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PRELIMINARY RECONNAISSANCE FOR URANIUM IN THE GREEN RIVER BASIN AND THE ROCK SPRINGS UPLIFT, SWEETWATER AND FREMONT COUNTIES, WYOMING

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ABSTRACT

Preliminary reconnaissance for uranium in the Green River Basin and the Rock Springs Uplift revealed anomalous radioactivity northwest of Oregon Buttes in the Tipton tongue of the Green River formation and in the Cathedral Bluffs tongue of the Wasatch formation, and in the Tipton tongue in Red Creek Basin. No previous reports of anomalous radioactivity in these two areas nor in the Green River formation are known.

Northwest of Oregon Buttes the uranium mineralization is in micaceous and arkosic sandstone and is localized along folds and faults that were created by movement on the Continental fault. In the Red Creek Basin the anomalous radioactivity is in light gray shale and in lenses of carbonaceous shale and coal.

INTRODUCTION (Fig. 1, Pl. 1.)

Preliminary reconnaissance was carried on in the Green River Basin from November 15, 1953 through January 22, 1954. The region covered comprises the area within and surrounding the Rock Springs Uplift in the western half of Sweetwater County, and the southern end of the Wind River Range in the southwest corner of Fremont County.

Reconnaissance was made primarily by auto traverse, using a Scintillator. This was followed by more-detailed examination of outcrops that showed anomalous radioactivity.

Two areas, one northwest of Oregon Buttes and one in the Red Creek Basin, showed sufficient anomalous radioactivity to encourage further exploration.

Area Northwest of Oregon Buttes

Location

This locality is in the southwest corner of Fremont County in T. 27 N., Rs. 101 and 102 W., and it extends from 2 to 10 miles northwest of Oregon Buttes (see Pl.1 and Fig. 1).

