# THE GEOLOGY AND GEOCHEMISTRY OF THE ARNOLD PROSPECT, MARSHALL DISTRICT, ALASKA

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Thomas R. Turner

**CALISTA CORPORATION**
601 West Fifth Avenue, Suite 200
Anchorage, Alaska 99501
(907)279-5516

## LIST OF FIGURES



## LIST OF TABLES

# The Arnold Prospect

The Arnold Prospect is located on a heavily trenched and pitted 800 x 400' talus slope on the upper east slope of Willow Creek, east of Marshall, Alaska. Auriferous quartz vein float was discovered in 1914 and the prospect has been repeatedly trenched over the years. Figure 4 is a geologic map of the prospect constructed by examination of the old trenches, pits, dumps, talus, and frost rubble. There is no outcrop on the prospect.

## Geology

The prospect is a quartz vein stockwork with scattered small breccia zones hosted in a chloritic andesite tuff cut by albite diorite dikes. Fragments of quartz porphyry occur within the breccia zones. A southeast trending shear zone cuts the stockwork and has served as the focus for emplacement of two major and several small albite diorite dikes. The dikes exhibit sheared margins with the development of slickensides. Hydrothermal alteration has affected both the sheared greenstone and the albite diorite and appears to be associated with the generation of the auriferous quartz veins.

Figure 5 is a geologic cross-section of Mount Okumiak ridge drawn through the Arnold Prospect. This section indicates the prospect is situated approximately 700' directly above the siltstone-greenstone contact which is exposed on the north flank of Mount Okumiak about a mile north of the property. Immediately beneath this contact, the siltstone is carbonaceous, and in probability, the carbonaceous beds extend down dip beneath the Arnold showing. This horizon is interpreted to be an important exploration target considering the affinity of gold for carbon.

## Mineralization

Minor pyrite-chalcopyrite-molybedenite occurs in the veins of the stockwork-breccia zone and as disseminations in the silica-iron carbonate altered and sheared greenstone. Grab samples of the stockwork yielded anomalous, but sub-ore gold values, the highest being 0.027 OPT gold. The late stage quartz veins, however, yielded significant gold assays. The veins are composed of massive white, limonite stained quartz that is occasionally vuggy. Pyrite-sphalerite-chalcopyrite-galena all occur in the quartz as occasional anhedral to subhedral clots up to two inches in diameter, but total sulfide content does not exceed two percent. Assay results from five grab samples of bull quartz ranged from 0.096 OPT gold to 2.72 OPT gold with an uncut average assay of 0.922 OPT gold ( Figure 4, Table 1). All of the samples were taken from dump piles adjacent to caved trenches and it was impossible to estimate the vein width. The largest quartz fragments on the dumps were about two and one-half feet wide and one can assume this dimension as the minimum width for the larger veins.

There are two additional lode prospects located in upper Willow Creek. Both prospects consist of quartz vein stockworks hosted in greenstone tuff with minor chalcopyrite and molybdenite. Grab sample of mineralized float yield anomalous Co-Mo, but only background gold values.

Sediment samples taken immediately downstream from the Arnold Prospect contain anomalous copper and molybdenum values but mainly background gold content ( Figure 6, Tables 2 and 3). In contrast, sample MS-9-86, collected one mile further downstream, is anomalous in gold and mercury as well as copper and molybdenum. This infers that the Arnold may not be the only lode source for the Willow Creek placer gold deposit and additional mineralization may be present elsewhere within the Willow Creek drainage. A soil survey and additional pan and stream sediment sampling should resolve this question. Stream sediment samples collected in Disappointment and Elephant Creeks contain anomalous mercury that appears to have its lode source in the rhyolite-chert sequence exposed on the ridges above the creeks.

## Conclusions

The Arnold Prospect has several similarities to the Treadwell Mine in southeast Alaska. The Treadwell Deposit is hosted in a Mesozoic greenstone belt that is comparable to the Lower Yukon Greenstone Belt. The deposit is a quartz-iron carbonate alteration pipe hosted in an albite diorite sill, and disseminated and vein molybdenum is present peripheral to the main deposit. These salient features; albite diorite intruding greenstones, quartz-iron carbonate alteration, and a molybdenite halo are all present in the Arnold Prospect. The two deposits may share a similar economic potential as the Treadwell produced over two million ounces of gold at a production grade of 0.12 OPT gold.

