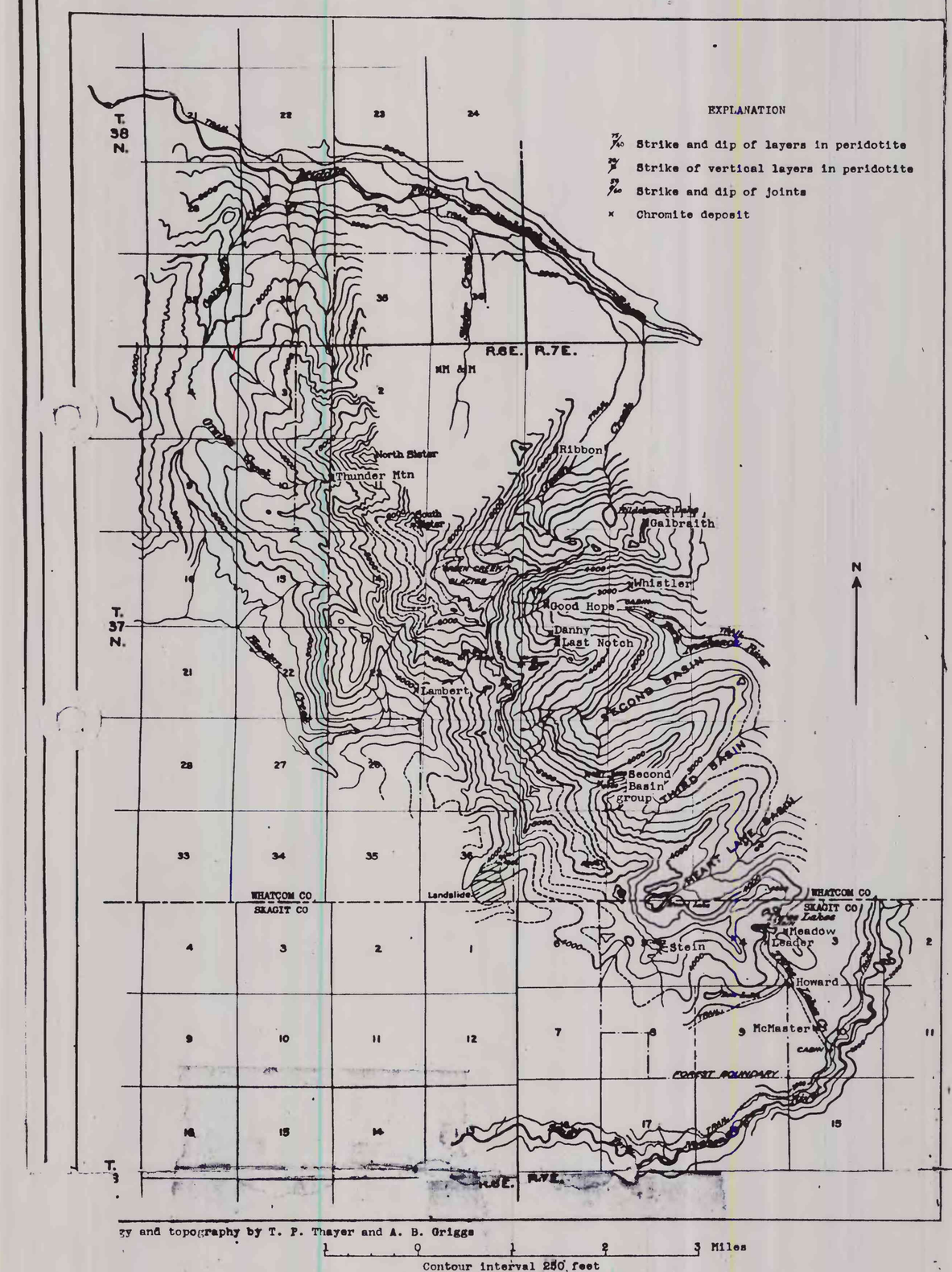


zy and topography by T. P. Thayer and A. B. Griggs

1 0 1 2 3 Miles

Contour interval 250 feet

Figure 2. PRINCIPAL CHROMITE DEPOSITS OF THE TWIN SISTERS MOUNTAINS, WASHINGTON

The principal chromite deposits of the Twin Sisters Mountains, shown on the accompanying maps, were examined and sampled by the Geological Survey, United States Department of the Interior, in 1940 and 1941, to ascertain their importance as a source of chromium, one of the strategic and critical metals. The reconnaissance topographic map of the higher parts of the mountains (fig. 2) was made in 1940, and deposits on the Leader and Meadow claims (figs. 3 and 4) were mapped in detail in 1941. With a relief of 4,000 to 5,500 feet, the region is accessible by forest trails only, and most of the deposits are in rocky places that can only be reached afoot. Cliffs 100 to 500 feet high are characteristic of the ridges between the glaciated valleys. Heavy timber covers the slopes below 3,500 feet.

The chromite deposits occur in the dunitic parts of an elliptical intrusive mass of fresh peridotite, which forms the entire mountain range, and are found in nearly all parts of the range where bedrock is exposed. Most of the deposits are small irregular masses or lenses of massive high-grade ore, the larger ones being ill-defined bodies of dunite in which chromite is disseminated. The deposits usually show prominent interlayering of high-grade ore, low-grade ore, and barren dunite parallel to the longer dimensions of the ore bodies, and to layering in the peridotite. Although the prevalence of layering suggests that persistent chromite-rich zones might be found, none exceeding 350 feet in length was seen.

