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

By Jeffrey Y. Foley

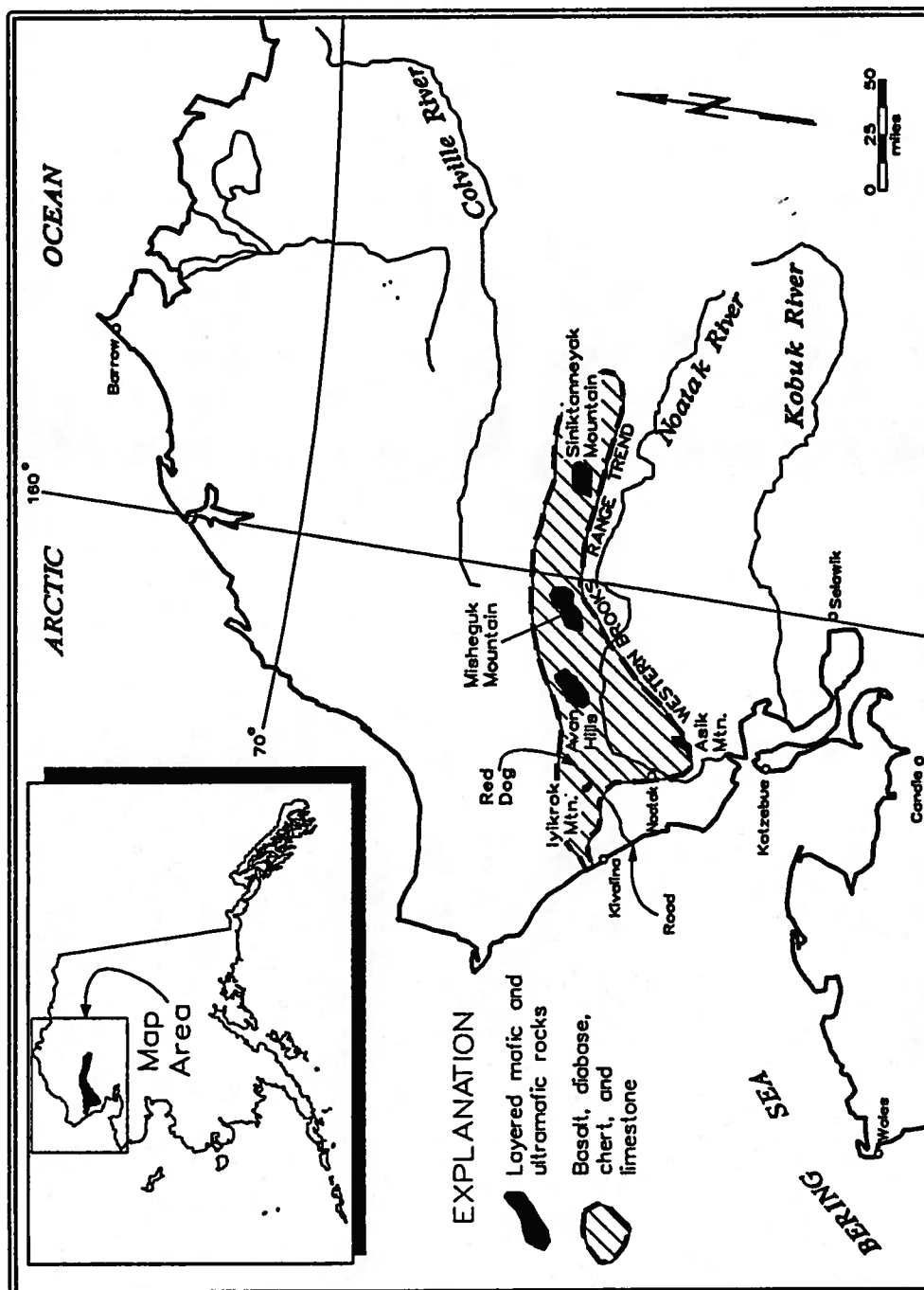
***** July 6, 1989

UNITED STATES DEPARTMENT OF THE INTERIOR

Manuel J. Lujan, Secretary

BUREAU OF MINES

T S Ary, Director



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 (Cr_2O_3) 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 223 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 726,000 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 end due to snow or

