Minerals in Afghanistan

Shirbatu Granite Dimension Stone in Bamyan Province

Summary

Exotic dimension-stone quality granites which form the Shirbatu Granite Complex (SGC) were identified by Afghanistan Geological Survey (AGS) geologists during the 2010 field season. The SGC is centered on 67.5590E longitude and 34.8610N latitude, and is located approximately 225 road km NW from Kabul, the capital city of Afghanistan.

The body comprises spectacular porphyritic to equigranular, coarse-medium grained, commonly phenocryts of pinkish orthoclase and microcline feldspars embedded in medium-fine grained feldspars, quartz, and micas. Mapping has delineated extensive outcropping over an area of 164km^2 and exposure of minimum 200m vertical depth with an inferred resource of 32 billion m^3 based on outcrop dimensions. The outcrops of the Shirbatu Granite Complex (Figure 1) are part of a greater "Bamyan Granitoid Complex" in the region, and holds equal potential for exploration, development and exploitation for decorative stone and construction materials. Excellent road network connecting Kabul city is in place with other development options for railway route and energy/power being investigated, to enhance the development of the nearby world-class Hajigak iron ore deposit.

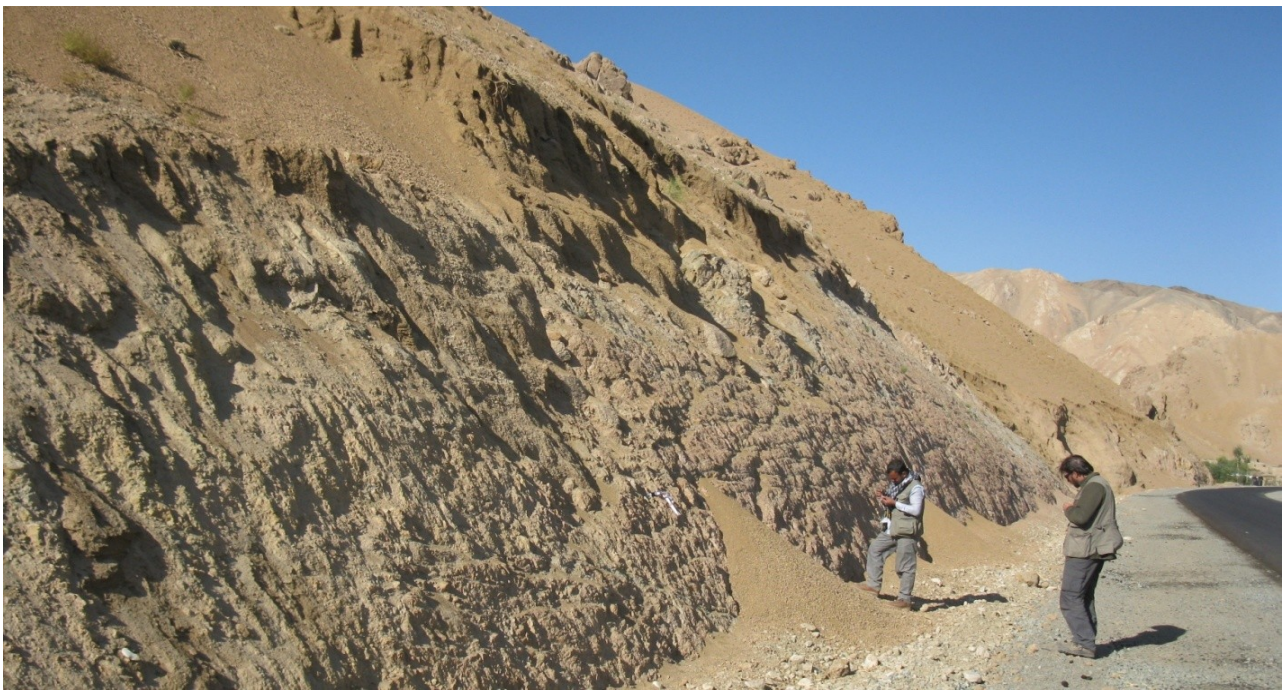

Figure 1. Part of the Shirbatu Granite Complex showing extensive bodies in the background along the rod cut from Bamyan to Yawkalang. The Shirbatu Granite Complex is centered on 67.559°E longitude and 34.861°N latitude.

Location and Accessibility

The Bamyan Granite Complex is centered on 67.559^{0}E longitude and 34.861^{0}N latitude, and located within 20km west of Bamyan town, the provincial capital of Bamyan Province. The BGC body is further linked by approximately 225 road km NW from Kabul, the capital city of Afghanistan, (Figure 2). The second access road from Kabul is via Wardak Province. This road is about 180km long and passes by the Hajigak iron ore deposit. This road is passable but certain portions require major upgrading and reconstruction.

