WYOMING STATE GEOLOGICAL SURVEY

GEOLOGY OF THE RED DWARF CORUNDUM (RUBY-SAPPHIRE) DEPOSIT, GRAHAM RANCH, WESTERN GRANITE MOUNTAINS, CENTRAL WYOMING

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INTRODUCTION

The Red Dwarf corundum deposit was investigated by the author in 1995, as part of a regional study of the geology and mineral resources of the Tin Cup district in the Granite Mountains of central Wyoming. The deposit was apparently discovered by William Marion and Lloyd Curtis while prospecting for jade in the 1930s (Branham, 1941). Branham reported that several star rubies were found by the discoverers including a few, unflawed, rubies. The ruby deposit was more recently described briefly by Osterwald and others (1966), Love (1970), and Sutherland (1990). During field investigations of the area, a sapphire deposit was discovered to the west of the Red Dwarf by Robert D. Odell in 1996.

Location & Accessibility

The Red Drawf (also known as the Graham Ranch) corundum deposit is located within the Tin Cup district along the western end of the Granite Mountains in central Wyoming (Figure 1). The nearest town to the deposit is Jeffrey City, which lies about eight miles southeast of the district along highway 287. From Jeffrey City, the deposit is reached by driving west along 287 to the Graham Ranch road, and turning onto the graded road which leads to the Sweetwater River and the Graham Ranch. From the Graham Ranch, the deposit lies 3 miles to the east along jeep trail within sections 13 and 24, T30N., R92W on the Graham Ranch 7.5' quadrangle.

GENERAL GEOLOGY AND MINERALOGY

The Granite Mountains in this region are underlain by amphibolite-grade metamorphosed Archean gneiss, schist, and amphibolite intruded by Archean granite and by basaltic dikes. Figure 2 prepared by the author, is a geological map of the Red Dwarf deposit, which shows a thin metasedimentary and metavolcanic unit located between two masses of granite gneiss. Within this metasedimentary-metavolcanic unit are two

