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Item 16

TONKIN PROSPECT, SIMPSON PARK MOUNTAINS
EUREKA COUNTY, NEVADA

INTRODUCTION

The geology of the Tonkin window was published in 1959 (Johnson, 1959). A poor road led into the area from the east through the Tonkin ranch and corrals. Travel over this road was discouraged by the ranchers. On June 17, 1966, the Tonkin prospect was found by Lyle F. Campbell during a horseback reconnaissance from the west side of the window. First, a strong soil anomaly was detected during reconnaissance soil sampling. A modification of Bloom's technique for cold extractable heavy metals was used. Five different rock types were gathered from the general area of a jasperoid outcrop adjacent to the strongest soil anomaly. These were pulverized and analyzed for mercury in camp using the Lemaire field detector. Sample No. 645-R from the jasperoid showed 12 parts per million mercury. All five rock samples were shipped to Rocky Mountain Geochemical Corporation for analysis. No. 645-R, the discovery rock, was reported as follows: (in ppm)

Au	13
Ag	9
Cu	80
Zn	5700
Pb	35
As	490

} Same as for Pat Prop.

That was the beginning. Ten Pat claims were located in June, 1966. Six more were located in July. Reconnaissance soil sampling was then conducted in the surrounding country through September in an effort to expand the anomalous gold occurrence. On September 25 a new, strong cold extractable soil anomaly was

found 4,000 feet southeast of the original discovery. Five rock samples were taken from nearby outcrops. Three of these were anomalous in gold as follows:

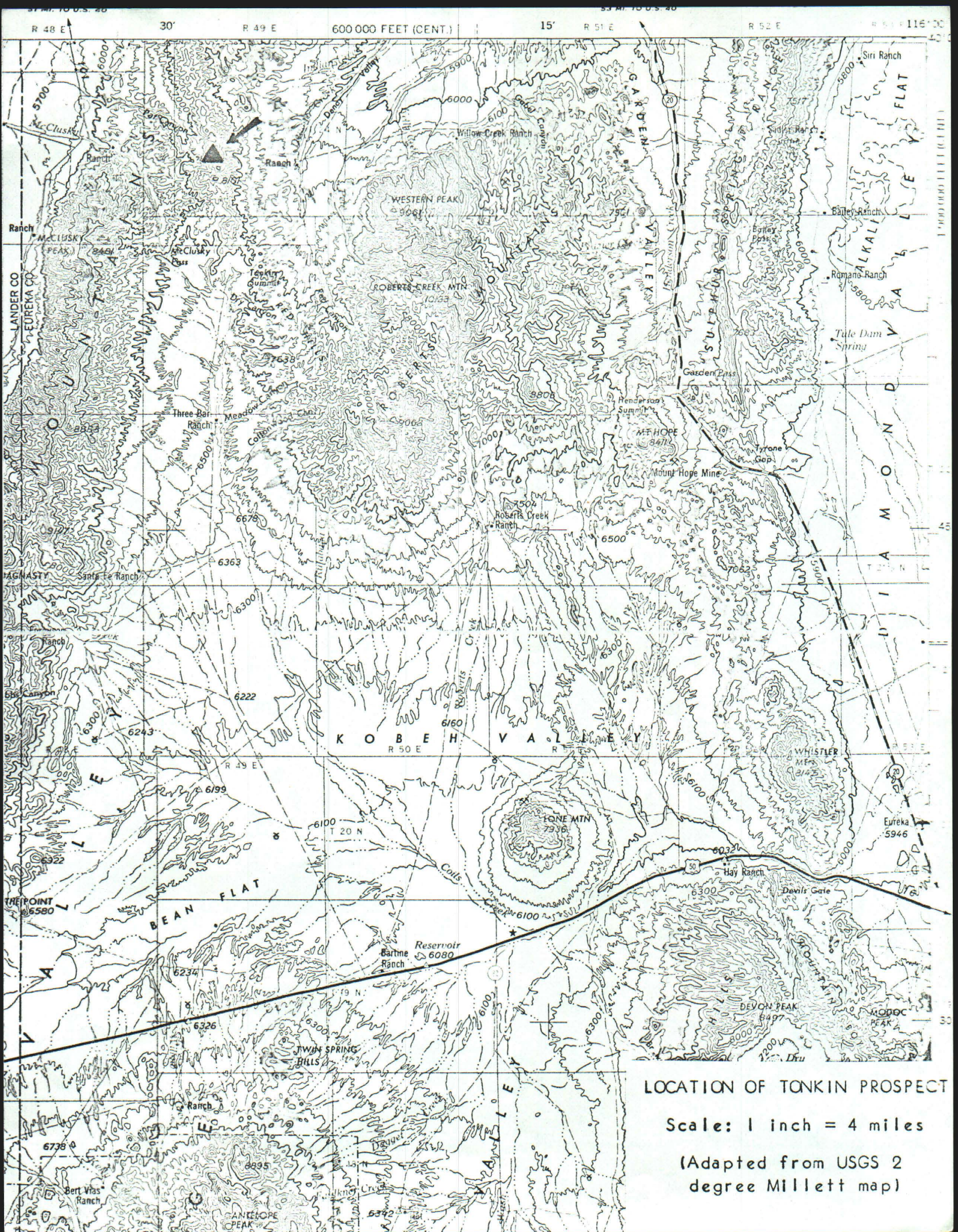
(in ppm)