Part of the outcropping bodies are transected by a newly sealed highway between Bamyan and Yawkalang. MCC the developer of Aynak copper, is planning to construct a railway to the north, with linkage to Hajigak world-class iron ore deposit. This railway will lie approximately 40km east of the Shirbatu granite resource and will also provide vital bulk transportation medium for the polished slabs to various markets. Furthermore, Shirbatu Granite resource will benefit immensely from shared infrastructures developed for Hajigak iron ore deposit.

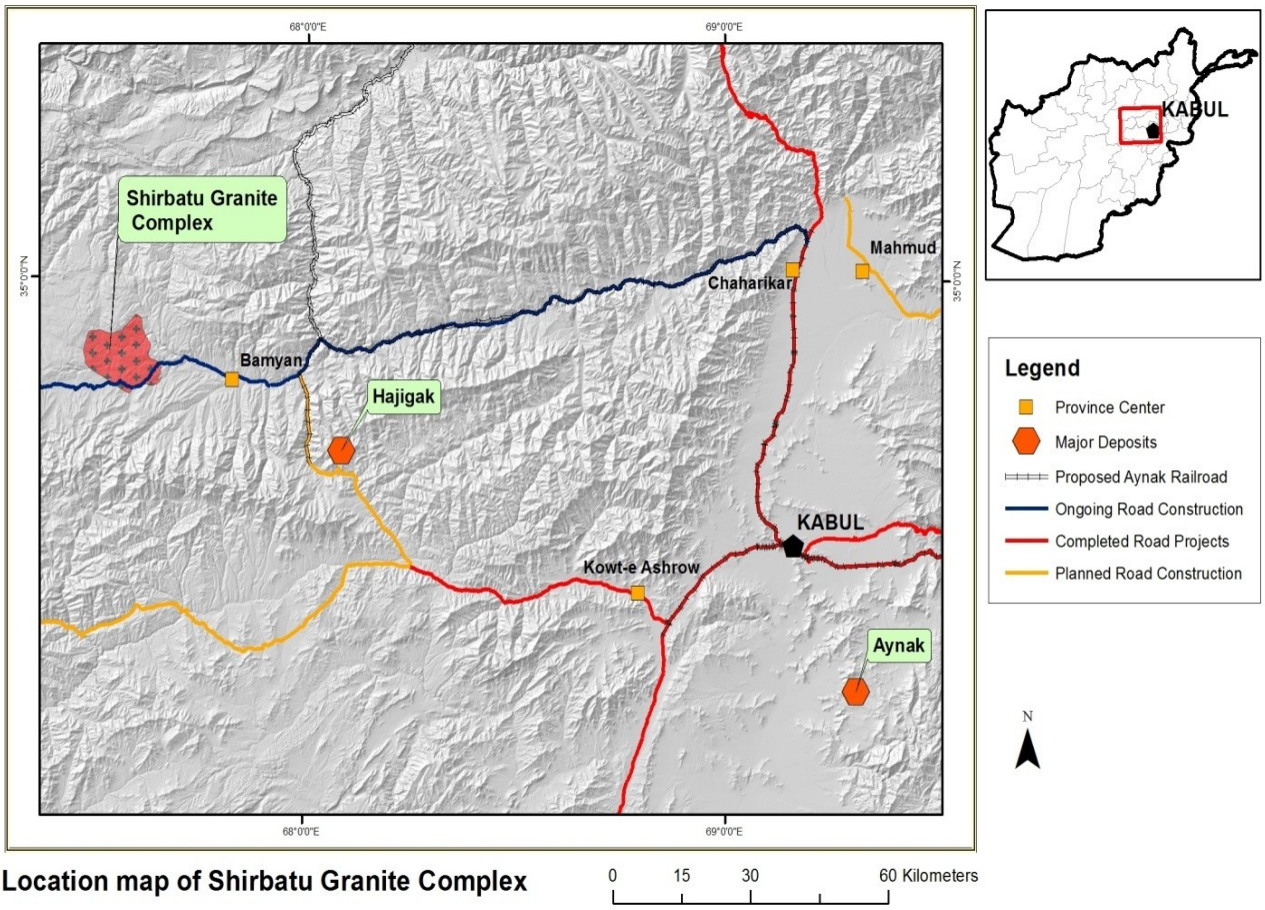

Figure 2. Location of Shirbatu granite dimension stone resource, major deposits and infrastructures (planned and existing).