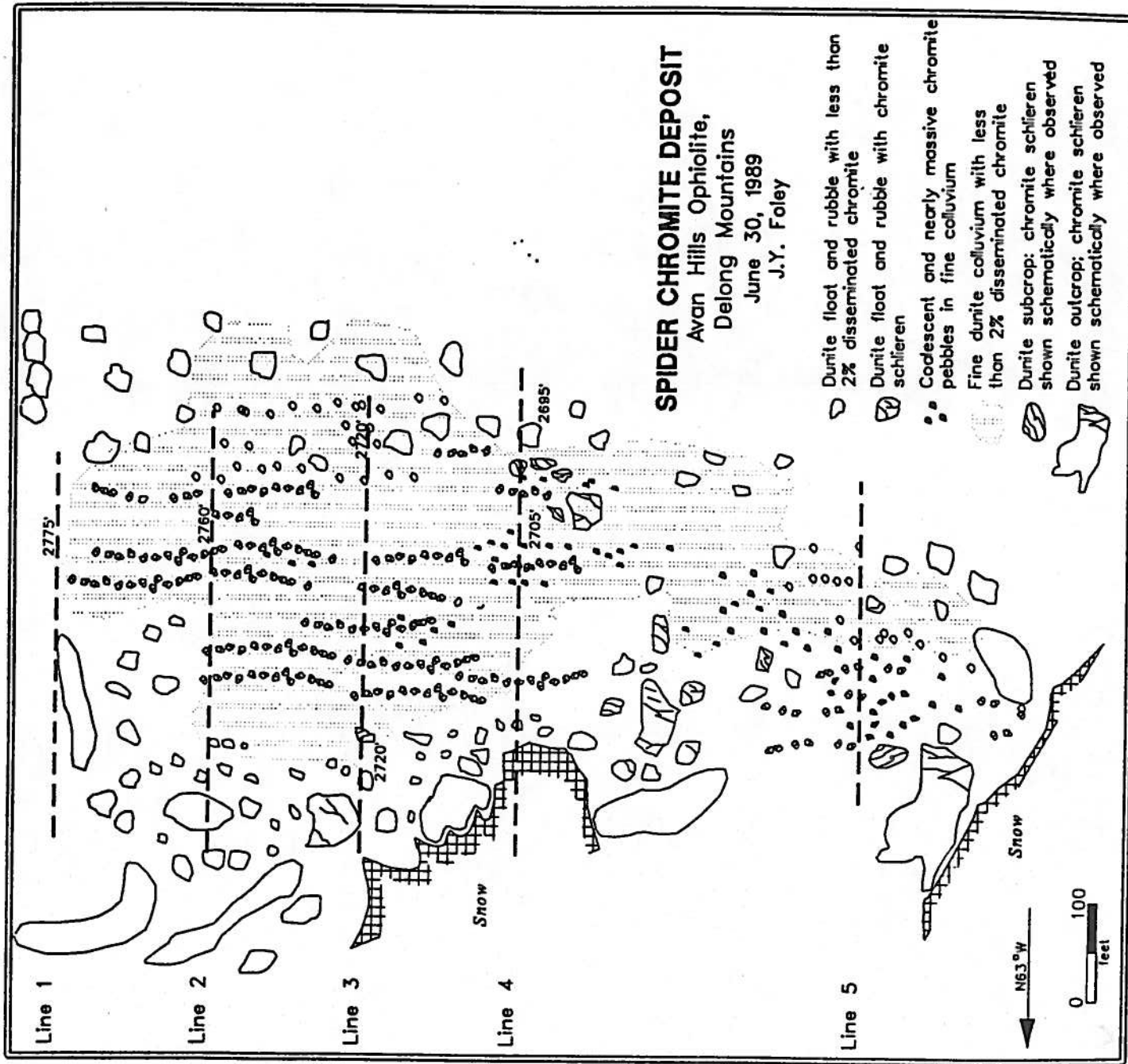
colluvial cover, the deposit length was multiplied by 1.25 for maximum deposit size calculation.