859-R	0.45
860-R	0.30
861-R	3.50

Before this new anomaly could be located, Homestake Mining Company moved into the area with a large crew. They started a massive claim locating program aimed at completely surrounding the Pat group. In the excitement that followed, the writer managed to acquire the ground covering the new anomaly. Homestake surrounded what came to be a 36 claim nucleus with 207 of their claims. Subsequent Homestake exploration greatly expanded the gold anomaly and their sampling enhanced the geochemical favorability of the prospect. Finally, in September, 1969, the most favorable of the Homestake claims were acquired. As a result the Tonkin property now totals 119 claims.

LOCATION

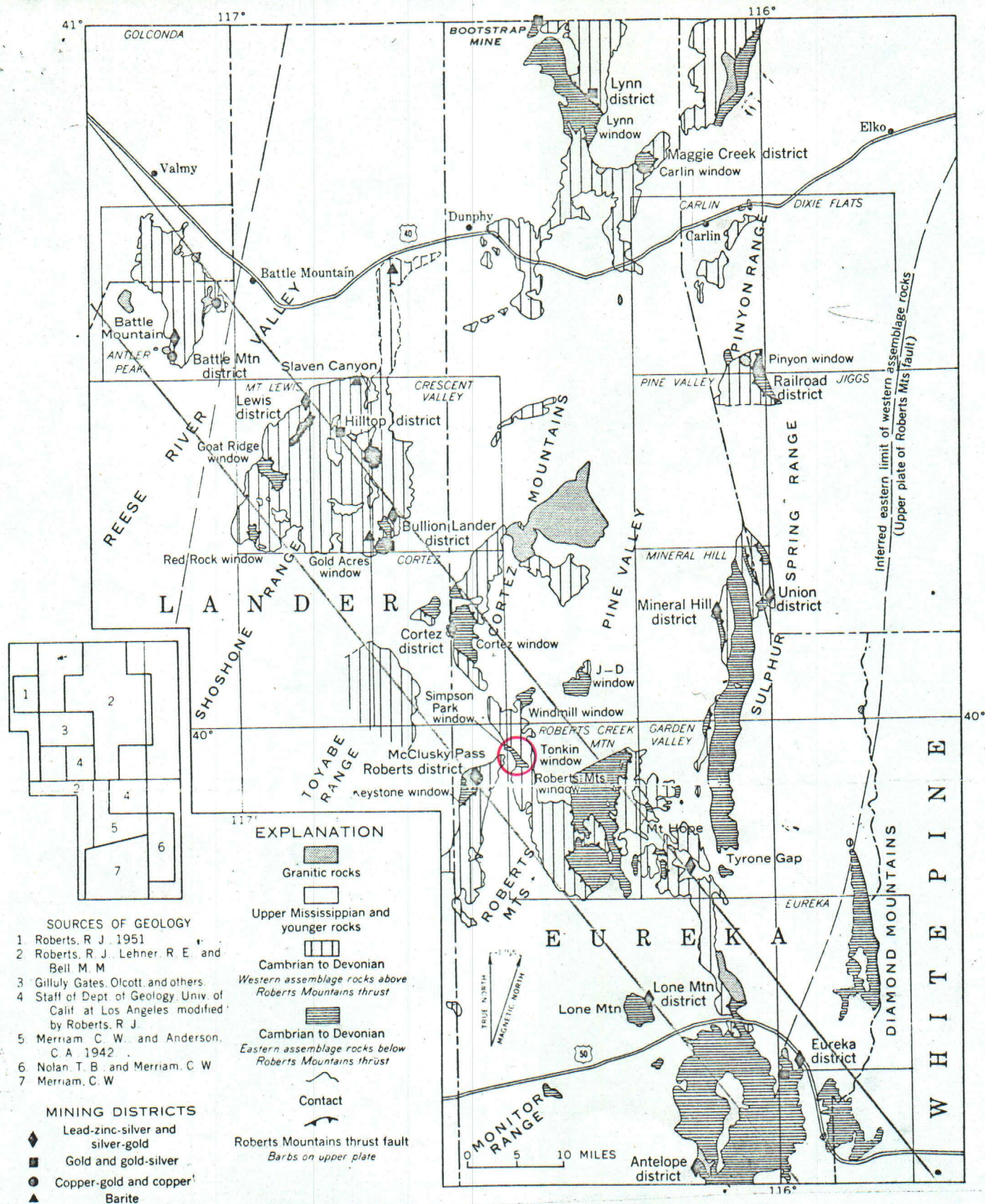
The Tonkin prospect is located in Sections 17, 19, 20, 21, 28, 29, 30, 32, 33, Township 24 North, Range 49 East. This is at the north, easterly offset, portion of the Simpson Park Mountains. The best approach to the claim area is from U.S. highway 50 to the south. About 25 miles west of Eureka a good, gravel road leads northwesterly. A sign at the road junction points to the 3-Bar Ranch. At 21.8 miles the road passes close aboard the 3-Bar. At 4.6 miles north of the 3-Bar turn left on the McCluskey pass road. Proceed west 1.1 miles to a gate in the fence on the north side of the road. A yellow BLM sign "Please Close



