

WYOMING STATE GEOLOGICAL SURVEY

**PRELIMINARY GEOLOGICAL MAP OF THE RATTLESNAKE
HILLS SUPRACRUSTAL BELT, GRANITE MOUNTAINS,
WYOMING**

by

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MINERAL REPORT MR94-1

Laramie, Wyoming
1994

This field report has not been reviewed for conformity with the editorial standards of the Wyoming State Geological Survey.

Economic Geology of the Rattlesnake Hills, Granite Mountains, central Wyoming

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During 1992 and 1993, the author mapped 40 mi² of previously undifferentiated Archean terrane in the Rattlesnake Hills, 50 miles west of Casper. Economic interest in the Rattlesnake Hills had been minor until significant gold anomalies were independently identified by the author in 1982, and by American Copper and Nickel Company in 1983. ACNC explored the belt until 1987: currently, three companies have projects in the area.

The Rattlesnake Hills supracrustal belt consists of refolded Archean metamorphics intruded by Tertiary (42 Ma) alkalic plugs and dikes. The belt is dominated by a thick metagreywacke succession. The metagreywackes enclose a 2,000 to 5,000 ft thick metatholeiite unit consisting of metagabbro, metabasalt, and uncommon graphitic schist. This unit hosts a 1.5 mile long pyritiferous and auriferous metachert. The chert consists of quartz, metachert, jasperoid, and sulfides. Sulfides include pyrite and uncommon galena. Assays range from <0.2 to 2.0 ppm Ag, <5 ppb to 7.55 ppm Au, 38 ppm to 0.04% Cu, 11 ppm to 0.13% Pb, and <0.010 ppm to 0.021 ppm Hg.

The metagreywacke succession is structurally underlain by 2,500 ft of well-preserved tholeiitic pillow metabasalts and amphibolites with minor intercalated ultramafics and intermediate metavolcanics. In the vicinity of three Tertiary alkalic plugs - Goat Mountain, Sandy Mountain, and a unnamed plug in sections 23, 24, and 25, T32N, R88W, the metatholeiites and metagreywackes have been brecciated and are locally gossaniferous.

Samples of the breccia yielded <5 ppb to 925 ppb Au, and 37 ppm to 0.14% Cu. The breccia is also anomalous in arsenic (25 ppm to 1.65% As) and weakly anomalous in mercury (0.012 ppm to 0.078 ppm Hg). A breccia vein within this disrupted succession yielded 92 ppb to 367 ppb Au. The Tertiary volcanics are also anomalous. Composite chip samples of volcanic rock collected over a few hundred feet along the flank of Sandy Mountain yielded 44 ppb and 370 ppb Au.

The mafic metavolcanic rocks are underlain by a metasedimentary succession containing banded iron formation (BIF), metapelite, and amphibolite. Samples of the BIF yielded <5 ppb to 5.0 ppm Au. Whole rock compositions ranged from 15.62% to 64.74% Fe₂O₃ and 23.13% to 79.12% SiO₂.

The Rattlesnake Hills supracrustals lie in contact with gneiss along the southwestern flank of the belt. Portions of the gneiss have been fractured and rehealed producing a stockwork of veinlets. Samples of the iron-stained gneiss yielded 300 ppb Au.

The preliminary results verify the presence of anomalous gold in Archean structures as well as in the Tertiary volcanics, breccias, and jasperoids. Further work in the district should concentrate on paleoplacers, Archean structures, Tertiary volcanics, and skarns.

anomalies were also identified in the Green River Basin of southwestern Wyoming.

Jelm Mountain district

The Jelm Mountain district, along the southeastern flank of the southern Medicine Bow Mountains of southeastern Wyoming, has had a notorious past involving fraud related to several historical mining ventures (Duncan, 1990). Geologically, the district lies within a favorable succession of Proterozoic volcanogenic metamorphic rocks known as the Green Mountain terrane. In similar rocks of the Sierra Madre and Laramie Range to the west and east of the Medicine Bow Mountains, volcanogenic massive sulfides and a copper-gold porphyry have been identified. The Geological Survey of Wyoming began a study of this district during the past field season as a follow-up to an inquiry by Red Mountain Mining Company.