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 aligned 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



SPIDER CHROMITE DEPOSIT

Avan Hills Ophiolite,
Delong Mountains

June 30, 1989

J.Y. Foley

- Dunite float and rubble with less than 2% disseminated chromite
- Dunite float and rubble with chromite schlieren
- Codescendent 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.

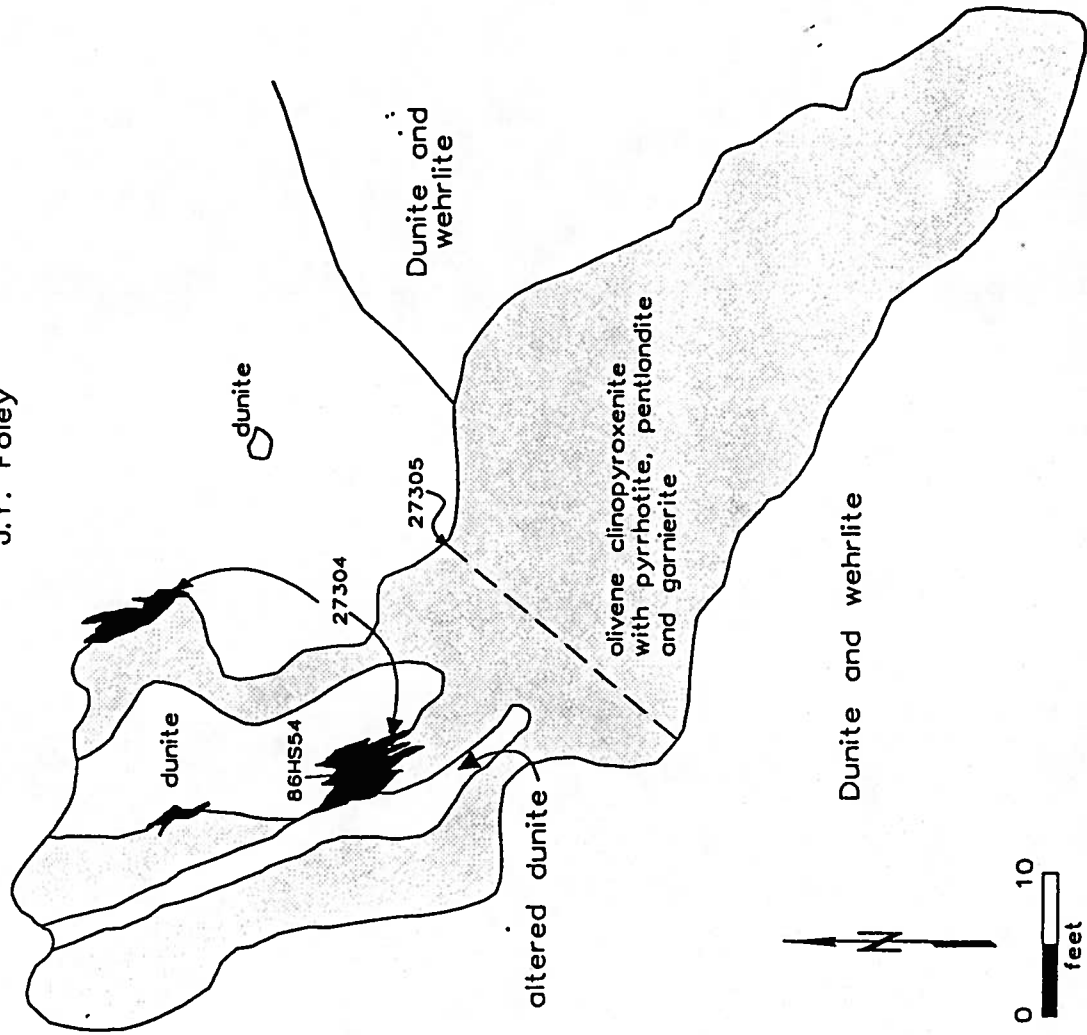
Immediately prior to this years field work, a mineral characterization report was received from ALRC. That report confirmed the presence of sperrylite (Pt As₂) in the high-iron chromian spinel from Harris's occurrence. Note that the extraordinarily high PGM values, associated with clinopyroxenite in 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.