LOCATION OF TONKIN PROSPECT

Scale: 1 inch = 4 miles

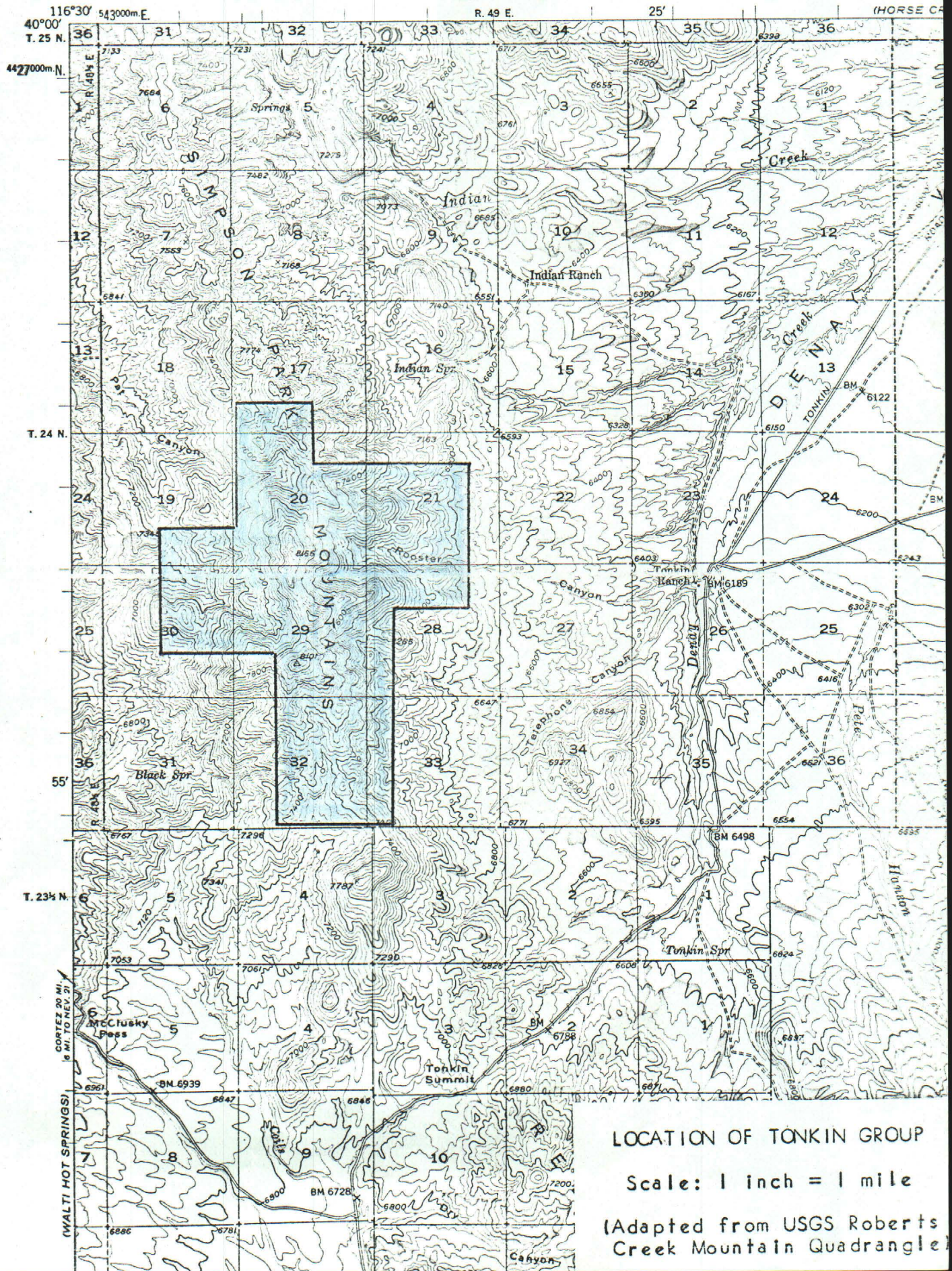
(Adapted from USGS 2 degree Millett map)