Calista Corporation believes that the Arnold Prospect has the potential to become a profitable lode gold mine. The surface showings and the historic gold placer production clearly demonstrate that the Willow Creek Drainage cuts an auriferous mineral system. Our current geologic data base compares favorably with the Treadwell Deposit, one of Alaska's premier lode gold mines. Finally, the property is ideally situated five miles off the Yukon River, with a good access road to the old placer camp, a suitable site to house an exploration crew.

It is Calista's intention to continue exploration of the Arnold Prospect and the Willow Creek drainage. We are committted to offering exploration leases at reasonable terms. Interested parties should contact Mike Neimeyer, Vice President, Land & Natural Resources, Calista Corporation, 601 W. Fifth Avenue, Suite 200, Anchorage, Alaska 99501, (907)279-5516.

Table 1: Rock Geochemistry of the Arnold Prospect

| Sample No. | Cu ppm | Pb ppm | Zn ppm | Mo ppm | Ag ppm | As ppm | Hg ppb | Au ppb | NOTES |
|---|---|---|---|---|---|---|---|---|---|
| MR-34-86 | 250 | 1200 | 282 | 445 | 305 | 120 | 10 | 0.187 OPT | quartz vein, limonite stain |
| MR-35-86 | 560 | 20 | 120 | 52 | 0.5 | 28 | 5 | 20 | quartz porphyry |
| MR-36-86 | 1090 | 38 | 130 | 20 | 1 | 135 | 10 | 50 | altered greenstone |
| MR-37-86 | 300 | 6 | 32 | 19 | 1 | 20 | 5 | 420 | brecciated greenstone tuff |
| MR-38-86 | 440 | 232 | 480 | 9 | 0.4 | 44 | 5 | 180 | altered felsic dike, limonitic, slickensides |
| MR-43-86 | 500 | 6 | 56 | 560 | 0.2 | 3 | 5 | 5 | greenstone breccia |
| MR-44-86 | 100 | 2690 | 140 | 30 | 10 | 110 | 5 | 1.012 OPT | limonitic quartz vein, minor pyrite, vugs |
| MR-45-86 | 300 | 6050 | 210 | 20 | 22 | 160 | 95 | 0.668 OPT | white vuggy quartz vein, minor pyrite |
| MR-46-86 | 3400 | 73 | 144 | 370 | 2.4 | 2 | 15 | 150 | altered greenstone with quartz veinlets |
| MR-47-86 | 400 | 24 | 18 | 50 | 0.8 | 11 | 10 | 40 | red/white quartz veinlets in greenstone |
| MR-48-86 | 1500 | 10 | 80 | 1000 | 1.1 | 2 | 10 | 15 | greenstone tuff with quartz veinlets |
| MR-49-86 | 800 | 10 | 80 | 640 | 1.1 | 2 | 10 | 15 | altered greenstone with quartz veinlets |
| MR-50-86 | 500 | 7 | 64 | 80 | 0.8 | 48 | 10 | 180 | altered greenstone with quartz-pyrite veinlets |
| MR-51-86 | 800 | 6 | 78 | 20 | 0.4 | 38 | 5 | 30 | altered greenstone |
| MR-52-86 | 100 | 8 | 12 | 20 | 0.2 | 12 | 20 | 260 | white vuggy quartz vein |
| MR-53-86 | 1400 | 6 | 90 | 120 | 0.8 | 4 | 15 | 10 | altered brecciated greenstone |
| MR-54-86 | 100 | 4 | 42 | 40 | 0.2 | 3 | 15 | 5 | hornblende granodiorite porphyry |
| MR-55-86 | 100 | 54 | 56 | 20 | 0.3 | 4 | 5 | 0.115 OPT | white quartz vein |
| MR-56-86 | 400 | 7 | 44 | 20 | 0.2 | 11 | 10 | 30 | brecciated greenstone with intrusive rock fragment |
| MR-57-86 | 400 | 1400 | 192 | 20 | 32 | 240 | 125 | 2.721 OPT | pyritic quartz vein |
| MR-58-86 | 700 | 32 | 112 | 100 | 1.1 | 100 | 30 | 0.027 OPT | altered greenstone |
| MR-59-86 | 500 | 18 | 92 | 20 | 0.7 | 75 | 5 | 840 | altered greenstone |
| MR-60-86 | 400 | 7 | 70 | 20 | 0.3 | 53 | 10 | 120 | brecciated altered greenstone |