Geology of the Shirbatu Granite Complex

Bamyan Granitoid Complex

The Shirbatu granite is part of a huge Triassic aged calc-alkaline batholith, named as "Bamyan Granitoid Complex" (Figure 3) which extends over thousands of square kilometers from the SW to the NE across Bamyan and Baghlan Provinces. The complex is part of a number of igneous complexes formed during Early—Late Triassic time as a result of subduction of an oceanic crust along the southern margins of the Eurasian plate. The BGC complex intruded Proterozoic and Paleozoic strata and is unconformably overlained by Cretaceous and younger sediments, (Stazhilo-Alekseev K.F. et al. 1976, Abdullah et al. 1978)

Absolute age determinations yielded two distinct ages for the Bamyan Granitoid Complex; 200—240ma and 95—155ma, (Abdullah et al, 1978). The age determination therefore indicated two distinct igneous phases for the Bamyan Granitoid Complex. Phase I (Early Triassic) is consisting of granites and granodiorites, while Phase II (Late Triassic) is made of granites, alaskite granites, granosyenites, quartz syenites and granosyenite porphyries.

The Phase I granitoid rocks crop out to the NE of the Shirbatu Complex and are represented by coarse-grained granite porphyry and light-grey and grayish-pink granite and granodiorite. They consist of almost equal amounts of plagioclase (25—35%), microcline (25—30%) and quartz (25—32%) with less biotite (5—8%), and accessory apatite, zircon, and other minerals. The texture of the rocks is porphyritic, hypidiomorphic-granular and poikilitic.

Shirbatu Granite Complex

The Shirbatu Granite Complex (SGC) crops out at the surface over an area of 164 km^2. The Shirbatu Granite was formed during the Phase II intrusion of granites and granodiorites. There are also some veins and stocks of alaskite granites and granosyenites. At this locality, the complex intruded Limestones of Upper Permian age, (Figure 4).

The contact aureole within the sedimentary rocks is characterized by development of skarn and marbelization of limestones, actinolization and biotization of volcanogenic rocks and serpentinization of dolomites. The presence of migmatized and hornfelsed contact aureoles are up to several hundred meters wide.

Several dyke series associated with the complex are represented by pegmatites and, less frequently, diorite porphyry and diabase bodies; measuring a few meters thick and a few dozen meters long, confined mainly to the contact zones of the intrusives.