Map showing Battle Mountain-Eureka alignment of carbonate windows and mining districts. (after Roberts, 1964)

(CORTEZ)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



LOCATION OF TONKIN GROUP

Scale: 1 inch = 1 mile

(Adapted from USGS Roberts
Creek Mountain Quadrangle)

Gate" is posted here. Go through the gate and proceed north on a bulldozer road 3.2 miles. A claim corner post on the east side of the road reads "0-27/SSC". This is on the southernmost line of the Tonkin group. Proceed 0.5 miles to where the road crosses a saddle. From here the road more or less follows the contour for about 1.1 miles to a second prominent saddle. Here a drill road leads off to the left. On the ridge to the north is a bold outcrop of Ordovician Vinini formation. Here you get a good view of a prominent north striking fault which cuts the outcrop. Samples 859 to 861-R were taken from this area. Proceed along the main road for 0.6 miles. The location monuments for R-41 and S-41 are located about 100 feet north of the road. This is the southeast portion of the largest and strongest gold anomaly.

MINING HISTORY

In the process of locating and sampling the Tonkin property, most of the area was traversed several times on foot. No old diggings or prospect pits were found. No doubt the area was thoroughly prospected after the 1863 discovery of the Cortez district. The various rock types have locally been intensely altered. However, disseminated gold is unrecognizable in the hand specimen. Other metallic minerals visible to the naked eye are rarely seen. This could explain the absence of ancient prospect pits in the area.

LAND STATUS

The following sequence of events will be important to anyone seriously concerned with an abstract of the property:

1. Pat Nos. 1 thru 10 were located June 25, 1966.
2. Pat Nos. 11 thru 16 were located July 25, 1966.
3. Pat Nos. 21 thru 32 and 37 thru 40 were located on October 10, 1966.
Pat Nos. 41 thru 50 were located on October 11, 1969. On October 11 and 12, 1969, Homestake located L and M 50 thru 54; N and O 50 thru 53; and P and Q 41 thru 46 over the top of the above 30 Pat claims.
4. On November 7, 1966, the Pat claims were leased with option to Homestake. Rights to Pat Nos. 41 thru 50 were relinquished to Homestake. In turn Homestake granted quitclaim deeds to the remaining 20 claims overlapping Pat claims. These 20 claims have been carried under the Homestake locations through the ensuing years. (A field inspection will show duplicate corners and location monuments on the thirty claims discussed in items 3 and 4.)
5. Homestake terminated the lease and option of the nucleus claims November 28, 1967.
6. Starting before daylight on September 1, 1969, the more favorable Homestake claims were relocated. They appeared to have been abandoned. This later proved to be true. The relocations were made using the same claim names as Homestake had used.
7. On October 11 thru 15, 1969, discovery cuts were dug on the 83 relocated claims to satisfy location work requirements.
8. Location certificates for the 83 claims were filed on November 26, 1969.
After original discovery in 1966, a search of BLM records revealed the land was public domain open to mineral location. No patents had been issued. A further

