HIGHLIGHTS OF 1989 MINERAL INVESTIGATIONS
IN THE WESTERN BROOKS RANGE, NORTHWESTERN ALASKA

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UNITED STATES DEPARTMENT OF THE INTERIOR

Manuel J. Lujan, Secretary

BUREAU OF MINES

T S Ary, Director
EXPLANATION

- Layered mafic and ultramafic rocks
- Basalt, diabase, chert, and limestone

Map Area

Arctic

Ocean

Bering Sea

Kotzebue

Candle

Wolse

Selawik

Noatak River

Kobuk River

Edzhalik Mountain

Sinuktrinniak Mountain

Western Brooks Range Trend

Asik Mtn.

Noatak Mtn.

Ilyrik Mtn.

Kivalina

Red Dog
Five chromite deposits were discovered during recent strategic and critical mineral investigations conducted jointly by the Bureau of Mines, the U.S. Geological Survey, and the Alaska Division of Geological and Geophysical Surveys. The chromite deposits are all in the Avan Hills ophiolite mass in the Delong Mountains, western Brooks Range where the Bureau had previously discovered and described 59 other chromite occurrences and deposits. Additional chromite deposits were also previously located by the Bureau at Iyikrok Mountain and Misheguk Mountain, also in the Delong Mountains, western Brooks Range (BuMines IC 9087 & OFR 97-85).

Depending on the actual deposit grade and subsurface extent, the largest of the recently discovered chromite deposits may contain as much as 1.5 million short tons of chromite. This would make the deposit approximately equal in size to the Turner Stringer Zone, at Red Mountain on Kenai Peninsula, where 1.25 million short tons of chromic oxide (Cr₂O₃) have been identified (IC 8990-1).

The other four, recently discovered chromite deposits in the Avan Hills, are estimated to contain from 100 to 72,000 short tons of chromic oxide, and combined with the larger chromite deposit, between 500 thousand and 1.6 million short tons of contained chromic oxide were discovered during the recent investigation. Combined with chromite deposits previously identified by the Bureau, the western Brooks Range ophiolite, together are estimated to contain between 725,000 and 2.5 million short tons of chromic oxide.

The above estimates assume that the chromite deposits are lens-shaped, as has been demonstrated to be the case for most chromite deposits in alpine peridotites. Tonnages were calculated for deposits with thickness equal to one quarter deposit length, and for deposits with thickness equal to one half deposit length. Therefore a minimum and maximum deposit size were calculated. In cases where deposits are open on one and due to snow or
Colluvial cover, the deposit length was multiplied by 1.25 for maximum deposit size calculation.

A tape and Brunton map of the Spider chromite deposit, the largest in the western Brooks Range, is included with this report. A sketch map of Harris's PGM-Cr occurrence, which contains material with up to 0.27 oz/st PGM is also included. The location of the five chromite deposits mentioned above, and the location of Harris's PGM-Cr occurrence are shown on the attached USGS 1:250,000 scale Delong Mountain and Misheguk Mountain topo sheets.

The Spider chromite deposit is exposed in outcrop, subcrop, rubble, and float. The deposit is between 2660- and 2775-ft elevations trends Northeast across a smooth, north-striking dunite ridge. At the time of discovery the deposit was covered with snow at its south end. The chromite content of the deposit is estimated to be between 5 and 10 pct, and may actually be richer. Chromite schlieren, which are elongated, and folded magmatic segregations up to several feet long and several inches wide are abundant within the 100- to 200-ft-wide by 1060-ft-long area shown on the tape and Brunton map. The schlieren variably contain segregations of disseminated, coalescent, and nearly massive chromite. Rubble and float blocks along the ridge are alligned in linear trains, separated by parallel trains of fine colluvium. These striated soil patterns result from concentration of surface waters in fine-grained material during annual freeze-thaw cycles. Five continuous grab samples were collected along survey lines 1-5 as shown on the map. The samples were collected for table concentration and mineral characterization by SLRC and ALRC.

During previous chromium investigations treatment of chromite samples in this way has resulted in the identification of several PGM occurrences in western Brooks Range and elsewhere in Alaska.