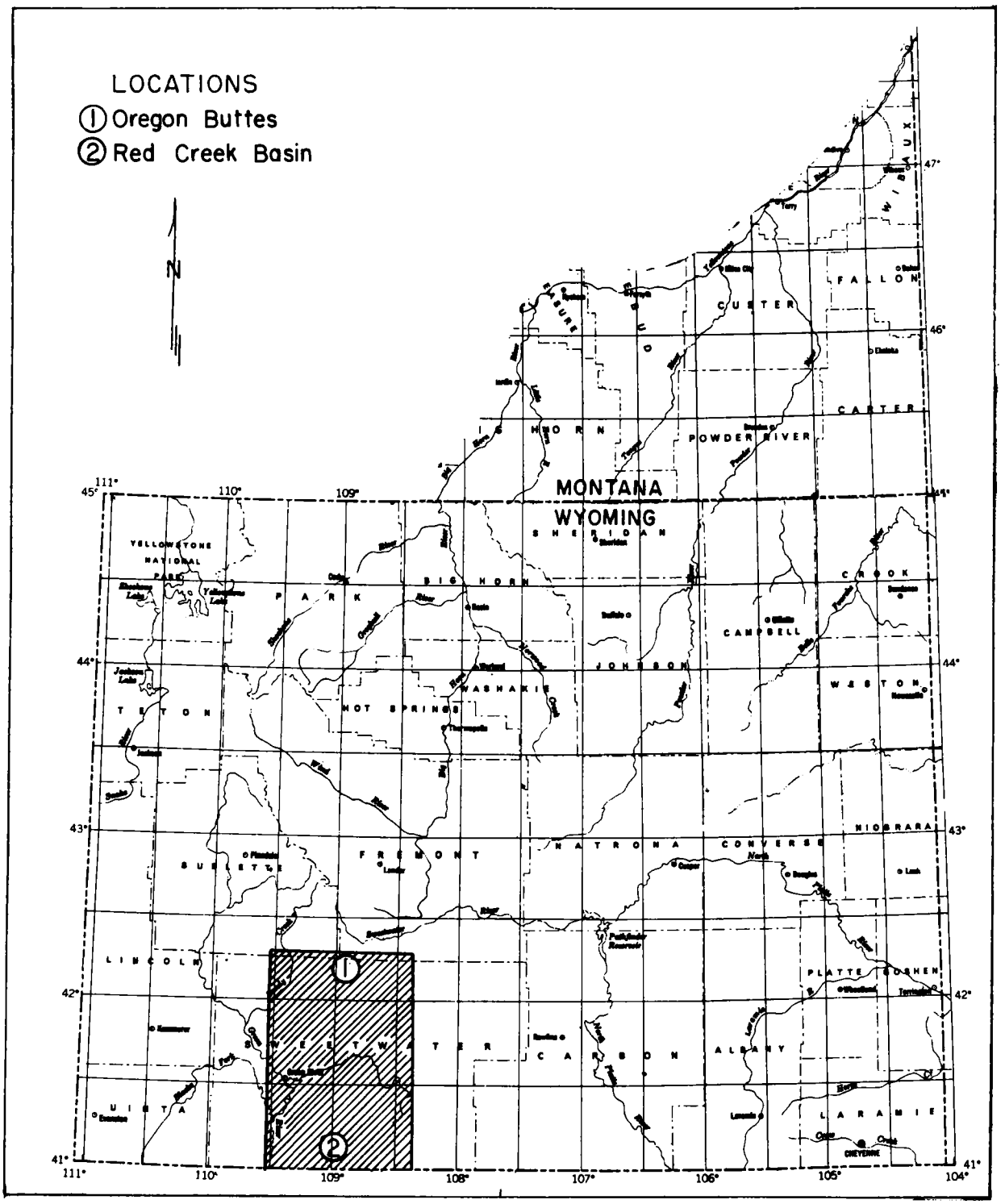

Fig. 1--Map of Wyoming and Southeastern Montana showing areas examined.

Geology

Sedimentary rocks exposed are the Hiawatha member of the Wasatch formation (Lower Eocene), the Tipton tongue of the Green River formation (Lower Eocene), the Cathedral Bluffs tongue of the Wasatch formation (Lower Eocene), the Bridger formation (Middle Eocene), and the White River formation (Oligocene). The ages of formations given above are not in exact agreement with those quoted from published maps on plate 1 and figure 2. Some beds, both of the Tipton tongue and of the base of the Cathedral Bluffs tongue, show anomalous radioactivity. The highly tuffaceous phases of the White River formation also display anomalous radioactivity, but the radioactive minerals were formed contemporaneously with the rock-particles that compose the strata, and they are thinly spread throughout the formation. In the Tipton tongue and the Cathedral Bluffs tongue, on the contrary, the uranium is epigenetic, having been introduced by ground waters, and it may have been concentrated locally into mineral deposits.

The Tipton tongue is exposed along the lower part of a monocline in secs. 19 to 22, T. 27 N., R. 101 W. where it is approximately 120 to 160 feet thick. Although the uppermost 20 to 30 feet contains lenses of coarse, porous, arkosic sandstone, the remainder of the tongue is composed of medium-to coarse-grained, micaceous, conglomeratic sandstone that represents a shoreline phase of sedimentation. The Cathedral Bluffs tongue, on the other hand, is made up largely of fine-grained fluviatile sediments in which there is a predominance of interbedded red, gray, and green shale, claystone, and muddy sandstone. The base of the tongue, however, interfingers with sandstone and conglomerate of the Tipton tongue, and there are numerous lenses of coarse arkosic and conglomeratic sandstone throughout the Cathedral Bluffs tongue immediately south of the Continental fault in T. 27 N., Rs. 101 and 102 W.

Movement on the Continental fault was normal, the downthrown side being on the north. As a result, the segment of the White River formation north of the fault has been preserved from erosion; but the segment south of the fault was elevated, and it has been almost entirely eroded except for a few remnants that cap the Oregon Buttes.

Radioactive Anomalies (Fig. 2.)

1. Anomalous radioactivity was discovered in steeply dipping beds of the Tipton tongue on the lower or southwest portion of the monocline in the NE¼ of sec. 28 and the SE¼ of sec. 21, T. 27 N., R. 101 W. (see fig. 2). The highest radioactivity recorded is in a highly biotitic and moderately arkosic sandstone, and it is accompanied by abundant limonitic staining. No radioactive mineral was recognized. A thin carbonate coating that fluoresces dark