check on January 8, 1970, showed that the land status had not changed.

GEOLOGY

The geology of the area is described in a U.C.L.A. master's thesis (Johnson, 1959). Homestake assigned 5 students to map five different segments of the area during the summer of 1967. These students returned to school in September and the project was turned over to a full-time geologist.

Although not qualified to do geologic mapping, it is the writer's opinion that neither of these geologic mapping efforts succeeded in unraveling the complex structure of the area. Except for the later sequence of volcanic flows, all of the rocks in the area are highly contorted and broken. Although there are numerous good outcrops, a thin soil covers enough of the ground to make interpretation of the extremely complex structure sheer speculation. Detailed geologic mapping in the geochemically favorable areas may help to alleviate this problem.

Regional mapping was done in the area by the U. S. Geological Survey (Roberts, et al., 1967). The area was shown as a window in the upper plate Vinini formation of the Roberts Mountains thrust. Where the western facies Vinini is eroded, eastern facies Devonian Nevada formation is exposed. The window lies within, and its major structures are aligned with the Battle Mountain-Eureka mineral belt (Roberts, 1964). The Precambrian structural trend can be inferred by the mineral belt and by the fact that the north part of the Simpson Park Mountains where the window is located is offset to the east (Roberts, 1966, p. 48).

ROCK GEOCHEMISTRY

The first rock found in 1966 which was anomalous in gold was described briefly in the introduction. The jasperoid outcrop of sample no. 645-R was sampled further on 5 ft. centers to verify the gold anomaly. Assaying was done by Crismon and Nichols with the following results:

<u>Sample No.</u>	<u>oz/ton</u>	<u>Au</u> <u>ppm</u>
14	0.15	5.1
15	0.31	10.6
16	0.10	3.4
17	0.29	8.2
18	0.09	3.1
19	0.17	5.8
20	0.36	12.3
21	0.17	5.8
22	0.17	5.8
23	0.06	2.0
24	0.40	13.6
25	0.07	2.4
26	0.31	10.5
27	0.01	0.3
28	0.34	11.6
29	0.36	12.3

As a part of the original location work, bulldozer trenches were dug at some of the more iron stained areas that appeared to be located on structures. Samples were taken of altered rhyolite and diabase dike rock and altered carbonate rocks in these trenches. One sample in ten showed detectable gold. Analyzed by Skyline Labs, Inc., they were reported as follows:

<u>Sample No.</u>	<u>Au (ppm)</u>
793-R	.25
802-R	.45
805-R	.15
808-R	.15

<u>Sample No.</u>	<u>Au (ppm)</u>
809-R	1.1
810-R	.28
815-R	.70
820-R-C	.10
832-R	.12
838-R	.30
847-R	.10

These results are considered especially significant. Although of lower magnitudes than the discovery outcrop, they show a gold anomaly in rock types other than jasperoid.

While Homestake sampling crews were gathering soil samples on a grid pattern, they also took rock samples of interesting outcrops. Both the soil and rock sampling showed a large gold anomaly in the east-central part of the claim group. The strongest rock anomalies found by Homestake were near Q42/NSC. Five rocks sampled by Homestake showed 0.06, 0.2, 0.7, 0.8, 0.9 ppm gold. In the summer of 1969 the writer took 9 fist-size selective grab samples in the same area to confirm the anomaly. These showed 0.36, 0.44, 0.60, 0.64, 2.4, 2.8, 7.0, 8.0, 9.0 ppm gold. As a result of these surprising and exhilarating assays, 139 rock outcrops were sampled during the fall of 1969. Almost invariably, where the new sample sites were located near previous Homestake sampling, the values were much higher. It is difficult to explain this. Most of the rocks were also analyzed for mercury. Mercury values correspond well with gold values. Again they run much higher than those found by Homestake.