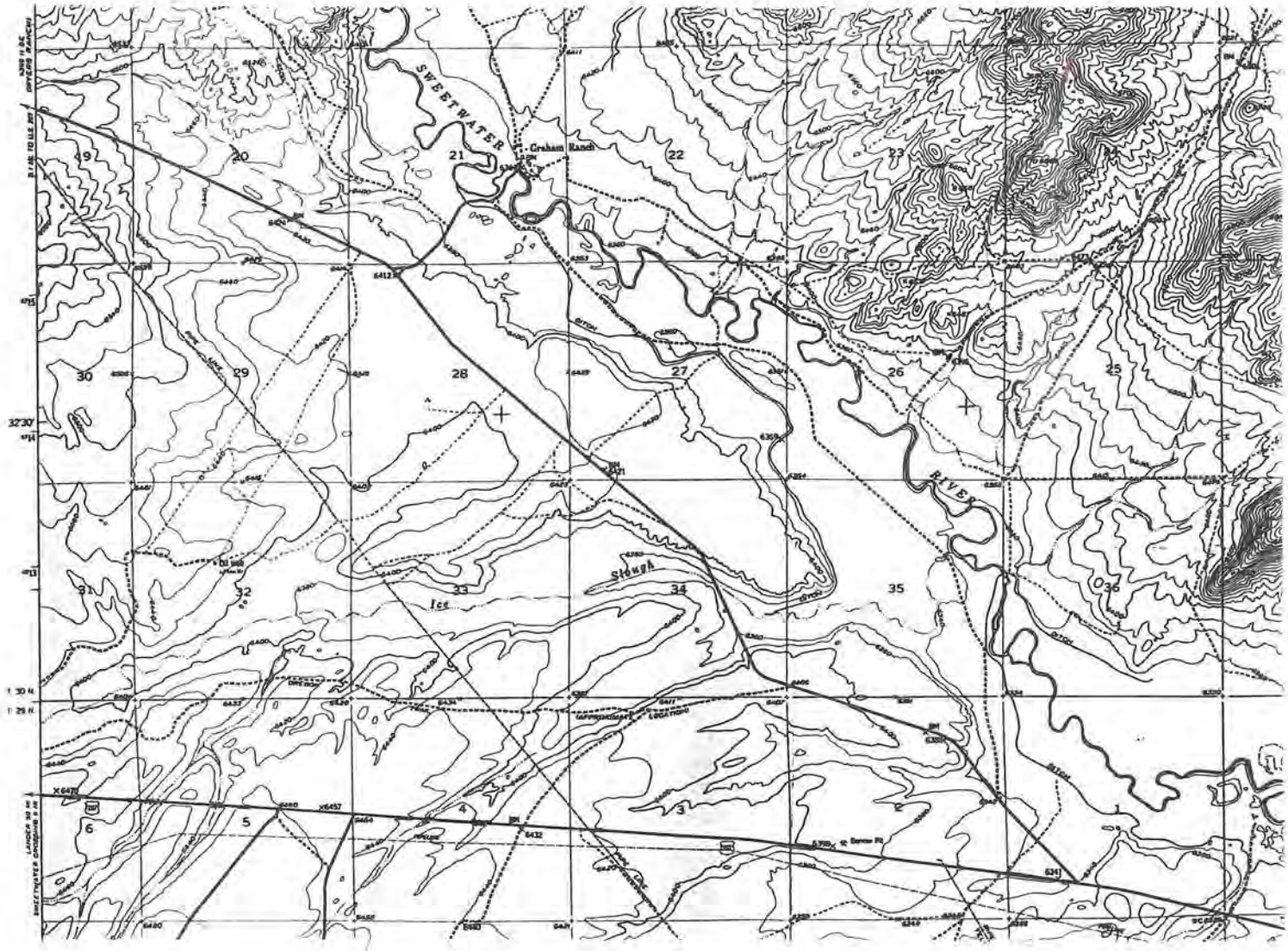

Figure 1. Location map of the Red Dwarf ruby deposit, Graham Ranch, Wyo. 7.5 minute topographic quadrangle.

parallel outcrops of quartzofeldspathic gneiss that contain abundant ruby porphyroblasts. All of the porphyroblasts show evidence of retrograde metamorphism, although ruby is preserved in many of the grains. The ruby gneiss was traced by the author for 5,000 feet along strike and locally reaches widths of 20 to 50 feet.

The ruby gneiss is a grey quartzofeldspathic gneiss which consists of isoclinally folded gneiss composed of biotite, quartz, and ruby porphyroblasts. The gneiss crops out in the S/2 section 13 and was traced south into section 24. In section 24, the gneiss contains secondary chlorite which commonly replaces biotite, and the rock takes on the appearance of a porphyroblastic chlorite-ruby schist. Presumably, the ruby gneiss continues under the thin Tertiary sedimentary cover to the northeast in section 13, and to the southwest in section 23.

A second corundum deposit was discovered by Robert D. Odell, consulting geologist from Casper, Wyoming, in 1995. The deposit was found in the SW section 13, west of the ruby gneiss (Figure 2), and consists of sapphire-bearing serpentininte. The sapphires are locally abundant in outcrop and are localized near the serpentinite-granitic gneiss contact.

Ruby Gneiss

The ruby gneiss continues to the south and grades into a chloritic schist. The schist also contains ruby porphyroblasts. The Red Dwarf gneiss contains common ruby porphyroblasts that are either entirely replaced, or partially replaced by damourite, a fine-grained, pearly-green variety of muscovite mica. Where entirely replaced by mica, the porphyroblasts consist of massive, greenish, mica with a hexagonal outline that mimics the former corundum crystals.

An XRD analysis of one reaction rim surrounding a ruby provided a good match for fuchsite (a greenish, chrome-bearing muscovite mica) (Robert Gregory, personal communication, 1995). Many of the rubies collected by the author, show a slight purple coloration that is possibly due to traces of chromium. And the presence of chromium in the rubies would explain a XRD match for fuchsite in the reaction rim.