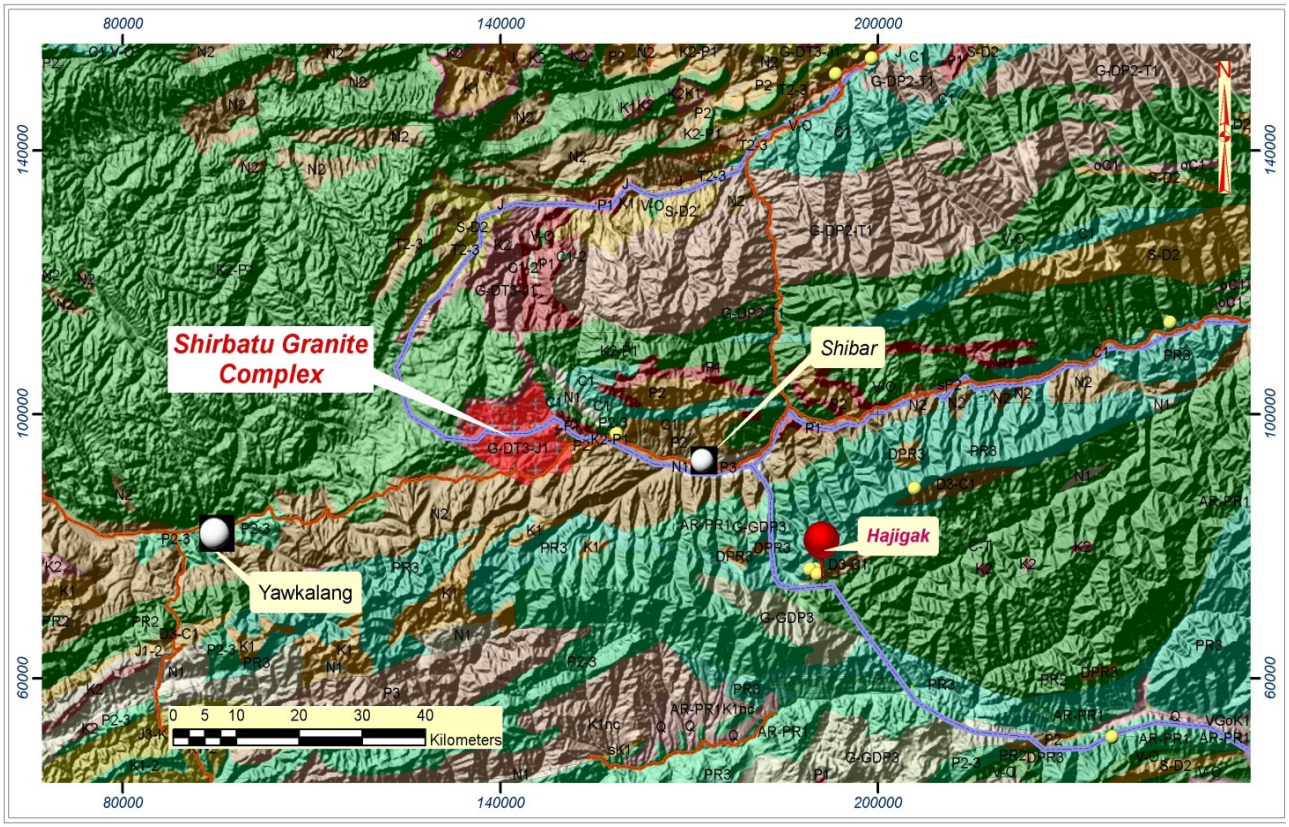

Figure 3. Shirbatu Granite Complex is located some 20km to the west of Bamyan town, capital of Bamyan Province along the main road (thick black line) connecting Bamyan with Band-e-Amir and Yakawlang. G-DT3-J1 and G-DP2-T1 are phase 1 and phase II igneous complexes, respectively. The Shirbatu Granite Complex intruded sedimentary host rocks of Upper Permian Limestone and terrigenous sediments, (K2-P1 and C2) which are then unconformably overlained by Neogene (N2) sediments (conglomerates, sandstone and siltstone) (Geology after USGS compiled from Soviet Union maps, 2007)

Phase II rocks which also include the "Shirbatu Granite Complex", are represented by granites, alaskite granite, granosyenite, quartz syenite and syenite porphyry. They are coarse—medium grained, massive light grey and grey-pink rocks with aplitic, graphic and porphyritic textures consisting of varying amounts of

- microcline (up to 65%),
- oligoclase (10—30%),
- quartz (15—30%),
- biotite (5—7%) and
- accessory zircon, garnet, apatite, and other opaque minerals.

The porphyry granites exhibit the typical granitic texture with elements of pegmatite texture, (Figure 4 and 5). This type of textures is extremely exotic looking when polished.

Figure 4. A polished slab of coarse grained porphyritic granite. Abundant coarse grained pinkish orthoclase feldspar embedded in relatively medium-fine grain plagioclase feldspar (grey) and quartz (white) and biotite (dark minerals).

Figure 5. A polished slab of medium grained equigranular granite, comprising >60 vol. % of pinkish orthoclase feldspar.

Economic Potential

The granites from Shirbatu massif exhibit beautiful textures when polished and can be used as very valuable building stone and decorative tiles for covering floors, sidewalks, vanities, kitchens tables, and other needs. The granite body is fresh, massive less weathered and fractured.

Texturally, coarse grains of varying amounts of feldspars and quartz are embedded in a finer grained of the same minerals with minor accessories giving a "porphyritic texture", (Figure 4) to equigranular and very coarse pegmatitic appearance. Less commonly are medium grained equigranular textures giving the rocks exotic appearance when cut and polished, (Figure 5).

The inferred resource for decorative building stone at the Shirbatu Granite Complex is approximately 32.8 billion m^3.

The road infrastructure is being upgraded and access to major markets in the north and to Kabul city will be excellent. With the further railway development, transportation of bulk commodities will be greatly improved.

The production of high quality tiles for decorative purposes and by-products for road aggregates and other usages can be fully established after detailed feasibility studies.

Government Strategy on Mineral Resource Development

The GoA has recognized the country's mineral resources as valuable assets that can be developed to create employment and promote economic independence. Under this goal, the GoA has recently made significant policy changes following its transition from state operator to regulator and is now driving infrastructural development with a view to enhancing and promoting mineral resource development. The GoA is constantly seeking investment from the private and foreign investors to develop the huge and very diverse mineral resource potential of Afghanistan.

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References

Abdullah, Sh and Chmyriov, V M (editors in chief). 2008. Geology and Mineral Resources of Afghanistan. 2 Volumes. British Geological Survey - Occasional Publication No. 15. (Reprint of the 1980 English translation of the 1977 Russian publication).

Peters, S.G., Ludington, S.D., Orris, G.J., Sutphin, D.M., and Bliss, J.D., eds., 2007, Preliminary Non-Fuel Mineral Resource Assessment of Afghanistan: U.S. Geological Survey Open–File Report 2007-1214.

SanFilipo, J. 2005. Assessing the Iron Ore Resources of Afghanistan, USGS Information sheet

Stazhilo-Alekseev K.F. et al. 1976, Abdullah et al. 1978

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