As a result of the rock sampling a large, strong anomalous area roughly coincident with the Homestake anomaly, but measuring about 5,000 by 2,000 feet, was out-

lined. All of the gold bearing rocks were in highly altered Vinini formation. Sampling of this area is incomplete. It is estimated that about one-third of the outcrops were sampled. During field sampling it became apparent that many of the better values occurred in minor faults or fracture zones that strike north. Also an oxidized intrusive rhyolite dike 100 feet wide which had not been previously mapped was found which has the same strike. This varies from the predominant fault system in the area which was mapped as striking north 20 degrees west (Johnson, 1959, p. 84). The significance of this is not understood.

SOIL GEOCHEMISTRY

Early Soil Sampling

Although it may have been fortuitous, it is interesting to note that the first two widely separated anomalous gold discoveries in 1966 were found through reconnaissance while using cold extractable heavy metal analysis of soils at the field site. In each case a very strong soil anomaly led to sampling and analysis of nearby rock outcrops which were then found to contain anomalous gold. These two anomalies inspired both the writer and Homestake to subsequent exploration efforts which led to the current status of the property.

On the original 16 Pat claims, soil samples were taken at all of the corner monuments. This gave a 600 by 750 foot grid. Those samples which showed a cold extractable metals anomaly in the field were analyzed by Rocky Mountain Geochemical Corporation for total copper, lead, zinc and for arsenic. The zinc and arsenic anomalies conformed in general to the gold anomaly. The copper and lead values were low, probably near background, and showed no significant pattern.

Homestake Soil Sampling

After the Homestake claims were relocated their exploration people were contacted and an arrangement was made with them in which they very generously agreed to turn over all the factual exploration data they had compiled on both the central nucleus and their surrounding claims. Drill logs, anomaly maps and property maps are in the writer's possession.

Homestake made a soil survey on a 600 by 750 foot grid similar to the one that had been made on Pat. The soil samples were analyzed for gold, silver, mercury, arsenic and zinc by Geochemical Systems Company. An anomaly map was prepared by Homestake for each of these elements.

Gold

Homestake found nine significant gold anomalies. Detailed soil and rock sampling should be done on most of these to follow up and confirm the anomalies. The anomaly pattern in soils showed the large anomaly in the east-central part of the property fairly well. There is some confusion in evaluating the results. Apparently at some points on the soil grid rock was sampled instead of soil. In places, the symbols on the gold anomaly map fail to distinguish between rock and soil samples. However, after studying the Homestake data and after recent orientation soil sampling of the anomaly, it is obvious that the large anomaly would have been detected by soil sampling on a 600 by 750 foot grid.

Mercury

The pattern of anomalous mercury values corresponds well with the gold anomalies.

Several large, strong anomalies do not coincide with gold anomalies. Possibly these are too large to be structurally controlled (?). These should be evaluated by detailed rock outcrop sampling and analysis for gold.

Arsenic

The arsenic anomaly patterns also correspond well with the gold anomalies. Here again, several strong arsenic anomalies which do not conform to the gold pattern but do correspond with mercury should be investigated. The arsenic analyses done by Geochemical Systems Company for Homestake are considerably lower than the work done for the writer by Rocky Mountain Geochemical Corporation. Geochemical Systems soil analyses showed values up to 80 ppm while Rocky Mountain analyses showed 800 ppm maximum in the same general area. Some of the Homestake drill cuttings recently gathered at drill sites were analyzed by Skyline Labs, Inc. The highest value was 3,200 ppm arsenic.

Zinc

About half of the zinc anomalies correspond with gold. Of course the strong cold extractable anomalies in soil that led to the two first discoveries of anomalous gold in rock were mainly due to zinc content. This should not be ignored in future exploration of the property. However, it should be noted that some of the highest gold values found in recent sampling showed no cold extractable anomaly.

Silver

The silver anomaly patterns roughly coincide with gold in about half of the locations. At this stage of exploration, silver is not considered a significant guide

to mineralization.

Recent Soil Sampling

Selective soil sampling was done at 168 sites in late fall 1969. The purposes were orientation, confirmation of Homestake sampling and checking for gold mineralization on covered portions of known or inferred structures.