During the recent investigations, the PGM-Cr occurrences sampled by R.A. Harris in 1986 at Misheguk Mountain was examined. The attached sketch map
Dunite float and rubble with less than 2% disseminated chromite

Dunite float and rubble with chromite schlieren

Coalescent and nearly massive chromite pebbles in fine colluvium

Fine dunite colluvium with less than 2% disseminated chromite

Dunite subcrop: chromite schlieren shown schematically where observed

Dunite outcrop: chromite schlieren shown schematically where observed
of that occurrence was constructed and additional samples were collected. Immediately prior to this year's field work, a mineral characterization report was received from ALRC. That report confirmed the presence of sperrylite (PtAs₂) in the high-iron chromian spinel from Harris's occurrence. Note that the extraordinarily high PGM values, associated with clinopyroxenite in dunite are similar to values obtained in similar rocks at Dust Mountain in the Border Ranges Complex, south central Alaska. Together, these occurrences indicate that a previously unknown environment for PGM exists and deserves further work.

Because the areas described herein are within the Noatak National Preserve, administered by the National Park Service, and are closed to Mineral Entry, it is recommended that no press release be issued pertaining to these discoveries. Unlike our attempts to visit these sites in 1988, this year's investigations were conducted without incident, and a productive, cooperative relationship was established and maintained with the NPS. A press release might have the adverse effect of soliciting unwanted response from various conservation and preservation groups, thereby interfering with any future mineral investigations in the Noatak National Preserve.

W132.5750 collected in 1987 from ridge to vent of Harris's occurrence.
Harris's PGM-Cr Occurrence
Misheguk Mountain Ophiolite
June 26, 1989
J.Y. Foley

Dunite and wehrlite

olivine clinopyroxenite
with pyrrhotite, pentlandite
and garnierite

0 10 feet
Deposit Tonnage Estimates

Spider Chromite Deposit:

Low estimate
1060 feet long
x 150 feet wide (average)
x 250 feet thick (deep) (i.e. 250 x 150)
39,750,000 ft³
\[ \div 9.7 \text{ ft}^3/\text{st} \]
4,097,938 st
\[ \times 0.05 \text{ (pet chromite)} \]
204,897 st chromite
\[ \times 0.65 \text{ (Cr}_2\text{O}_3 = 0.65) \]
133,183 st \text{ Cr}_2\text{O}_3

High estimate
1060'
x 150'
x 500' (i.e. .5 x length)
79,500,000 ft³
\[ \div 9.7 \text{ ft}^3/\text{st} \]
8,195,876 st
\[ \times 0.10 \text{ (10 pet chromite)} \]
819,588 st chromite
\[ \times 0.65 \]
532,732 st \text{ Cr}_2\text{O}_3

* Deposit is open on south end, therefore:
1060 x 1.25 =
1325 feet long
x 150 feet wide
x 750 feet thick ( .5 x length)
14,906,000 ft³
\[ \div 9.7 \text{ ft}^3/\text{st} \]
1,490,625 st chromite
\[ \times 0.65 \]
968,906 st \text{ Cr}_2\text{O}_3
Harris #1, B9 HS 137 = WB 27343

\[
\text{Log } 2m(x 3.281 \text{ ft/m}) = 6.54 \text{ ft wide}
\]

\[
\times 82 \text{ ft long}
\]

\[
\frac{120 \text{ ft thick }}{11,296 \text{ ft}^3}
\]

\[
\div 9.7 \text{ ft}^3/\text{st}
\]

\[
1144 \text{ st}
\]

\[
\times .08 \text{ (8 pt chromite)}
\]

\[
93 \text{ st chromite}
\]

\[
\times .45
\]

\[
60 \text{ st Cr}_2\text{O}_3
\]

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Harris #2, B9 HS 138 = WB 27341

\[
\text{Log } 350 \text{ ft long}
\]

\[
50 \text{ ft wide}
\]

\[
\frac{87.5 \text{ ft thick }}{1,531,250 \text{ ft}^3}
\]

\[
\div 9.7
\]

\[
157,861 \text{ st}
\]

\[
\times .10
\]

\[
15,786 \text{ st chromite}
\]

\[
\times .45
\]

\[
10,260 \text{ st Cr}_2\text{O}_3
\]
Toni #1, 897#143

\[
\begin{align*}
125 & \quad 300 \ L \\
100 & \quad 100 \ W \\
75 & \quad 75 \ F \\
2,250,000 \ ft^3 & \div 9.7 \\
231,957 \ ft & \\
\times 0.05 & \quad 11,598 \ ft \ \text{chromite} \\
\times 0.65 & \quad 7,539 \ ft \\
\end{align*}
\]

Toni #2

\[
\begin{align*}
50 \times 50 & \times 2.5 \ \text{depth (in inch)} \\
62,500 \ ft^3 & \div 9.7 \\
6,443 \ ft & \\
\times 0.05 & \quad 322 \ ft \ \text{chromite} \\
\end{align*}
\]

\[@ \quad 12.5 \ ft \ \text{thick,} \quad 105 \ ft \ \text{Cr}_2O_3\]