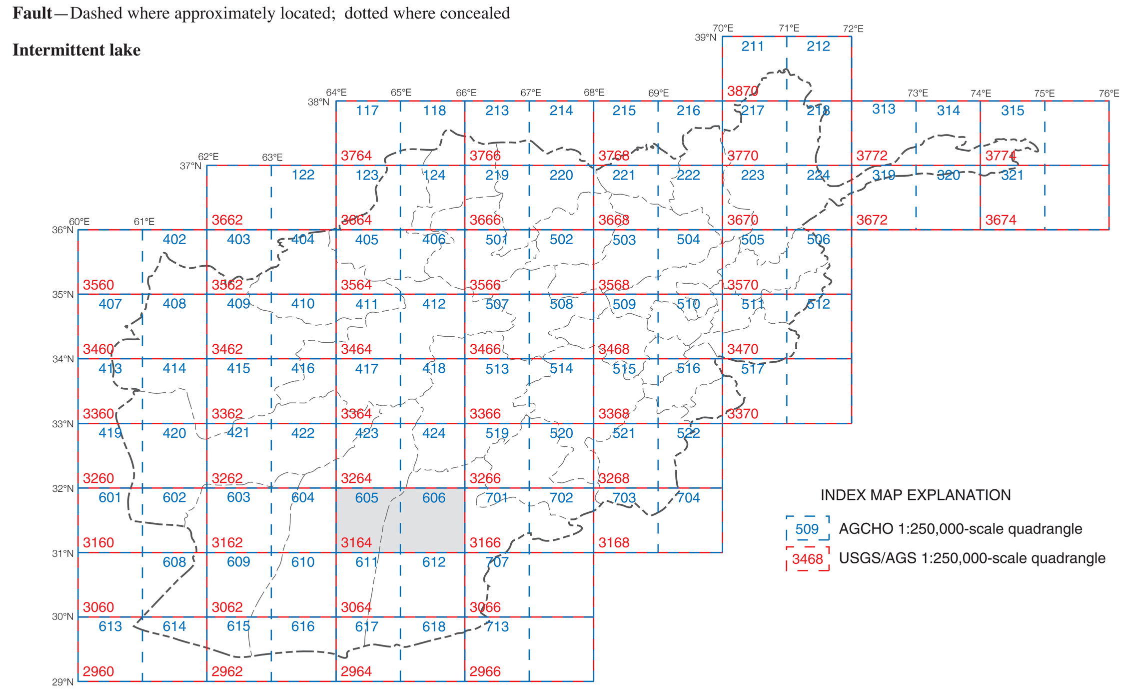
It is the primary intent of the U.S. Geological Survey (USGS) to present the geologic data in a useful format while making them publicly available. These data represent the state of geologic mapping in Afghanistan as of 2005, although the original map was released in the late 1970s (Abdullah and Chmyriov, 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.



GEOLOGIC MAP OF QUADRANGLE 3164, LASHKARGAH (605) AND KANDAHAR (606) QUADRANGLES, AFGHANISTAN

Compiled by
Dennis W. O'Leary and John W. Whitney

2005