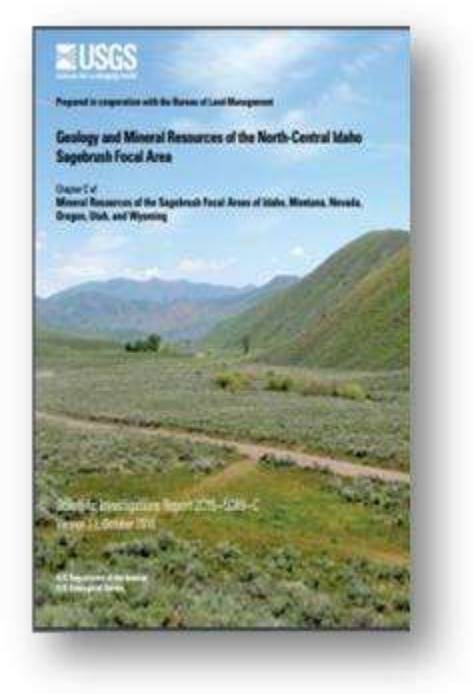

OCTOBER 2016 USGS REPORT –
USGS CLASSIFIES BLACKSTONE AS HIGH POTENTIAL FOR A MAJOR POLYMETALLIC GOLD, SILVER, LEAD, and ZINC DEPOSIT

Geology and Mineral Resources of the North-Central Idaho Sagebrush Focal Area Chapter C of Mineral Resources of the Sagebrush Focal Areas of Idaho, Montana, Nevada, Oregon, Utah, and Wyoming

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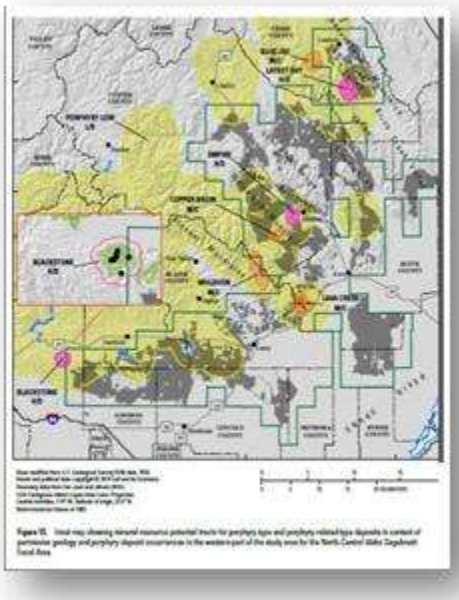
Economic Analysis of the Deposit Type
The North-Central Idaho Sagebrush Focal Area has high mineral-resource potential in three tracts (Blackstone, Empire, and Latest Out) and moderate mineral-resource potential in four tracts (Blue Jay, Copper Basin, Lava Creek, and Muldoon) for porphyry-type deposits. This type of deposits is characterized by enrichment in copper, molybdenum, gold, and silver. For economic analysis of these commodities, see Bleiwas (2016).

Blackstone Tract H/D—There is high potential, with certainty level D, for porphyry-related Au-Ag-Cu-Pb-Zn polymetallic-vein deposits in the Blackstone tract (fig. 15), in the upper part of an Eocene pluton. The tract is in the Volcano Mining District, Elmore County, 36 km southwest of Fairfield, Idaho (fig. 1). The tract geometry is based on the location of the Blackstone mine and on exposure of the top of the Eocene granite pluton. The tract is trimmed to extend 1 km into valley fill, accounting for shallow burial of potentially mineralized rock.

The geology of the Blackstone tract is characterized by Cretaceous quartz monzonite and two-mica granite (approximately 90–80 Ma), as well as Eocene granodiorite, quartz monzodiorite, minor diorite, granite, and subvolcanic dacite stocks and dikes (approximately 52–45 Ma). These rocks are partly covered by Miocene rhyolite ignimbrite in the south and by Pliocene-

Pleistocene basalt flows in the north. Quaternary-aged unconsolidated alluvium overlies much of the northern part of the tract (Worl and Johnson, 1995). Mineralization at the Blackstone and Revenue mines (Fernette and others, 2016a; San Juan and others, 2016) in the tract consists of northeast-striking mesothermal silver, telluride, base-metal, and manganese-oxide-bearing veins and stockworks hosted predominantly in Cretaceous granodiorite. However, mineralization is controlled by east-striking down-to-the-north normal faults, and also spatially and temporally associated with east-northeast striking Eocene dikes (Allen, 1952; Bennett, 2001). Alteration includes biotite after hornblende, sericite after plagioclase, and late albite, epidote, magnetite, and specular
hematite. Mineralized zones at the Revenue mine contain chalcopyrite, galena, sphalerite, and molybdenite (Bell, 1930).



From 1902 to 1982, the Blackstone mine had intermittent production. A more intense mining effort took place between 1982 and 1988 (Bennett, 2001). Blackstone currently has proven high-grade ore reserves of 35,500 tons of ore with grades of 0.106 oz Au, 23.58 oz Ag, 4.94 weight percent Cu, 1.5 weight percent Mn, and 8.5 weight percent Zn per ton; low leach-grade ore reserves of 700,000 tons of ore with grades of 0.078 oz Au, 2.11 oz Ag, 0.2 weight percent Cu, 2 weight percent Mn, 0.25 weight percent Pb, and 0.5 weight percent Zn per ton (Kucera and Egan, 2015). There are active lode claims adjacent to the study area; however, none are in the study area.

There are no analyzed rock or heavy mineral concentrate samples in the geochemical databases for the Blackstone tract. Only one sediment sample is weakly anomalous for zinc and may be related to mineralization. Five sediment or soil samples in this tract are anomalous or weakly anomalous for uranium or thorium but these elements are probably not associated with porphyry mineralization (Smith and others, 2016).

Advanced Spaceborne Thermal Emission Reflection Radiometer (ASTER, Rockwell, 2016) satellite imagery shows small, local areas of ferric iron and sericite/smectite in the tract. Argillic minerals are exposed at the Blackstone open pit and the Ajax mine. A short-wave infrared (SWIR) scratch-error region passes through tract (Rockwell, 2016), so some data are unreliable.

Radiometric mapping over the felsic volcanic and intrusive rocks does not image a Late Cretaceous pluton. A magnetic anomaly is suggestive of a concealed Eocene pluton, mostly north and east of the tract. Mineral occurrences in a magnetic low could indicate the presence of a concealed Late Cretaceous pluton or of hydrothermal alteration (Anderson and Ponce, 2016).

This Blackstone tract is in the area of a previous USGS mineral-resource potential assessment (Parks and others, 2016) and ranked as permissive for porphyry, Comstock, and hot-spring deposits (U.S. Geological Survey National Mineral Resource Assessment Team, 1998).

Definitions –
HIGH mineral resource potential is assigned to areas where geologic, geochemical, and geophysical characteristics define a geologic environment favorable for resource occurrence, here interpretations of data indicate a high degree of likelihood for resource accumulation, where data support mineral deposit models indicating presence of resources, and where evidence indicates that mineral concentration has taken place. Assignment of **high resource potential** to an area requires positive knowledge that mineral-forming processes have been active in at least part of the area.

Level D. Available information clearly defines the level of mineral resource potential; generally level D is used where geologic environments are clearly defined, activity or lack of activity of resource forming processes can be ascertained, and data on expectable mineral-deposit types are well understood.