Table 2: Stream Sediment Geochemistry of the Marshall District

| Sample No. | Cu ppm | Pb ppm | Zn ppm | Mo ppm | Ag ppm | As ppm | Hg ppb | Au ppb |
|---|---|---|---|---|---|---|---|---|
| M-4-85 | 32 | 10 | 72 | | | 50 | 50 | 5 |
| M-7-85 | 19 | 10 | 60 | | | 9 | 75 | 5 |
| W-8-85 | 14 | 9 | 54 | | | 9 | 65 | 20 |
| MS-8-86 | 40 | 15 | 74 | 1 | 0.2 | 12 | 35 | 5 |
| MS-9-86 | 147 | 13 | 74 | 11 | 1.3 | 46 | 300 | 5100 |
| MS-10-86 | 149 | 11 | 80 | 12 | 0.2 | 35 | 80 | 55 |
| MS-11-86 | 20 | 12 | 68 | 2 | 0.2 | 42 | 1250 | 5 |
| MS-12-86 | 15 | 10 | 70 | 2 | 0.2 | 22 | 2800 | 5 |
| MS-13-86 | 33 | 10 | 80 | 2 | 0.2 | 45 | 1250 | 5 |
| MS-14-86 | 16 | 13 | 62 | 2 | 0.2 | 24 | 310 | 5 |
| MS-15-86 | 23 | 11 | 60 | 2 | 0.2 | 35 | 110 | 960 |
| MS-16-86 | 36 | 16 | 90 | 3 | 0.2 | 41 | 50 | 30 |
| MS-17-86 | 103 | 12 | 64 | 13 | 0.2 | 20 | 65 | 5 |
| MS-18-86 | 125 | 24 | 68 | 13 | 0.2 | 17 | 85 | 25 |
| MS-19-86 | 35 | 11 | 66 | 2 | 0.2 | 13 | 40 | 5 |
| MS-20-86 | 40 | 15 | 80 | 3 | 0.2 | 16 | 70 | 10 |
| MS-21-86 | 44 | 16 | 70 | 2 | 0.2 | 36 | 80 | 5 |
| MS-22-86 | 16 | 12 | 40 | 2 | 0.2 | 14 | 50 | 5 |
| MS-23-86 | 25 | 13 | 74 | 2 | 0.2 | 32 | 50 | 5 |

Table 3: Pan Con Geochemistry of the Marshall District

| Sample No | 16" Pan | Notes |
|---|---|---|
| MP-7-86 | 0 color | greenstone-gabbro float |
| MP-8-86 | 19 colors, 0.2-1 mm dia | sluice tailing pile, pyrite in con |
| MP-9-86 | 50 colors, 0.2-0.5 mm dia | flat, angular habit, hand tailings |
| MP-10-86 | 5 colors, 0.2-0.5 mm dia | flat, angular habit, Willow Creek |
| MP-11-86 | 2 colors, 0.2 mm dia | elongate, angular habit, chert-felsite-grnstn float |
| MP-12-86 | 4 colors, 0.05 mm dia | angular habit, gravel orange brown color, above tailings |
| MP-13-86 | 7 colors, 1-0.3 mm dia | flat, subangular habit, pyrite, hematite, tailings |
| MP-14-86 | 1 color, 0.1 mm | angular habit, tailings |
| MP-15-86 | 0 color | minor pyrite, chert rhyolite float |
| MP-16-86 | 5 colors, 0.1 mm dia | flat angular rod habit |
| MP-17-86 | 0 color | minor pyrite, poor sample |
| MP-18-86 | 1 color, 0.2 mm dia | upper tailing |
| MP-19-86 | 4 colors, 0.2-0.75 mm dia | angular shotty habit, smaller colors dendritic |