Harris's PGM-Cr Occurrence

Misheguk Mountain Ophiolite

June 26, 1989

J.Y. Foley



Deposit Tonnage Estimates

Spider Chromite Deposit:

Low estimate	High estimate
1060 feet long	1060'
x 150 feet wide (average)	x 150'
x 250 feet thick (deep) (i.e. $.25 \times \text{length}$)	x 500' (i.e. $.5 \times \text{length}$)
39,750,000 ft^3	79,500,000 ft^3
$\div 9.7 \text{ ft}^3/\text{st}$	$\div 9.7$
4,097,938 st	8,195,876 st
x .05 (pct chromite)	x .10 (10 pct chromite)
204,897 st chromite	819,588 st chromite
x .65 ($\frac{\text{Cr}_2\text{O}_3}{\text{chromite}} = .65$)	x .65
<u>133,183 st Cr_2O_3</u>	<u>532,732 st Cr_2O_3</u>

* Deposit is open on south end, therefore:

$$\begin{aligned} 1060 \times 1.25 &= 1325 \text{ feet long} \\ &\times 150 \text{ " wide} \\ &\times 750 \text{ " thick (}.5 \times \text{length)} \\ &14,906,000 \text{ ft}^3 \\ &\div 9.7 \text{ ft}^3/\text{st} \\ &1,490,625 \text{ st chromite} \\ &\times .65 \\ &\underline{\underline{968,906 \text{ st } \text{Cr}_2\text{O}_3}} \end{aligned}$$

Max at 10 pct
chromite.

Harris #1, 89 HS 137 = WB 27343

$$\begin{aligned} \text{Low } 2m (\times 3.281 \text{ ft/m}) \\ = 6.56 \text{ ft wide} \\ \times 82 \text{ ft long} \\ \times 20 \text{ ft thick } (.25 \times \text{length}) \\ \hline 11,296 \text{ ft}^3 \\ \div 9.7 \text{ ft}^3/\text{ton} \\ \hline 1164 \text{ st} \\ \times .08 \text{ (8 pct chromite)} \\ \hline 93 \text{ st chromite} \\ \times .65 \\ \hline 60 \text{ st Cr}_2\text{O}_3 \end{aligned}$$

$$\begin{aligned} \text{High} \\ 123 \text{ ft} \times \\ \times 6.6 \text{ ft} \\ \times 61 \text{ ft } (.5 \times \text{length}) \\ \hline 49520 \text{ ft}^3 \\ \div 9.7 \\ \hline 5105 \text{ st} \\ \times .10 \text{ (10 pct chromite)} \\ \hline 510.5 \text{ st chromite} \\ \times .65 \\ \hline 332 \text{ st Cr}_2\text{O}_3 \end{aligned}$$