The chromite from several of the deposits in this district is richer in chromic oxide than in most other districts of the United States, as the following analyses made in the Geological Survey laboratory show.

Partial analyses of chromite from the Twin Sisters Mountains, Wash.

Name of deposit	Cleaned chromite			Crude ore	
	Cr_2O_3 (percent)	Fe (percent)	Cr/Fe	Cr_2O_3 (percent)	Chromite (percent)
Danny	58.8	12.87	3.13	51.7	88
Galbraith	50.5	12.01	2.86	44.4	88
Lambert, NW.	56.58	14.59	2.65	36.92	65
Lambert, SE.	58.14	15.03	2.65	16.49	28
Leader	54.2	15.73	2.35	33.5	62
McMaster	58.2	15.34	2.58	56.4	97
Meadow	56.75	13.41	2.90	46.18	81
Ribbon	59.4	13.2	3.06	51.2	86
Whistler	60.4	12.24	3.06	52.8	87

The known reserves of the district are comparatively small, partly because little exploration has been done on the deposits of low-grade disseminated ore. The amount of shipping-grade ore containing 40 percent or more chromic oxide (Cr_2O_3) is probably between 2,000 and 5,000 long tons, and the reserve of milling-grade ore indicated by surface exposures is about 45,000 long tons, ranging from 10 to 25 percent Cr_2O_3. Additional possible reserves of 100,000 long tons of milling-grade ore might be revealed by surface trenching and subsurface exploration. Concentrates containing 45 to 50 percent Cr_2O_3 and having a chromium-iron ratio of 2.4 to 2.7 probably could be produced from the disseminated deposits unless the chromite slimes excessively during fine grinding, which may be necessary to free the finer grains of ore from the fresh dunite.

