



# PRELIMINARY BEDROCK GEOLOGIC MAP OF THE LAHORE 7.5-MINUTE QUADRANGLE, ORANGE, SPOTSYLVANIA, AND LOUISA COUNTIES, VIRGINIA

By  
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present. Alleghanian (Pennsylvanian)  $S_2$  schistosity is coarser and more micaceous than  $S_1$ , and is locally accompanied by a lineation that is represented by mineral lineations, micro-crenulations, or mullion fabric, and represents the hinges of  $F_2$  folds. These lineations are more steeply plunging (fig. 1D) than their counterparts in the Ferncliff and Louisa quadrangles (Burton and others, 2019) (fig. 1E), which is perhaps a function of the interaction of the Ellsville pluton (SOeg) with a distal-transpressive stress field (Burton and others, 2019). A foliation in the plutonic rocks is represented by an equilibrium assemblage of aligned mafic minerals and is early Paleozoic in age, possibly representing an igneous flow foliation that was locally affected by tectonic stresses during synkinematic intrusion.

Regionally, the most common trend and plunge of joints is northwest and subvertical, respectively, and orthogonal to the regional strike of foliation (Burton and others, 2019); however, the diversity of joint directions shown in the rose diagram of joint azimuths in the Lahore quadrangle (fig. 1F) resembles the joint pattern southeast of the "Ellsville neck" of the Ellsville pluton in the Ferncliff quadrangle, where early Mesozoic extension is thought to be a factor (Burton and others, 2019) (fig. 1G). Early Mesozoic extension may have also reactivated the Harris Creek fault, a late Paleozoic (Alleghanian orogeny) transpressional fault that marks the contact between granulodiorite of the Ellsville pluton (SOeg) and the Choptawwase Formation (Oc) (Burton and others, 2019). The Harris Creek fault, in the extreme southeast corner of the map, is a continuation of the fault mapped in the adjacent Mineral, Va., quadrangle by Carter and others (2019).

Metamorphic grade in the non-plutonic rocks of the Lahore quadrangle ranges from lower-greenschist to the northwest to upper-greenschist to the southeast, as represented by mineral assemblages in non-plutonic rocks. The biotite isograd may be, in part, lithologically controlled by the contact between the informally named Hardware (CZm) and Byrd Mill (CZb) formations, and locally affected by contact metamorphism by the Lahore pluton (Old and Olg, in western part of map). The Taconic garnet isograd is defined by the sparse presence of small (<1 millimeter), euhedral garnet crystals. Both the biotite and garnet isograds continue along strike to the southwest into the Ferncliff and Louisa quadrangles (Burton and others, 2019), where the isograds have been identified as Ordovician age (Taconic orogeny) based on muscovite, biotite, and amphibole  $^{40}\text{Ar}/^{39}\text{Ar}$  cooling ages reported by McKee and others (2017).

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