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RADIOACTIVE CONGLOMERATE IN PROTEROZOIC (PRECAMBRIAN X)
METASEDIMENTARY ROCKS OF THE SIERRA MADRE, WYOMING

By

Paul J. Graff and Robert S. Houston

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This report is preliminary and has not been edited
or reviewed for conformity with U.S. Geological Survey
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UNIVERSITY OF UTAH
RESEARCH INSTITUTE
EARTH SCIENCE LAB.

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INTRODUCTION

A program of evaluation of miogeosynclinal metasedimentary rocks of early middle Precambrian age in southeastern Wyoming (fig. 1) as a pos-

Figure 1.—NEAR HERE

sible host for uranium-bearing conglomerate started in 1975 as a cooperative effort of the U.S. Geological Survey; the Department of Geology, University of Wyoming; the Wyoming Geological Survey; and the Energy Research and Development Administration. As outlined in previous open-file reports (Miller, Houston, Karlstrom, Hopkins, and Ficklin, 1977; Houston, Graff, Karlstrom, and Root, 1977) this program was begun because miogeosynclinal metasedimentary rocks of the Medicine Bow Mountains and the Sierra Madre of Wyoming were considered possible correlates of uranium-bearing miogeosynclinal metasedimentary rocks of the Huronian Supergroup found in the Blind River area of Canada. The study has resulted in the discovery of uranium-bearing quartz-pebble conglomerate at several localities in the Medicine Bow Mountains and Sierra Madre (Houston, Graff, Karlstrom, and Root, 1977).

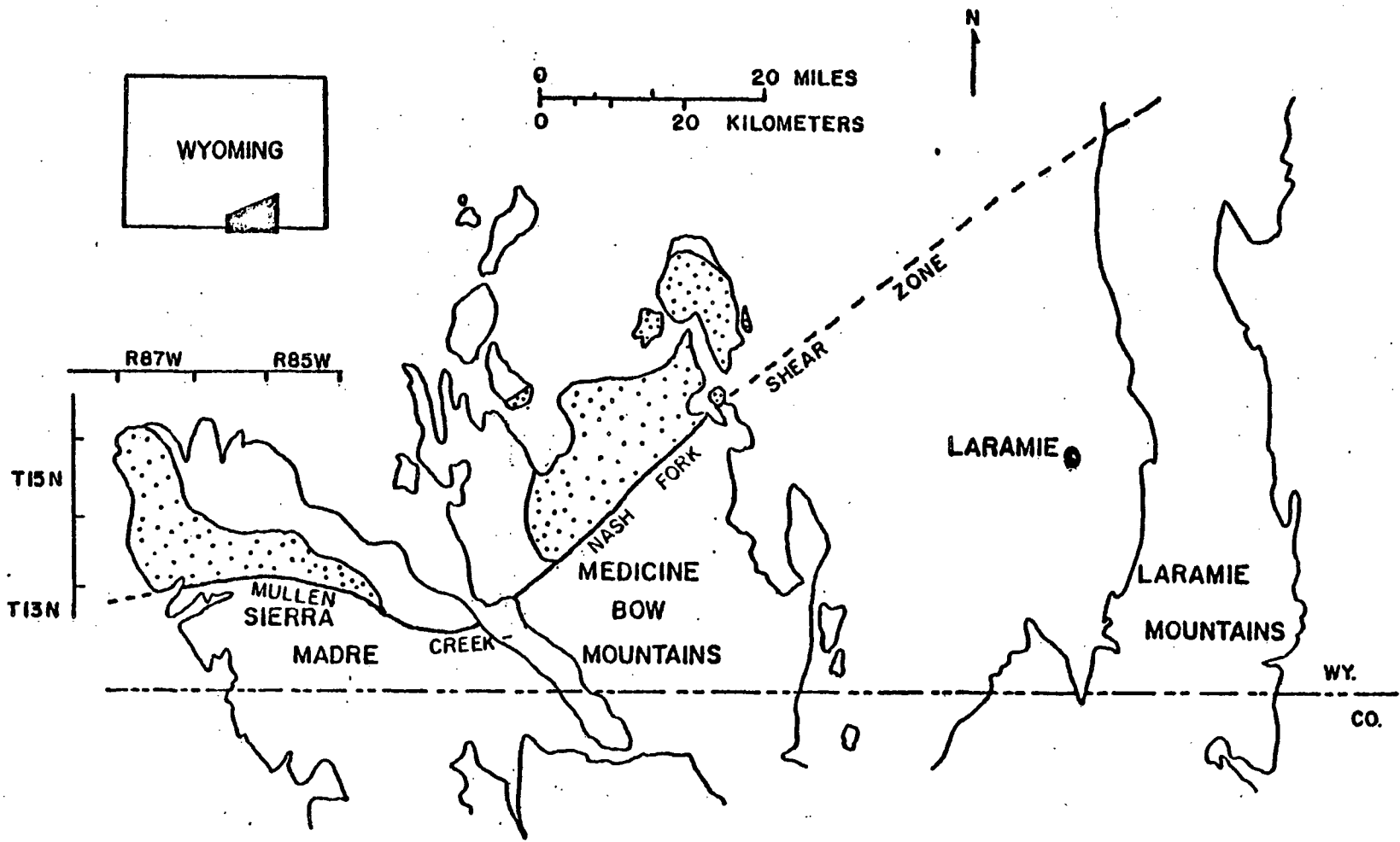


Figure 1.--Index map showing general location of metasedimentary rocks of early middle Precambrian age (stippled pattern) in southeastern Wyoming.