Harris #2, 89 HS 138 = WB 27341

$$\begin{aligned} \text{Low } 350 \text{ ft long} \\ 50 \text{ ft wide} \\ \times 87.5 \text{ ft thick} \\ \hline 1,531,250 \text{ ft}^3 \\ \div 9.7 \\ \hline 157,861 \text{ st} \\ \times .10 \\ \hline 15,786 \text{ st chromite} \\ \times .65 \\ \hline 10,260 \text{ st Cr}_2\text{O}_3 \end{aligned}$$

$$\begin{aligned} \text{High} \\ 437.5 \text{ ft long} \\ \times 75 \text{ ft wide} \\ \times 218.75 \\ \hline 7,177,625 \text{ ft}^3 \\ \div 9.7 \\ \hline 739,961 \text{ st} \\ \times .15 \\ \hline 110,994 \text{ st chromite} \\ \times .65 \\ \hline 72,146 \text{ st Cr}_2\text{O}_3 \end{aligned}$$

Tom's #1, B9TL143

$$\begin{array}{r} \text{Low} \\ 300 \text{ L} \\ 100 \text{ W} \\ \underline{75 \text{ T}} \\ 2,250,000 \text{ ft}^3 \\ \div 9.7 \\ \hline 231,959 \text{ st} \\ \times .05 \\ \hline 11,598 \text{ st chromite} \\ \times .65 \\ \hline 7,539 \text{ st} \end{array}$$

trends $\sim 30^\circ \text{W}$, dips 45°NE
5-10 pct chromite

$$\begin{array}{r} \text{High} \\ 300 \text{ L} \\ 100 \text{ W} \\ \underline{150 \text{ T}} \\ 4,500,000 \text{ ft}^3 \\ \div 9.7 \\ \hline 463,918 \text{ st} \\ \times .10 \\ \hline 46,392 \text{ st chromite} \\ \times .65 \\ \hline 30,155 \text{ st } \text{Cr}_2\text{O}_3 \end{array}$$

Tom's #2

$$\begin{array}{r} 50 \times 50 \\ \times 25 \text{ deep (thick)} \\ \hline 62,500 \text{ ft}^3 \\ \div 9.7 \\ \hline 6443 \text{ st} \\ \times .05 \\ \hline 322 \text{ st chromite} \\ @ 12.5 \text{ ft thick,} \\ 105 \text{ st } \text{Cr}_2\text{O}_3 \end{array}$$

$$\begin{array}{r} 50 \times 50 \times 25 \\ = 62,500 \text{ ft}^3 \\ \div 9.7 \\ \hline 6443 \text{ st} \\ \times .10 \\ \hline 644 \text{ st chromite} \\ \times .65 \\ \hline 418 \text{ st } \text{Cr}_2\text{O}_3 \end{array}$$

~~561-5585 Public~~

BOM 271-2455

786-7492

786-7431 - 561-1181

Investigation team members include:

Tom White, USGS

Jeff Foley, BOM

Dr. Ron Harris, U of WVa (last years grad student from England)

Milt Wiltse, Geol. State of AK

000 (NWA)

July 5, 1989

Memorandum

To: Regional Director, Alaska Region

From: Superintendent, Northwest Alaska Areas

Subject: Misheguk Mountain/Avan Hills Mineralization Study
by BOM, USGS, UAF, UWV, and State of Alaska personnel

Mr. Tom Light, USGS, requested Special Use and Collecting Permits again this year to continue geologic (AMRAP) studies in the subject areas of the Noatak National Preserve. Such permits were issued and discussions held with the team of investigators prior to their field trip. Problems related to last years field investigation were reviewed and efforts and agreements made that, apparently, eliminated most, if not all, the difficulties experienced during the 1988 field season.

It was pointed out by Mr. Light in our preliminary discussions that this years investigations constitute a continuation of last years survey. Several questions were again raised regarding the purpose and long range implications of these studies. Messrs. Light and Foley and Dr. Harris all offered comments regarding the general nature of the investigation and its contribution to the overall geologic data base for the State of Alaska. It was mentioned several times during the conversation that there was no commercial interests involved in the studies except, perhaps, for national long range strategic purposes.