The rubies recovered from the gneiss by the author ranged from 2 inches across to millimeter size. And although the great majority of the stones collected were of poor quality, some stones of gem character were found (Hausel 1996a,b) and were also reported by Branham (1941). Several samples collected from the deposit were examined under a binocular microscope:

TC37-97A. This ruby shows good rhombohedral parting and encloses several, distinct, opague (metallic) mineral inclusions (possibly rutile?). The ruby is lavendar, semi-translucent, and shows slight color zonation.

TC37-95B. This vitreous corundum shows good rhombohedral parting. The mineral exhibits color zonation from lavendar to lavendar-purple. The specimen is cloudy and semi-translucent to opaque.

TC37-95C. This vitreous, corunudum exhibits excellent rhombohedral parting. The mineral shows color zonation from lavendar to dark-purple, and is semi-translucent to opaque.

TC37-95D. This mineral is vitreous, with good rhombohedral parting. The grain also shows color zonation from lavendar to reddish-purple, and is opaque.

TC37-95E. This is a vitreous ruby with good rhombohedral parting. The mineral shows color zonation from light to reddish lavendar. The mineral is semi-translucent, and 0.7 inch across. The broken surface of the grain contains a yellowish-orange stain.

TC37-95F. This 0.25 inch vitreous ruby is enclosed in an 0.8 inch emerald-green reaction rim of mica. The specimen consists of an hexagonal ruby with good rhombohedral parting, surrounded by a hexagonal micaceous reaction rim. The reaction rim is very soft and easily scratched with a pocket knife producing a white, waxy, streak. XRD analysis indicates the reaction rim is composed of microscopic fuchsite.

A handspecimen provided to the author by David J. Love, consists of massive fuchsite with several purple rubies. The rubies are semi-translucent.

Sapphire serpentininte

A sapphire-bearing serpentinite, located west of the ruby gneiss, contains some small, light-blue, opaque, and semi-translucent to translucent sapphires. The sapphires were verified by XRD (Robert Gregory, personal communication, 1996).

The host rock is serpentinite, which is associated with a nearby tremolite schist. Locally, the serpentinite contains abundant sapphire. Serpentinite samples containing 20 to 30% sapphire were found by the author. Unlike the rubies, the sapphires show no evidence of retrograde metamorphism; however, the sapphires are smaller than the rubies and have an average size of only about 1 mm. Some uncommon grains up to 0.25 inch (6 mm) were collected.

CONCLUSIONS

The Granite Mountains, which enclose the Red Dwarf corundum deposit, are known for their variety of lapidary materials and gemstones. These mountains not only contain ruby and sapphire, but also host numerous nephrite jade occurrences and some attractive agate and jasper. Although, never verified, some diamonds were also reportedly found in the Granite Mountains east of the Tin Cup district (Eugene F. Clark, personal communication).

Because of the metamorphic grade, in all probability, other undiscovered corundum deposits occur in the Granite Mountains. For instance, white sapphire was reported by Love (1970) several miles to the west of the Red Dwarf ruby gneiss, and float ruby schist was found to the southeast on Green Mountain (Hausel, 1986; Sutherland, 1990). Other ruby occurrences have been reported in the eastern Granite Mountains at an undisclosed location (Larry Clark, personal communication). A detailed field investigation of the Granite Mountains region would possibly lead to the discovery of some other corundum deposits.

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GEOLOGIC MAP OF THE RED DWARF RUBY, SAPPHIRE, AND JADE DEPOSITS, GRAHAM RANCH, WESTERN GRANITE MOUNTAINS, WYOMING