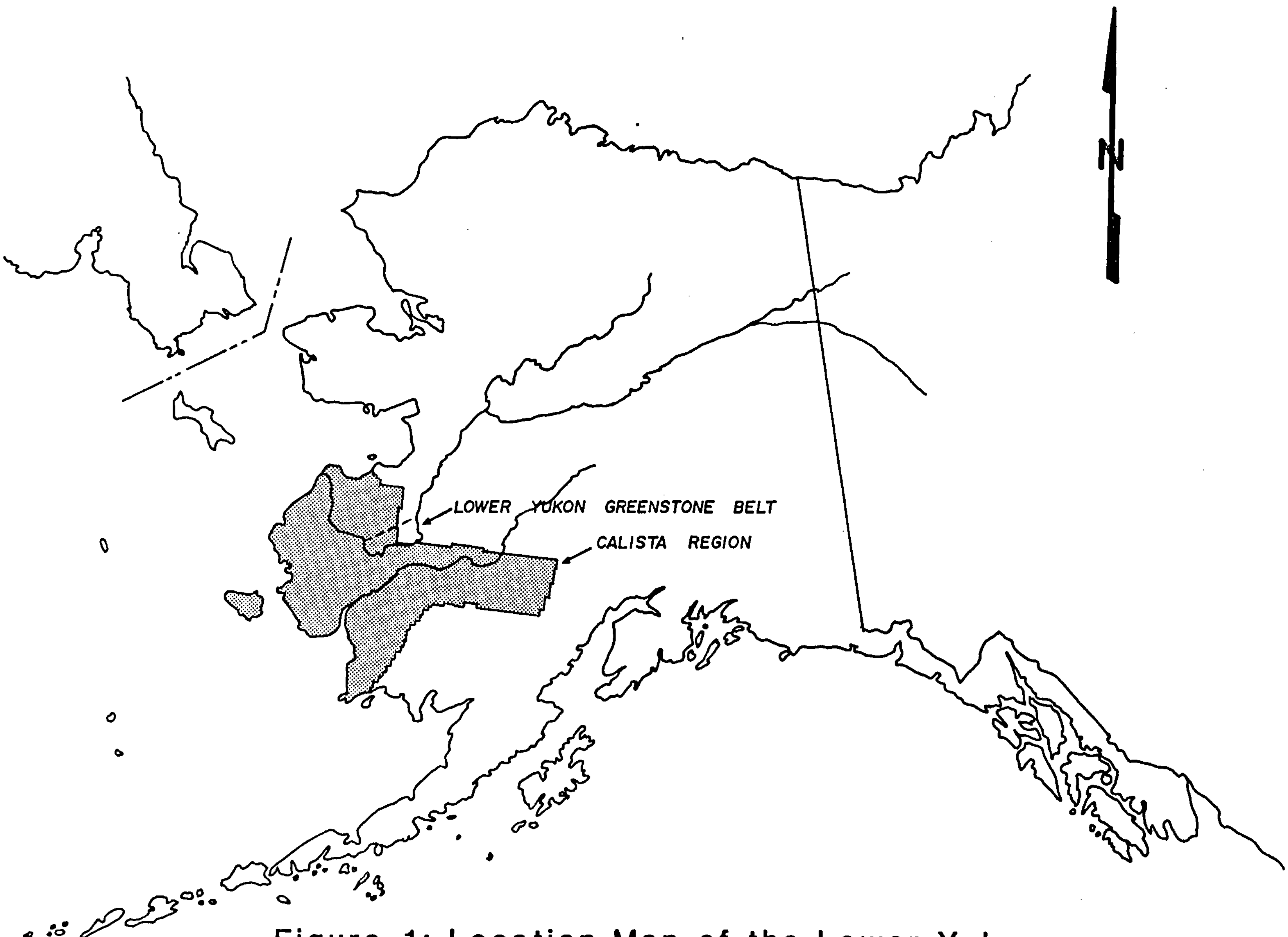
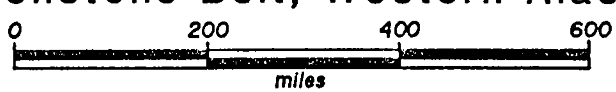