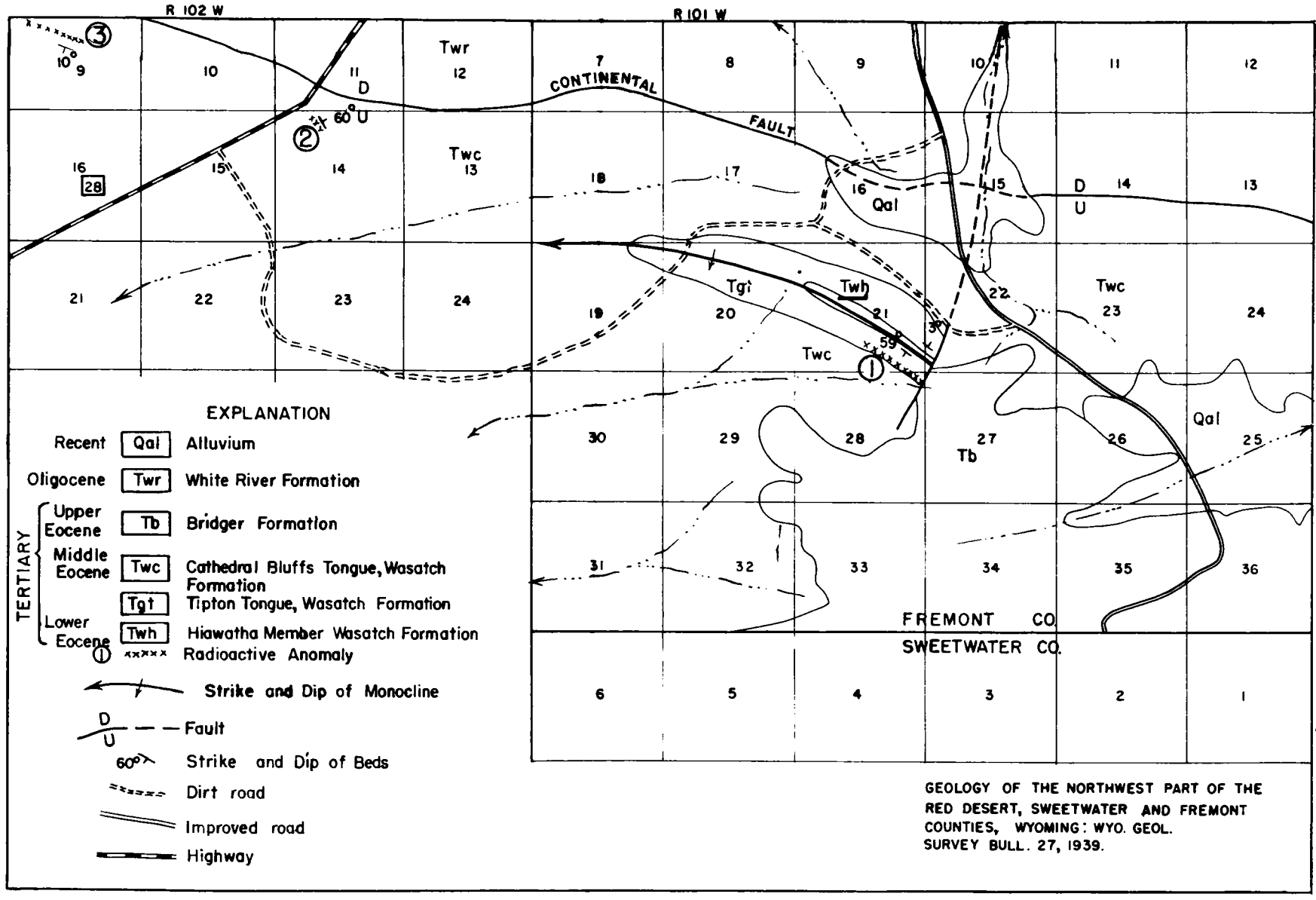

Fig. 2--Geologic map of area Northwest of Oregon Buttes, Fremont County, Wyoming.

green was found on the undersurfaces of outcrops, but it is only slightly more radioactive than the rock itself. The maximum scintillator reading on the outcrop was 0.3 MR/hr. with a background count of 0.015 MR/hr.

2. A lens of conglomeratic sandstone within the Cathedral Bluffs tongue that crops out in the NW¼ of sec. 14, T. 27 N., R. 102 W., displays anomalous radioactivity. The beds dip steeply to the southwest, apparently as a result of minor faulting and tilting in the vicinity of the Continental fault. The maximum scintillator reading on the outcrop was 0.2 MR/hr. with a background count of 0.015 MR/hr.