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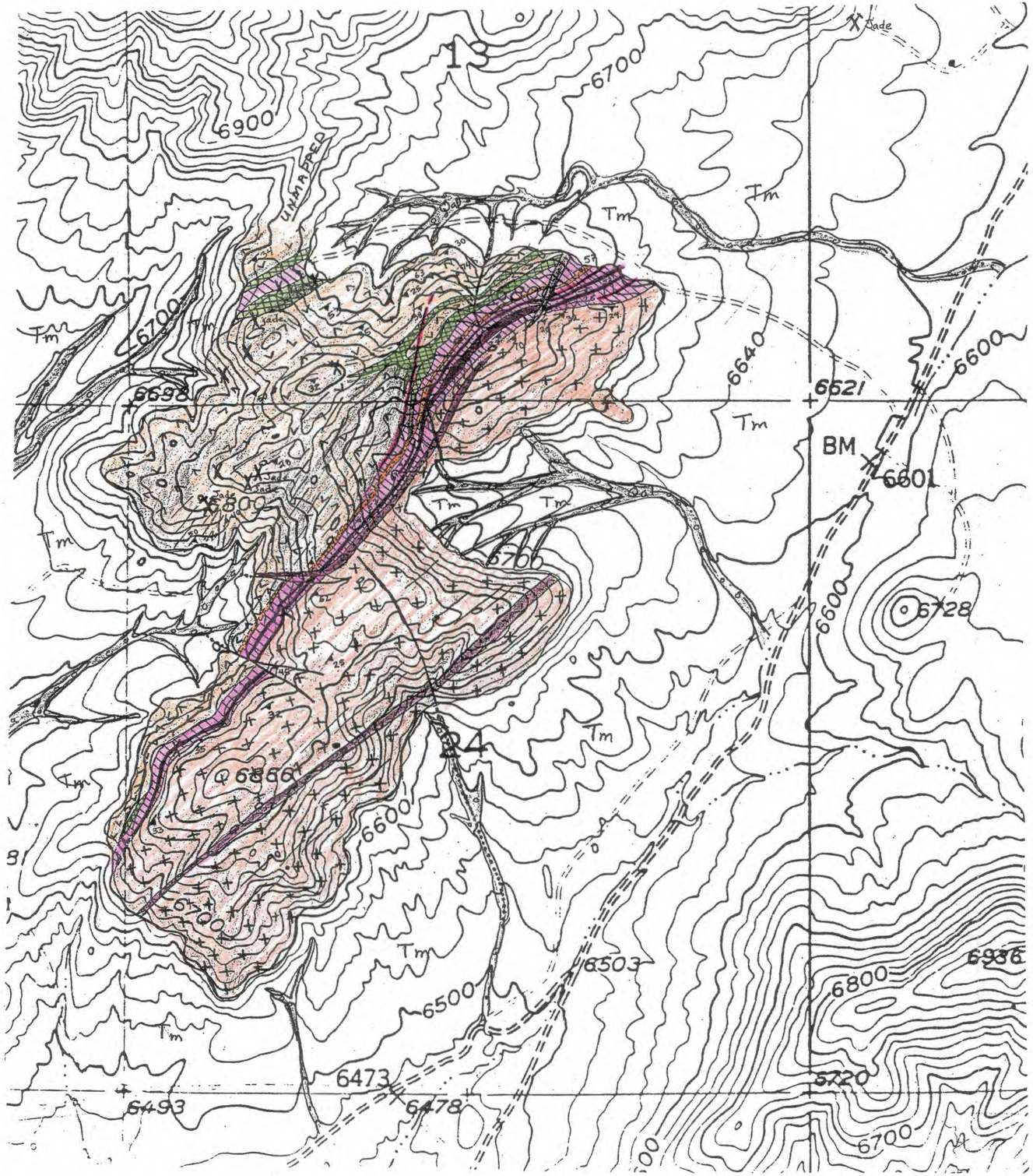

Qal — Alluvium

Tm — White tuffaceous sandstone

Basalt dikes

Leucocratic granitic dikes

Ultramafic schist - includes serpentinite, tremolite-actinolite schist, & talc-chlorite schist. Green area is zone of sapphire-bearing serpentinite.

Pink to orange, weakly foliated granite-gneiss

Amphibolite w/ intercalated granite gneiss.

Ruby-bearing quartzo-feldspathic gneiss. Grades to chloritic gneiss & schist to the south

Quartzite

Grey granitic gneiss w/ intercalated amphibolite

Foliation trends

Strike & dip of foliation

Isoclinal fold

Prospect pit

Adit

Jade mine

Fault, dotted where buried

SCALE 1 inch = 910 feet

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