Figure 1: Location Map of the Lower Yukon Greenstone Belt, Western Alaska



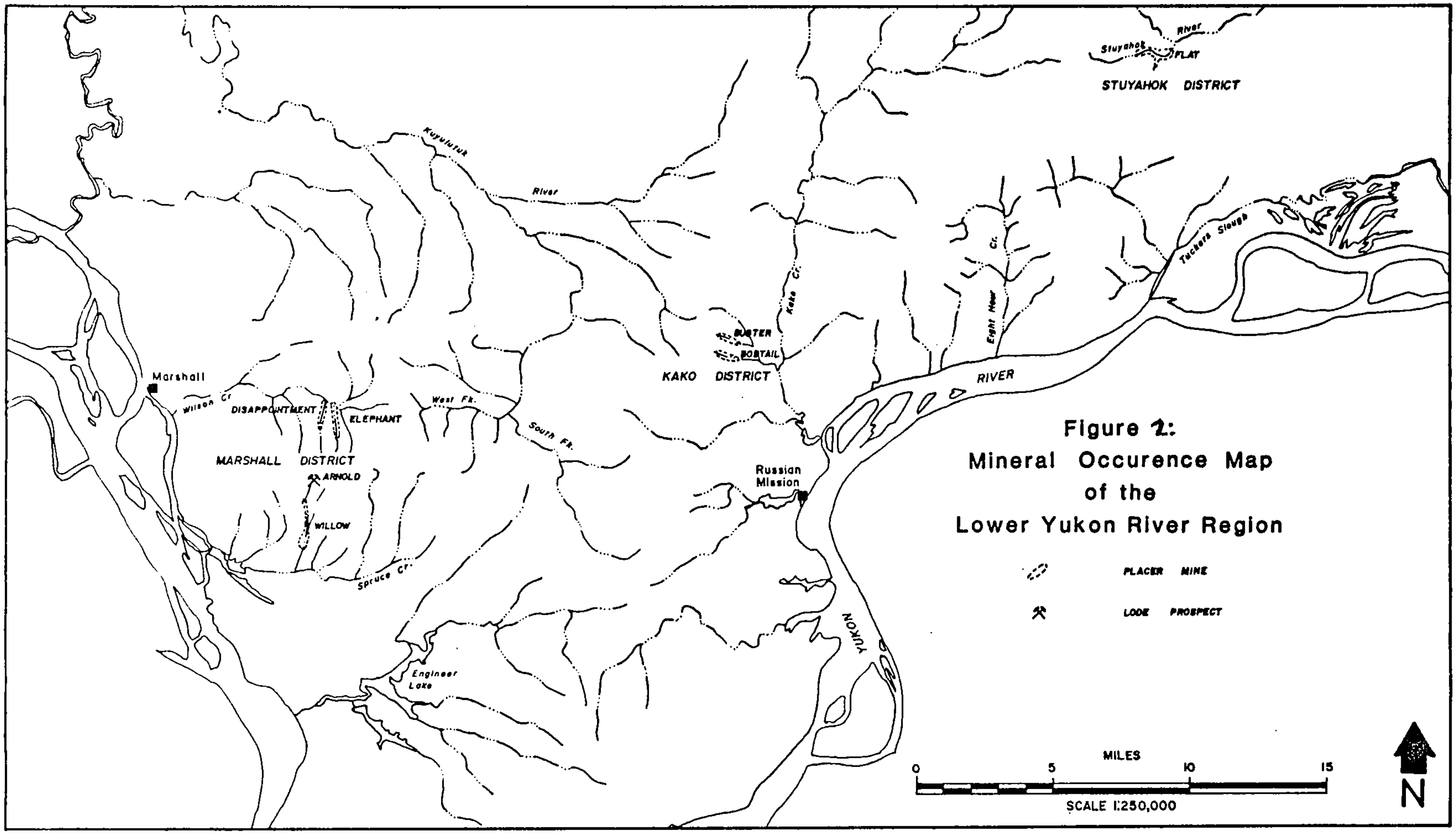