3. Anomalous radioactivity was found in lenses of coarse arkosic and conglomeratic sandstone within the Cathedral Bluffs tongue exposed along the north-facing scarp of the Continental fault in sec. 9, T. 27 N. R. 102 W. The maximum scintillator reading, obtained in the vicinity of a minor northwest-striking fault, was 0.15 MR/hr; background count was 0.015 MR/hr.

Red Creek Basin

Location

The Red Creek Basin lies immediately north of the Wyoming-Utah state line in Tps. 12-13 N., Rs. 103-104 W. (see pl. 1 and fig. 1). Structurally the basin is situated along the trough of the Red Creek syncline whose axis strikes east and lies approximately 6 miles north of the Wyoming-Utah state line.

Geology

The Wasatch formation is exposed throughout the basin and on the northern and southern rims. The overlying Green River formation forms Pine Mountain and Little Mountain which enclose the basin on the east and on the northwest respectively. The Wasatch formation in the Red Creek Basin comprises alternating beds of reddish-brown to yellow conglomeratic sandstone and red, gray and green shale. The Tipton tongue of the Green River formation overlies the Wasatch formation in the vicinity of Pine Mountain; it is composed of gray to brown shale and sandstone, marlstone, and thin lenses of carbonaceous shale and coal. To the northwest, at Little Mountain, the Tipton tongue is composed of light gray to brown thin-bedded shale and marlstone, and of thin lenses of brown sandstone.

Radioactive Anomalies

Anomalous radioactivity was detected in the Tipton tongue of the Green River formation at two places in Red Creek Basin; one is on the west side of Pine Mountain and one is on Little Mountain. At the latter locality lenses and seams of carbonaceous shale and coal gave scintillator readings up to 0.07 MR/hr. with a background count of 0.015 MR/hr. On Pine Mountain a thick series of light gray shales gave scintillator readings of 0.03 to 0.04 MR/hr. with a background count of 0.015 MR/hr.

Other Radioactive Anomalies in the Green River Basin

Anomalous radioactivity was located in a persistent bed of limestone in the basal part of the Tipton tongue of the Green River formation. The limestone crops out around the base of a mesa in the northern half of T. 24 N., Rs. 101 and 102 W., and in the southern half of T. 25 N., Rs. 101 and 102 W. This limestone, which is 10 to 12 inches thick, is thin-bedded, white, and of chalky appearance. Scintillator readings obtained on it averaged 0.05 MR/hr. with a maximum count of 0.17 MR/hr. and a background count of 0.015 MR/hr. Directly overlying this limestone is 20 to 30 feet of dark green shale that is also slightly radioactive.

CONCLUSIONS AND RECOMMENDATIONS

Area Northwest of Oregon Buttes

Uranium mineralization of epigenetic origin is restricted to the coarse sandstone phases of the Green River and Wasatch formations that are exposed along the south side of the Continental fault, and it is concentrated along minor folds and faults created by the movement on the Continental fault. A possible source of the uranium is the overlying White River formation which is composed mainly of weakly radioactive tuff and tuffaceous sandstone.

Due to the comparatively small size of individual exposures and to the restricted area of favorable exposures, it is recommended that further exploration be done on the ground rather than by aerial reconnaissance.

Red Creek Basin

In the Red Creek Basin there are radioactive Tipton shales, and the sandstones and conglomerates are of types that contain uranium deposits elsewhere. In view of these circumstances, it is inferred that there may be commercial concentrations of uranium in the Red Creek Basin although none of the sandstones and conglomerates examined revealed significant radioactivity.

Further exploration in the Red Creek Basin should be done by aerial reconnaissance since the area to be prospected is comparatively large and since favorable host beds are well exposed throughout the basin.