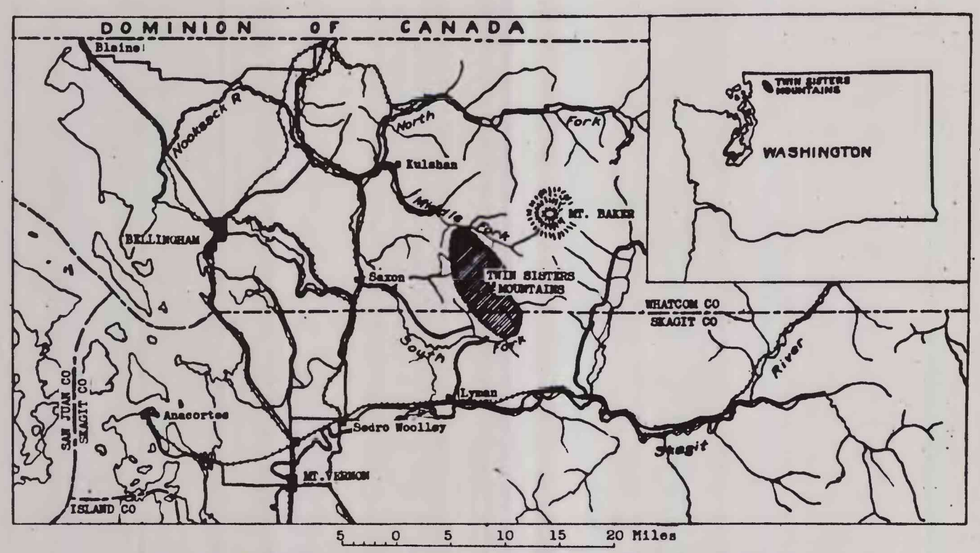
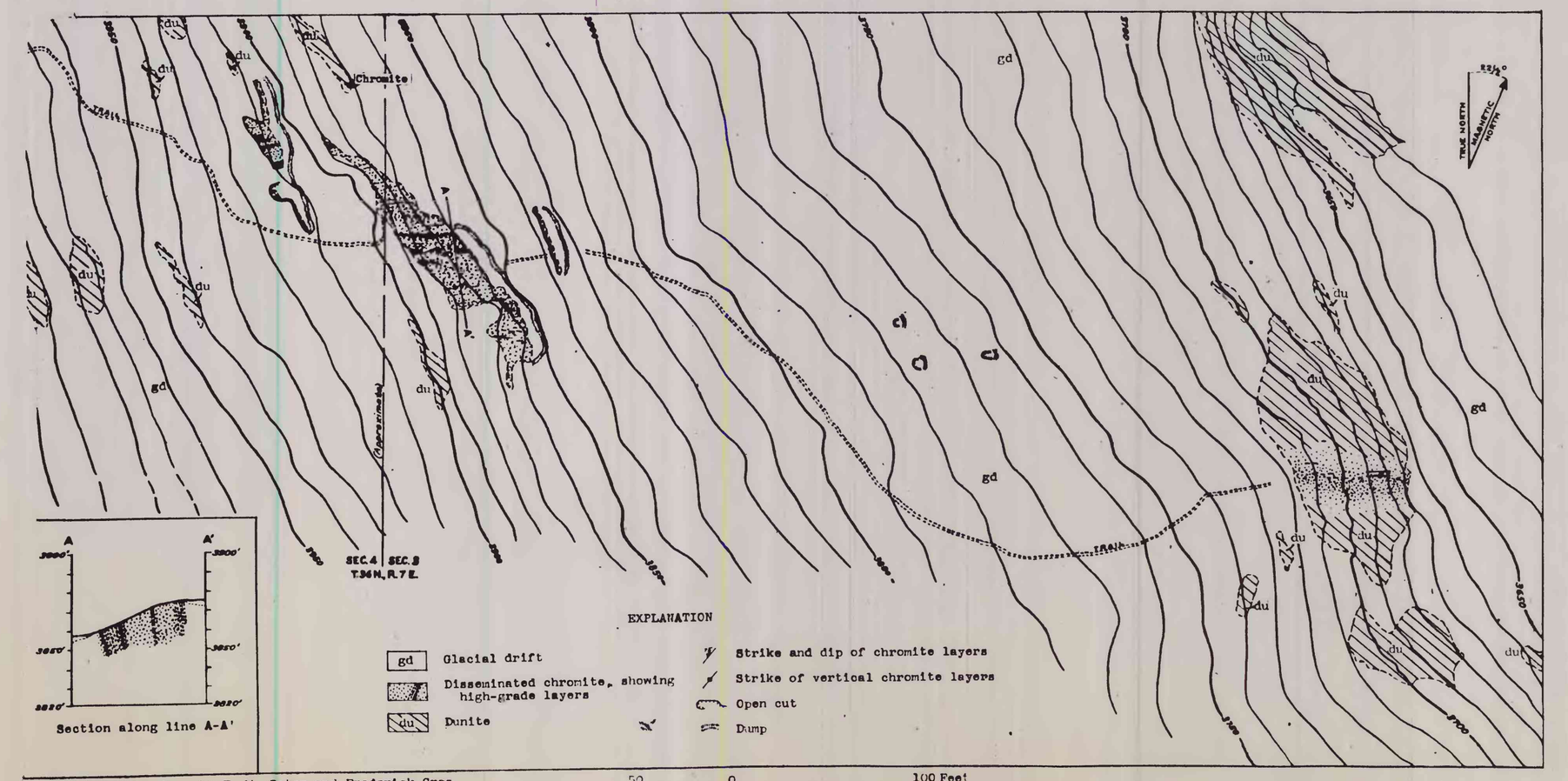