**Figure 2: Mineral Occurence Map of the Lower Yukon River Region**

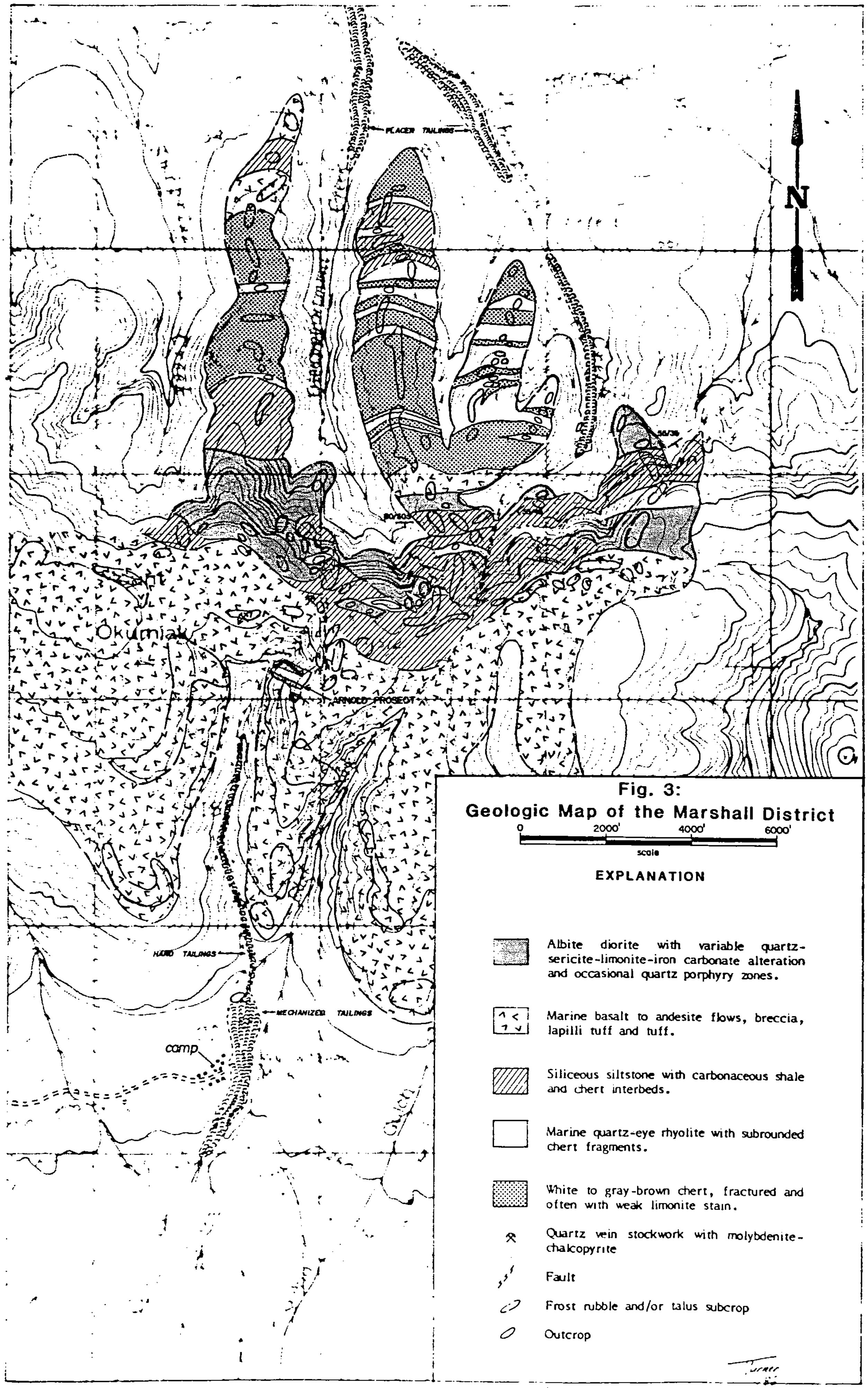