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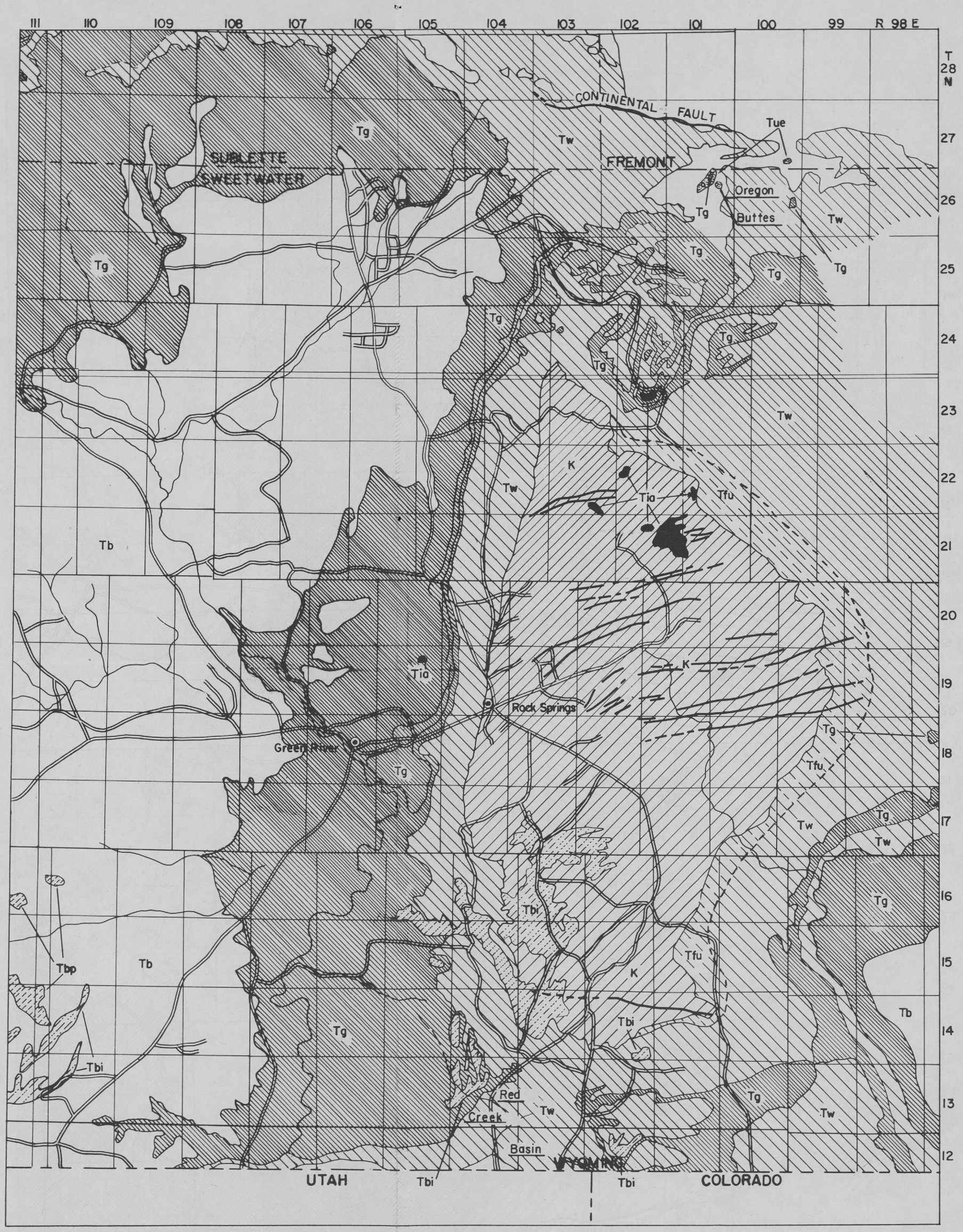

EXPLANATION

Tbp — Brown's Park Formation (Miocene)

Tbi — Bishop Conglomerate (Miocene)

Tue — Upper Eocene Rocks - Undivided

Tb — Bridger Formation (Middle Eocene)

Tg — Green River Formation (Middle & Lower Eocene)

Tw — Wasatch Formation (Middle & Lower Eocene)

Tfu — Fort Union Formation (Paleocene)

K — Cretaceous Rocks

Tia — Alkalic Intrusive & Extrusive Rocks (Tertiary)

Scintillometer Traverse of Road

Portion of Geologic Map of Part of Southwestern Wyoming by J.D. Love and J.L. Weitz, U.S. Geological Survey.

Plate 1--Geologic map of part of Southeastern Wyoming. Scale-1:500,000.