Preliminary mapping by the State Survey shows the belt to consist of an isoclinally folded metamorphosed succession of amphibolite grade gneisses and schists. Samples collected from various prospects in the district yielded 26 parts per million (ppm) to 1.39% Cu, none to 0.1% Pb, 29 ppm to 0.43% Zn, none to 4.0 ounce per ton (opt) Ag, and none to 0.07 opt Au (Table 14). The samples collected to date verify the presence of localized zones of anomalous copper, lead, zinc, silver, and gold.

Rattlesnake Hills

During the 1993 field season, the author mapped approximately 40 square miles of previously undifferentiated Archean rocks of the Rattlesnake Hills supracrustal terrane in the Granite Mountains, 50 miles west of Casper. Prior

Table 14. Geochemical analyses of rock samples from the Jelm Mountain district (analyses by Robert W. Gregory, *Geological Survey of Wyoming*).

Sample no.	Cu	Pb	Zn	Ag	Au
	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)
JM1-93	0.63%	9.7	286 ppm	nd	nd
JM2-93	889 ppm	989	103 ppm	51.0	0.7
JM3-93	65 ppm	116	884 ppm	1.9	nd
JM4-93	36 ppm	24	201 ppm	137.0	nd
JM5-93	26 ppm	8.3	59 ppm	nd	nd
JM6-93	904 ppm	276	0.43%	5.8	nd
JM7-93	32 ppm	nd	29 ppm	nd	nd
JM8-93	0.38%	62	80 ppm	3.0	nd
JM9-93	0.21%	12	87 ppm	nd	nd
JM10-93	1.39%	16	110 ppm	12.0	nd
JM11-93	0.18%	955	184 ppm	88.0	2.3

nd = not detected

to this study, very little geological information had been published on this terrane.

Economic interest in the Rattlesnake Hills had been minor until significant gold anomalies were independently identified by the Geological Survey of Wyoming in 1982 (Hausel and Jones, 1982), and by American Copper and Nickel Company in 1983 (John T. Ray, personal communication). Currently, three companies are involved with gold projects in this area.

The Rattlesnake Hills supracrustal belt consists of reformed Archean metamorphic rocks intruded by several Tertiary (42 Ma) alkalic plugs and dikes (Pekarek, 1977). The Precambrian belt is dominated by a thick metagreywacke succession with chemistries similar to those reported for the South Pass (Condie, 1967; Hausel, 1987; 1991) and the Seminole Mountains greenstone belts (Hausel, 1993b). Many of the metagreywacke beds are relatively alumina-rich which made them favorable for the production of aluminosilicate porphyroblasts during prograde metamorphism. X-ray diffraction patterns of some porphyroblasts indicate the presence of cordierite.

The metagreywacke succession contains a two to five-thousand-foot thick metatholeiitic volcanic complex of metagabbro, metabasalt, and uncommon graphitic schist. This complex hosts the Lost Muffler vein with a strike length of nearly 1.5 miles. The vein is localized near or along the contact between the metatholeiites and metagreywackes, and consists of quartz, metachert, minor jasperoid, and sulfides. Sulfides include pyrite and uncommon galena. Assays of vein material (samples LMP82-1, LMP82-2, LMP82-3, LMP82-4, RH1-92, RH2-92, RH3-92, RH4-92, RH21-93, and RH23-93) range from <0.2 to 2.0 ppm Ag, <5 parts per billion (ppb) to 7.55 ppm Au, 38 ppm to 0.04% Cu, 11 ppm to 0.13% Pb, and <0.010 ppm to 0.021 ppm Hg (Table 15).

The metagreywacke succession is structurally underlain by 2,500 feet of metavolcanics dominated by well-preserved pillow metabasalts and amphibolites with minor intercalated ultramafics and intermediate metavolcanics. In the vicinity of three Tertiary alkalic plugs - Goat Mountain, Sandy Mountain, and an unnamed plug in sections 23, 24, and 25, T32N, R88W, the metatholeiites and metagreywackes have been brecciated and are locally gossaniferous.