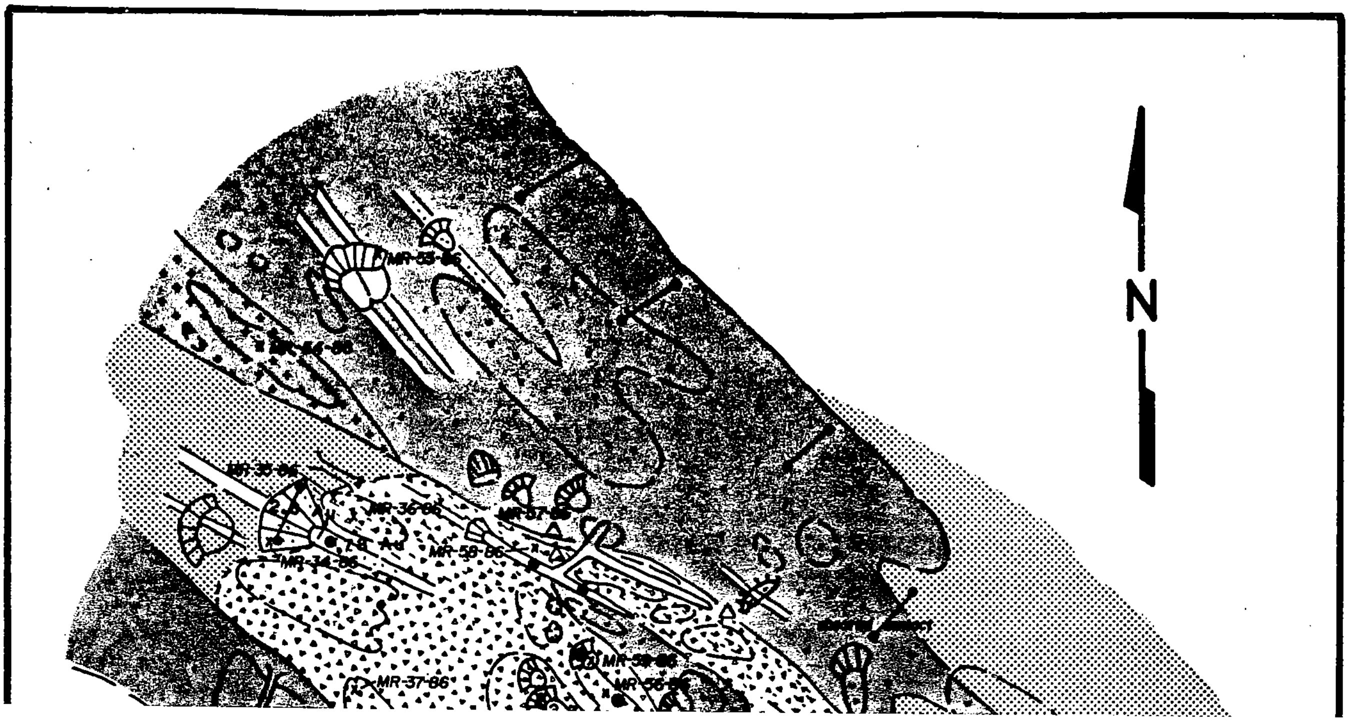
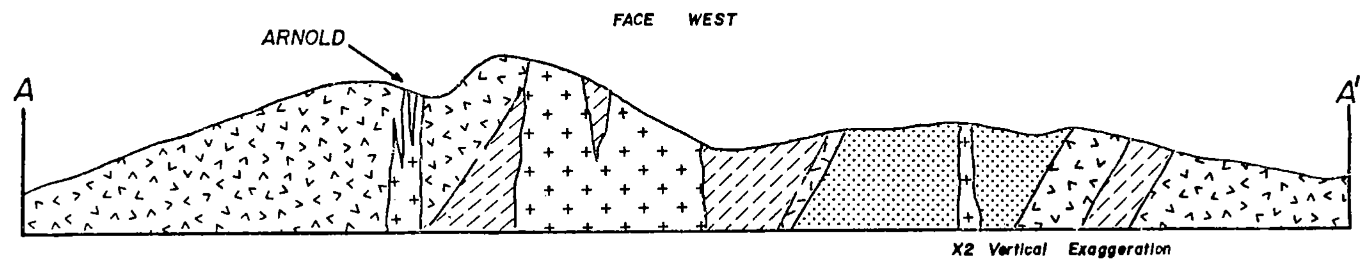
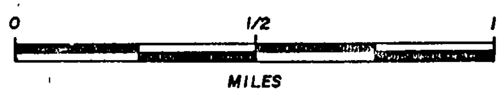