For orientation purposes, a 100 foot fence 4,500 feet long was sampled through the center of the largest anomaly. Four distinct gold highs were found. They are probably leakage patterns which indicate covered structures. The highs generally correspond to patterns of high values found in rock outcrops.

A 100 foot fence was sampled on a soil and talus slope 400 feet south of the north striking, prominent fault where sample no. 861-R is located. A significant anomaly was developed. One sample was located alongside the P-40 location cut. Another sample was taken 5 feet below this in the cut and a significant increase in gold value was noted. These results should be viewed with caution, since it is not known if the soil is residual or transported. The obvious next step is to dig a backhoe trench to bedrock and sample both horizontally and vertically on short centers to see if the gold values develop a useful pattern.

Further orientation sampling was done on a short 50 foot fence adjacent to an outcrop sample that ran 11.0 ppm gold. Both the minus 80 and the minus 20, plus 40 mesh fractions were analyzed. The results indicate the minus 80 mesh fraction should be used in soil geochemistry in this area.

Five different Homestake gold anomalies in soil were checked. One of these failed confirmation. This is tentatively thought to be due to an apparent higher

background value for gold in the volcanic flow rocks which border the property.

The soil samples were also analyzed for mercury which shows a remarkable correlation with gold.

Results of the recent soil sampling indicate that soil sampling is a powerful tool for exploring the Tonkin prospect. Much further evaluation and confirmation sampling of both soil and rock is needed in many areas on the property.

All soil and rock sample sites are marked by orange flagging and an aluminum tag showing the sample number. The rock sites have a small pile of broken rock which is a remnant of the rock that was sampled.

The following three pages show gold values found in soil sampling three different areas.

Sample No.	(Au in ppm)
2141	.01
2142	.02
2143	.04
2144	.05
2145	.07
2146	.30
2147	1.06
2148	.53
2149	.20
2150	.05
2151	.10
2152	.21
2153	.18
2154	.32
2155	.20
2156	.14
2157	.08
2158	.11
2159	.08
2160	.11
2161	.17
2162	.66
2163	.06
2164	.07
2165	.07
2166	nd
2167	.02
2168	.04
2169	.07
2170	.04
2171	.17
2172	.20
2173	.09
2174	nd
2175	.01
2176	.02
2177	.04
2178	.02
2179	nd
2180	.01
2191	.04
2192	.04
2193	.03
2194	.03
2195	.04

D_n

Q_v

Q42/NSC

Q42/2

R42/NSC

R42/1

S42/NSC

S42/2



SOIL SAMPLING

100' fence thru largest anomaly.
 North slope, frequent outcrops.
 Soil 1 to 3 feet deep.
 Minus 80 mesh fraction.
 Scale: 1" = 500'

Sample No.	Au In ppm (-80 mesh)
2205	.02
2206	.04
2207	.03
2208	.04
2209 2210 19	.06
2211	.06
2212	.14
2213	.05
2214	.32
2215	.16
2216	.12
2217	.11
2218	.05
2219	.12

5' down in disc. cut →

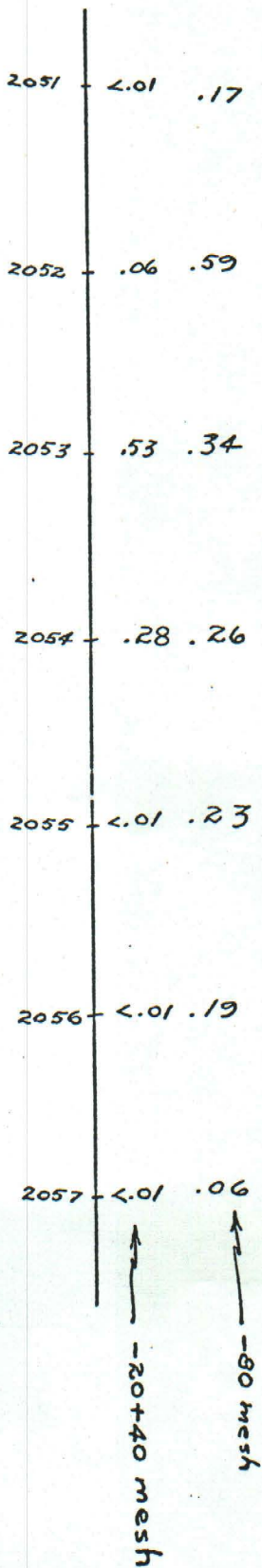
Z →

□ P-40 Mon.