Samples of brecciated Precambrian rock along the flanks of the Tertiary plugs (samples RH20-92, RH22-92, RH29-92, RH8-93, RH13-93, and RH14-93) yielded <5 ppb to 925 ppb Au, and 37 ppm to 0.14% Cu (Table 15). Some samples yielded anomalous arsenic (25 ppm to 1.65% As) and mercury (0.012 ppm to 0.078 ppm Hg). Samples of a breccia vein within this disrupted succession yielded 92 ppb to 367 ppb Au (samples RH23-92, RH31-92, RH32-92, and RH33-92). The Tertiary volcanics which disrupted the Precambrian rocks are also anomalous in gold. Composite chip samples of volcanic rock collected along the flank of Sandy Mountain (samples RH19-93A and RH20-93) yielded 44 ppb and 370 ppb Au, respectively (Table 15).

Table 15. Geochemical analyses of rock samples from the Rattlesnake Hills district (analyses by Bondar-Clegg).

sample no	Ag	Au*	Zn	As	Sb	Cu	Pb	Hg
RH1-92	1.2	114	35	88	38.6	38	197	<0.01
RH2-92	1.8	21	90	124	2	432	1307	<0.01
RH3-92	2	52	59	20	1.4	123	61	0.021
RH9-92	<0.2	8	33	75	3.3	57	16	<0.01
RH11-92	0.9	26	25	213	1.8	614	<2	0.139
RH13-92	1.1	29	253	110	1.6	423	9	0.013
RH15-92	0.2	157	18	1080	11	263	41	<0.01
RH18-92	0.5	16	53	68	4.6	22	11	<0.01
RH20-92	1.2	925	12	16500	8.2	524	42	0.028
RH22-92	0.6	<5	37	91	1.5	37	16	0.012
RH23-92	0.2	92	4	131	0.4	125	8	0.372
RH29-92	0.5	300	-	-	-	-	-	-
RH30-92	1.8	<5	-	-	-	-	-	-
RH31-92	<0.2	367	52	4720	2.5	835	12	0.101
RH32-92	1.7	109	4	8820	3.1	37	<2	<0.01
RH33-92	0.56	164	17	543	0.8	163	55	0.083
RH35-92	<0.2	800	-	-	-	1000	-	-
RH36-92	0.28	300	-	-	-	-	-	-
RH37-92	<0.2	5000	-	-	-	-	-	-
RH43-92	<0.2	<5	-	-	-	-	-	-
RH44-92	1.5	10	-	-	-	-	-	-
RH3-93A	<0.2	<5	34	-	-	49	7	-
RH6-93	<0.2	28	42	280	7	285	17	0.043
RH8-93	<0.2	103	78	222	6	128	67	0.04
RH9-93	11	-	-	-	-	-	-	-
RH13-93	<0.2	9	297	36	8	62	11	0.078
RH14-93	<0.2	29	95	25	7	1369	14	0.015
RH19-93A	<5	370	<200	345	11	-	-	-
RH20-93	<5	44	<200	103	4.1	-	-	-
RH21-93	<0.2	31	309	95	<5	167	13	<0.010
RH23-93	<0.2	<5	137	<5	7	130	11	<0.010
LMP82-1	-	7550	-	-	-	-	-	-
LMP82-2	-	4460	-	-	-	-	-	-
LMP82-3	1.03	1030	-	-	-	-	-	-
LMP82-4	-	1370	-	-	-	-	-	-

* means not detected; all values in parts per million (ppm).