**Fig. 3: Geologic Map of the Marshall District**


N
MR-36-86
MR-34-86
MR-58-86
MR-37-86




# Figure 5: Geologic Cross Section of the Marshall District




Albite diorite with variable quartz-sericite-limonite-iron carbonate alteration and occasional quartz porphyry zones.

Marine basalt to andesite flows, breccia, lapilli tuff and tuff.

Siliceous siltstone with carbonaceous shale and chert interbeds.

Marine quartz-eye rhyolite with subrounded chert fragments.

White to gray-brown chert, fractured and often with weak limonite stain.

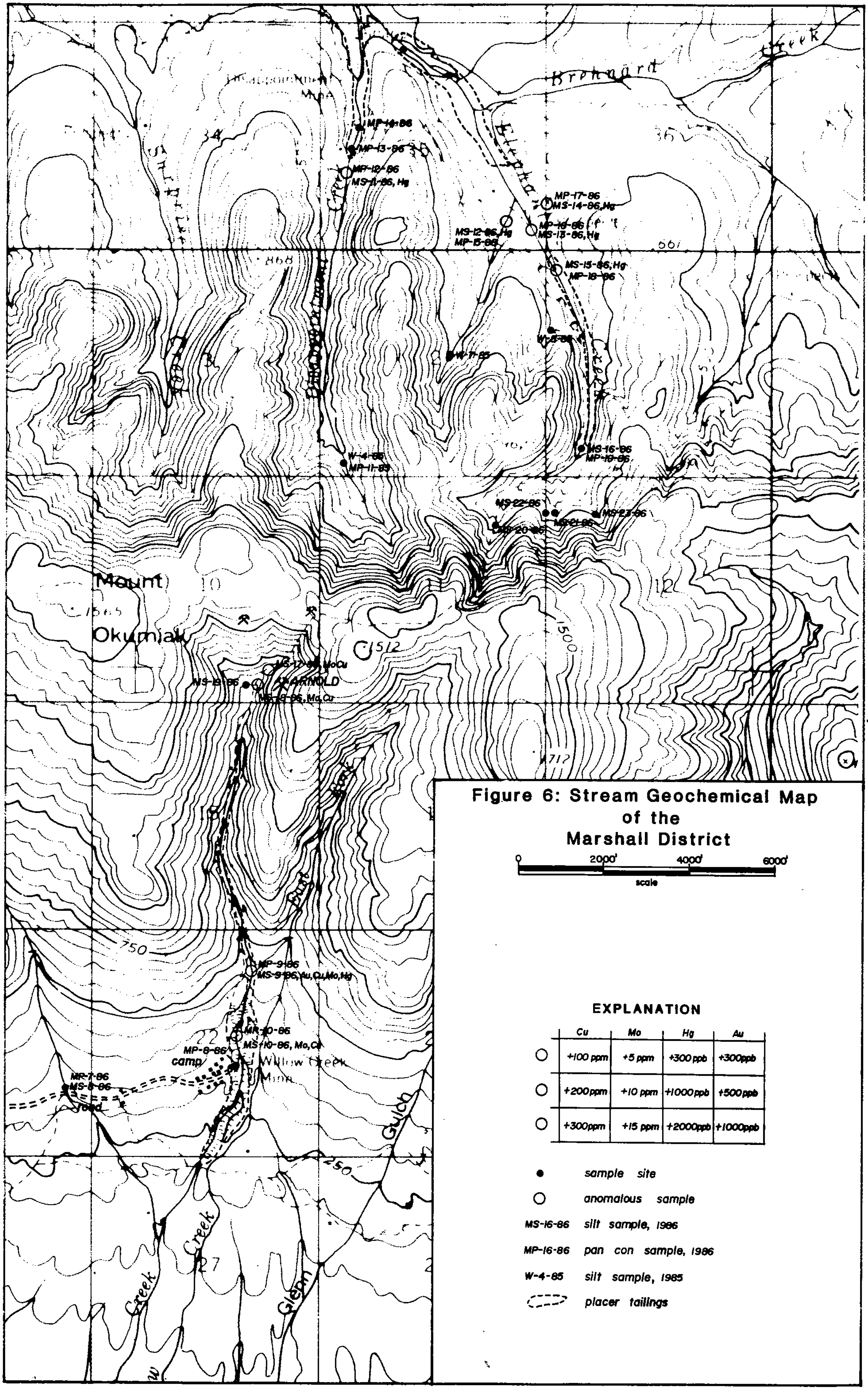



Figure 6: Stream Geochemical Map of the Marshall District