Figure 1. INDEX MAP OF NORTHWESTERN WASHINGTON, SHOWING LOCATION OF THE TWIN SISTERS MOUNTAINS

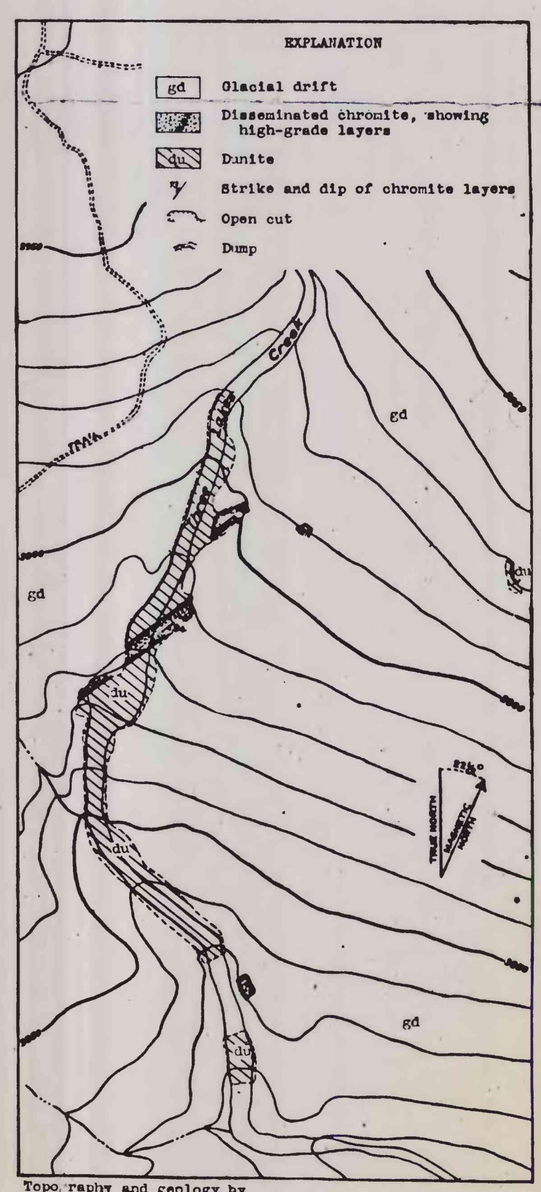


Topography and geology by F. W. Cater and Frederick Gros

50 0 100 Feet

Contour interval 10 feet

Figure 3. CHROMITE DEPOSITS ON THE MEADOW CLAIM



Topography and geology by
F. W. Cater and Frederick Gros

50 0 100 Feet

Contour interval 10 feet

Figure 4. CHROMITE DEPOSITS ON THE LEADER CLAIM

CHROMITE DEPOSITS OF THE TWIN SISTERS MOUNTAINS, WASHINGTON