* FPB

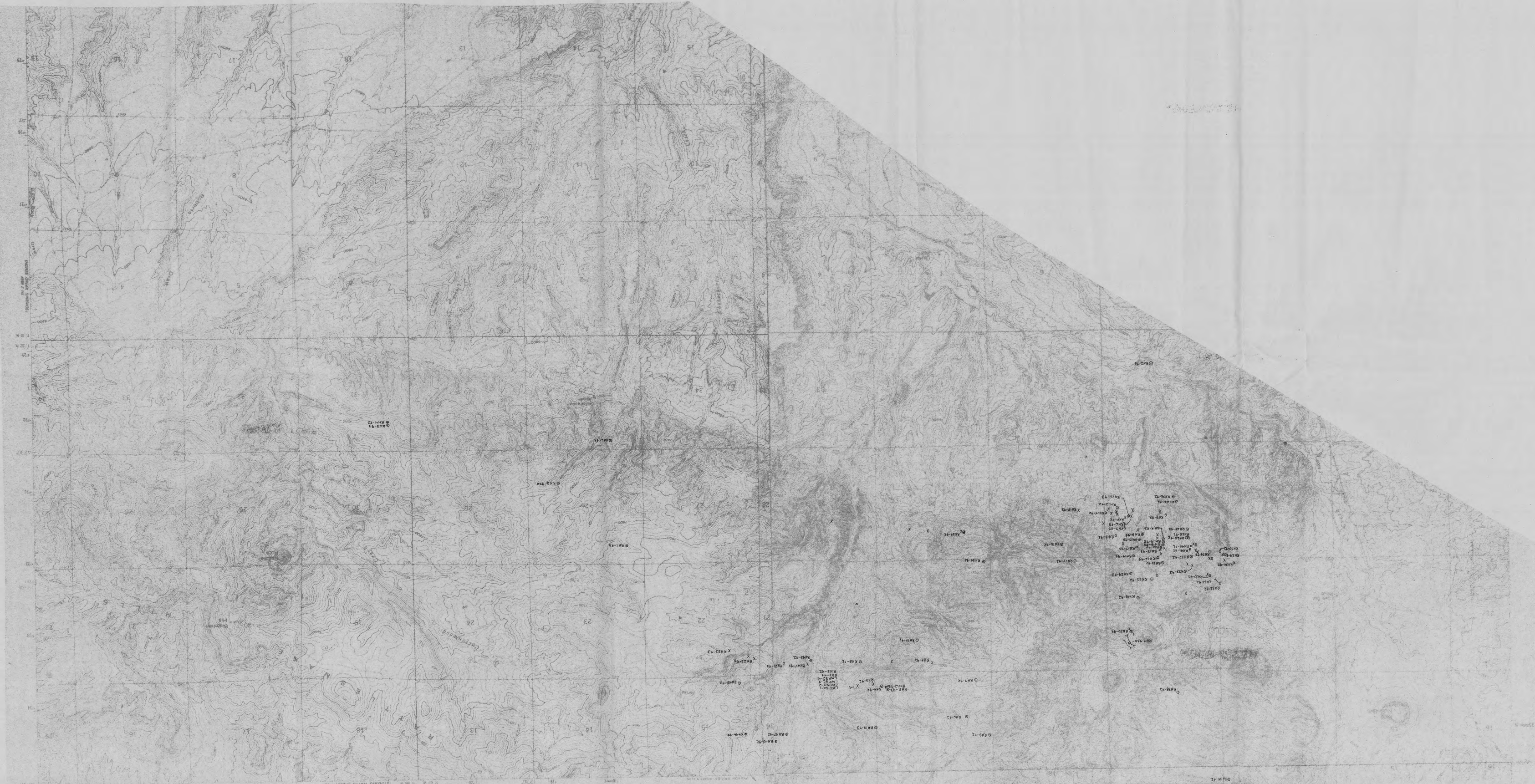
The mafic metamorphic rocks are underlain by a succession dominated by metasedimentary rocks containing banded iron formation, metapelite, and amphibolite. Samples of the banded iron formation (RH30-92, RH37-92, and RH9-93) yielded <5 ppb to 5.0 ppm Au (Table 15). Other iron formation samples collected for whole rock analysis yielded 15.62% to 64.74% Fe₂O₃ with 23.13% to 79.12% SiO₂.

The supracrustals lie in contact with gneiss along the southwestern flank of the belt which has been fractured and reheated producing a stockworks-like network of veinlets. A sample of the iron-stained gneiss (RH36-92) yielded 300 ppb Au (Table 15).

The preliminary results verify the presence of anomalous gold in Archean structures as well as in the Tertiary volcanics, breccias, and jasperoids in the district. Further work will be directed at sampling placers and paleoplacers in the district.

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