Because of last years problems with litter, abandoned equipment, etc. it was decided to stop in on the camp during the course of on-going field studies to check for compliance with conditions of the Special Use Permit. Management Assistant Mills and Chief Ranger Rigby stopped at the Avan Hills camp on July 1 and reported

the camp to be well maintained and clean.

On Friday, June 30, 1989, Park Wildlife Biologist Lee Anne Ayres had occasion to use the Trans-Alaska Helicopter in connection with our sheep survey project. Trans-Alaska pilot, Ken Butters, assigned to fly the USGS, BOM, UAF, UWV, and AK State geologist around the Kelly-Misheguk area, reportedly told Lee Anne that the field researchers had discovered a chromite deposit in the large red rock outcrop at the mouth of the Kelly. According to Butters there had been some discussion among the researchers regarding the strategic importance of this mineral and the potential for development of the site. Mr. Butters reportedly stated that those on the crew were "quite excited about the find" plus comments regarding the fact that the only other mine on U.S. soil was a small deposit in Homer.

We were struck with the proximity to and apparent relative ease of access of this deposit to the Red Dog road. Such a connection could make it potentially attractive for both strategic and economic development interests.

Questions that I believe need to be addressed include:

Just what was found and how significant is the find? I was told that a preliminary finding would be available within a year and that a final report could be expected in about three years.

At what point, if not now, do we take the offensive in laying out a strategy for long range protection over and above existing authority and legislation?

All samples taken in this years and previous studies were from the surface and included fist-sized materials as well as fine materials. The next step in subsequent investigations could very well include core studies (although prohibited) should more extensive field studies be indicated.

It is only to be expected that researchers would be cautious in citing the mineral value of an area prior to comprehensive laboratory and additional site studies. If, however, there is sufficient concern about chromite and other potential, e.g. platinum, minerals, and if this preliminary information becomes widely known considering the current mining climate in this area, there is the very real possibility of a push for accelerated studies and such things as boundary changes, land trades, etc., any of which could compromise the integrity of the Noatak Basin and existing Preserve values.

United States Department of the Interior
National Park ServiceAPPLICATION FOR PERMISSION TO COLLECT
SPECIMENS OF PLANTS, ROCKS, MINERALS, AND ANIMALS

Name of Area <u>Noatak National Preserve</u>		Date <u>June 25, 1989</u>
Name of Applicant <u>Thomas D. Light</u>	Home Address <u>4200 University Dr., Anchorage, AK</u>	
Representing (Name of Institution) <u>U.S. Geological Survey</u>		
Type of Specimens to be Collected <u>Geological (rocks)</u>		
Class of Collecting* ☒ Class A ☐ Class B	Check for Class B Permit ☐ Paid Employee ☐ WOC Collaborator	Period of Collecting From <u>6/25/89</u> To <u>7.12.89</u>

Reason for Collecting

Geological and geochemical reconnaissance studies of Misheguk Mtn. and Avan Hill
ephiolite complexes. AMRAP survey.

Place Where Specimens are to be Deposited

USGS

I, the applicant, having read the conditions on the reverse of the permit relating to collections in areas administered by the National Park Service, agree that, if the permit is granted, I will comply with all the conditions stated therein.

Signed [Signature]

TO BE FILLED IN BY ISSUING OFFICE ONLY--DO NOT WRITE BELOW THIS LINE

Approved for Collecting Following Specimens <u>Geological (rocks)</u>		Class <u>A</u>
Locality of Collecting Limited to <u>Noatak National Preserve; Misheguk Mtn. and Avan Hill area.</u>		Expiration Date <u>7/12/89</u>
Special Conditions or Restrictions <u>See attached and Special Use Permit.</u>		
Recommended by (Signature and Title) <u>[Signature] Resource Management Specialist</u>	Approved By (Signature and Title) <u>[Signature] [Title]</u>	Date Approved <u>6/25/89</u>

--- Incident. --- Collection will be sent