RESULTS OF THE 1977 FIELD PROGRAM

The most significant result of the 1977 field program was the discovery of radioactive conglomerate in the northwestern Sierra Madre that offers at least as much promise for commercial uranium as that in the Medicine Bow Mountains. Known localities of radioactive conglomerate of the Sierra Madre are listed in table 1. Localities discovered in the 1977 field season are shown by an asterisk. Table 1 shows that the uranium content of conglomerate samples from the northwestern Sierra Madre is as much as 20 times greater than that in samples from the eastern Sierra Madre, and is comparable to the better grade samples from the Medicine Bow Mountains, which are shown in table 1 for comparison.

The quartz-pebble conglomerate beds of the western Sierra Madre are not uniformly mineralized; some layers have much higher uranium values than others. Individual beds of radioactive conglomerate are more than 100 meters thick, and mapping of isolated outcrops of one basal conglomerate indicates that it extends for a distance of 3 miles along strike (T. 16 N., Rs. 87 and 88 W.). These conglomerates appear to correlate with the Deep Lake Formation in the Medicine Bow Mountains and are believed to be between 1,800 and 2,400 m.y. old.

Table 1.—Uranium in radioactive quartz-pebble conglomerates in metasedimentary rocks of the Sierra Madre and Medicine Bow Mountains, southeastern, Wyoming

<u>Limonite pseudomorphs after pyrite</u>	<u>PPM U</u>	<u>PPM Th</u>	<u>Location</u>
Present	3.0	n.d.	Eastern Sierra Madre SE 1/4 sec. 13, T. 14 N., R. 85 W.
Present	5.0	n.d.	Eastern Sierra Madre SE 1/4 sec. 13, T. 14 N., R. 85 W.
N.d.	4.3	n.d.	Western Sierra Madre NE 1/4 sec. 8, T. 14 N., R. 86 W.
Present	131.0	n.d.	*Western Sierra Madre SE 1/4 SE 1/4 sec. 21, T. 15 N., R. 87 W.
Present	22.0	n.d.	*Western Sierra Madre SE 1/4 SE 1/4 sec. 21, T. 15 N., R. 87 W.
N.d.	0.8	n.d.	*Western Sierra Madre SW 1/4 NW 1/4 sec. 21, T. 14 N., R. 87 W.
Present	27.5	n.d.	*Western Sierra Madre NW 1/4 SE 1/4 sec. 36, T. 16 N., R. 88 W.

Table 1.--Uranium in radioactive quartz-pebble conglomerates in metasedimentary rocks of the Sierra Madre and Medicine Bow Mountains, southeastern, Wyoming--Continued

<u>Limonite pseudomorphs after pyrite</u>	<u>PPM U</u>	<u>PPM Th</u>	<u>Location</u>
Present ^{1/}	9 samples	9 samples	Medicine Bow
	range =	range =	NW 1/4 sec. 10,
	2.8- 8.4	<20-38	T. 16 N., R. 80 W.
Present ^{1/}	5 samples	n.d.	Medicine Bow
	range =		SW 1/4 NW 1/4 sec. 22,
	0.5-11.2		T. 17 N., R. 79 W.
Present	150.0	n.d.	*Medicine Bow
			S 1/2 NW 1/4 sec. 6,
			T. 17 N., R. 78 W.
Present	80.0	n.d.	*Medicine Bow
			SE 1/4 NW 1/4 sec. 5,
			T. 18 N., R. 78 W.
Present	128.0	n.d.	*Medicine Bow
			S 1/2 NW 1/4 sec. 6,
			T. 18 N., R. 78 W.

*Samples collected in the 1977 field season

n.d. = not determined

^{1/} Arkosic

Although none of the analyzed samples from the Sierra Madre contain commercial quantities of uranium, higher concentrations may be present below the zone of weathering and oxidation. All samples analyzed were taken from extensively weathered outcrops. In many samples, small (less than 1 mm) limonite pseudomorphs replacing pyrite crystals and rounded grains show the pervasive oxidation of this mineral. Because uranium is very soluble in oxidizing solutions, it is probable that a significant proportion of the uranium present before weathering has been leached from these rocks. A study in the Medicine Bow Mountains showing anomalous amounts of radon in the waters of the area (Miller, Houston, Karlstrom, Hopkins, and Ficklin, 1977) suggests that commercial quantities of uranium might be present at depths, even though oxidized surface samples are not of high enough grade to be ore. Speculation on economic concentrations of uranium at depth in the Sierra Madre can only be confirmed by exploration drilling.

REFERENCES

- Houston, R. S., Graff, P. J., Karlstrom, K. E., and Root, F. K., 1977, Preliminary report on radioactive conglomerate of middle Precambrian age in the Sierra Madre and Medicine Bow Mountains of southeastern Wyoming: U.S. Geol. Survey Open-File Rept. 77-584, 31 p.
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