SOIL SAMPLING

100' fence thru P-40, Q-40 monuments.
 South slope, no outcrops.
 Soil depth unknown.
 Midpoint 400' south of major N-S fault.
 Scale: 1" = 200'

+Rock 2002
11.0 ppm



N →

SOIL SAMPLING

50' fence in area of No. 2002 rock o/c.

Gentle east slope.

Soil $\frac{1}{2}$ to 1 foot deep.

Compares -80 and -20+40 mesh fractions.

Scale 1" = 50'

EXPLORATION DRILLING

As is usual in a large, rush location program, Homestake had problems satisfying the \$100.00 per claim location work requirement within the 90 day period. As has happened many times to others, drill holes were spotted more or less at random before suitable geologic studies could be made. A number of shallow holes were drilled in November and December, 1966, to help validate the claims. Many of these holes were located in lower plate carbonate.

In late summer 1967, after their geochemical samples were analyzed and plotted and geologic mapping was completed, Homestake drilled 11 holes in the largest gold anomaly area using rotary dry drilling. The holes were logged by a geologist. Composites of 5 foot runs were analyzed for gold. Most of these holes were mineralized throughout their length. Results are summarized as follows:

<u>Hole No.</u>	<u>Depth</u>	<u>Avg. Au (ppm)</u>	<u>Best 5' Run (ppm)</u>
TK- 1	300	0.37	1.70
TK- 2	300	0.34	1.19
TK- 3	270	0.37	1.02
TK- 4	300	0.20	1.53
TK- 5	300	0.31	2.89
TK- 6	273	0.20	0.51
TK- 7	110	Nil	Nil
TK- 8	207	Nil	Nil
TK- 9	100	0.21	0.89
TK-10	100	0.17	1.30
TK-11	90	0.09	0.30

(Homestake turned over detailed logs of the above holes to the writer.)

The drill logs indicate that the holes were drilled in the chert, siltstone and shale of the upper plate Vinini formation.

Of the 11 holes, 7 were mineralized at the bottom. Three of these had 0.3 ppm

gold in the bottom and four had 0.1 ppm. The mineralization in these holes is especially significant when one considers that it was possible to drill a hole within the main ore body at the Carlin Gold Mine and get similar or lower results (Akright, 1969). Since the samples analyzed were composites of 5 foot runs, it is likely that short sections were encountered that would match the higher grades found in surface outcrop sampling.

DISCUSSION

The Tonkin prospect is the most favorable low grade disseminated gold prospect known to the writer.

It has an extremely complex structure. This is a common characteristic of all of the disseminated gold deposits which have been discovered to date: Carlin, Cortez, Bootstrap, No. 8, Gold Quarry, Getchell, Manhattan, Mercur, Gold Acres, Buckhorn.

Intrusive rhyolite dikes have been found on the property. They indicate the presence of a favorable intrusive at depth. The thrust of the intrusive probably caused much of the extreme distortion of the rocks. Possibly it caused doming followed by erosion to form the Tonkin window.

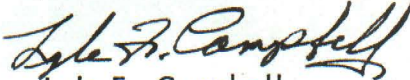
The Roberts Mountains thrust outcrops on the property. The largest gold anomaly occurs in the upper plate closely adjacent to the thrust.

The rocks are intensely altered locally. In areas of higher grade gold anomalies, it is difficult to positively identify rock types in the field because of the high degree of alteration.

The widespread and strong gold, arsenic and mercury anomalies geochemically

indicate a probable commercial deposit somewhere nearby. They make the search for ore imperative. The limited Homestake drilling has given the gold anomaly a third dimension.

It appears that the ideal host rock for disseminated gold is permeable and reactive. At this writing the upper part of the Roberts Mountains formation is the favored host. Many knowledgeable explorers are of the opinion that new deposits of disseminated gold will be found at other favorable places in the stratigraphic column in north-central Nevada (Erickson, 1970).


Lyle F. Campbell
Reno, Nevada

January, 1970