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Alaska Open File Report #40  
Preliminary Investigations,  
Livengood Mining District, Alaska

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September 1974

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## LIVENGOOD MINING DISTRICT

The Livengood district is located about 60 airline miles or 83 miles by the Elliott Highway northwest of Fairbanks. Field work done during the summer of 1973 by G. R. Eakins, assisted by W. S. Roberts, covered the approximate area of figures 1 and 2.

A total of 150 stream-sediment and soil samples and 500 rock samples were collected to aid in interpreting the general geology and mineral occurrences. The samples were analyzed for copper, lead and zinc by W. W. McClintock of the Division of Geological and Geophysical Surveys. Some samples were analyzed for silver and gold. Sample locations and anomalous sites are indicated on figures 1 and 2. The analytical data for these samples are shown in tables 1 and 2. Histograms for copper, lead, and zinc are shown in figures 3 - 5.

Bulldozer cuts and roads on the ridge south of Livengood Creek were mapped on a scale of 1 inch to 50 feet. Numerous gravity and radioactivity measurements were taken in the vicinity of Livengood as an aid in mapping the structure and intrusives, particularly in covered areas. Commonly, gold recovered in the placer operations has differing characteristics from stream to stream. T. C. Tribble of the DGGs laboratory is developing a method for measuring trace elements within the gold in an attempt to determine the source of the various placer deposits. Future work on the samples will include emission spectrographic analysis, thin section examination, and K-Ar age dating of selected intrusive rocks.

The Livengood mining district is in the northwest portion of the Yukon-Tanana upland, a region of highly deformed metamorphic rocks of Precambrian, Paleozoic, and Mesozoic age. Structural trends are generally northeast-trending, although some units have been overturned and overthrust to the north. Metamorphism ranges from greenschist to amphibolite facies. Numerous dikes and plutons intrude the metamorphic country rocks. Physiographically, it is a region of low rounded ridges and occasional broad valleys. Only the few mountains above 4000 feet have been glaciated.

The district lies within a narrow belt, designated the Livengood trend<sup>1</sup>, that includes alpine-type ultramafic rocks and serpentinite. It extends about 120 miles northeast from Manley Hot Springs. It may be significant as well that the mineral deposits at Livengood are situated on the axis of the postulated Alaska orocline<sup>2</sup> and within an area of major faulting near the junction of the Kaltag fault and the Tintina Trench, located north of Livengood. The ridge between Livengood Creek and the Tolovana River is believed to be the source for nearly all of the gold in the district and is geologically the most complex part of the terrane.

Gold was discovered on Livengood Creek near the mouth of Ruth Creek in 1914 by Jay Livengood and Nathaniel R. Hudson. A stampede immediately followed. It was soon evident that the main pay streak was on a buried bench along the northern

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<sup>1</sup> Foster, Robert L., 1967, Tectonic inclusions from serpentinite, east-central Alaska: U.S. Geol. Survey Prof. Paper 575-D, p. D120-D122.

<sup>2</sup> Lathram, Ernest H., 1972 Nimbus IV view of the major structural features of Alaska: Science, March 1972, vol. 175, no. 4029, fig. 3, p. 1425-1426.

side of Livengood Creek and the creek placers were relatively small deposits. About 380,000 ounces of placer gold is estimated to have been produced. Most of the town is now in ruins, but small-scale sluicing operations are still conducted intermittently.

Nevertheless, current mining and other activity indicate that Livengood may soon enjoy a substantial comeback. Standard Mines, Ltd., of Ontario, Canada, plans to spend over \$4 million during the next 4 years to develop a placer operation on a 2,000-acre tract on the bench along Livengood Creek. The firm hopes to have two dredges operating. A copper-molybdenum prospect discovered in 1972 by Earth Resources, south of the confluence of Livengood Creek and the Tolovana River near Shorty Creek has been drilled at several locations. Both the Alyeska pipeline road and the proposed pipeline route will pass near Livengood, and extensive improvements are scheduled for the Elliott Highway. A 1,000-man construction camp is to be erected just west of Livengood. When pipeline construction begins, the Elliott Highway will be one of the busiest roads in the state.

The growth of the Livengood mining district has depended entirely on placer gold, but the variety of minerals that have been found within the area in minor or trace amounts is striking. Elements that have been found in amounts sufficient to have caused significant expenditures of time and money include mercury, antimony, nickel, and copper. In addition, high concentrations of chromium, arsenic, silver, boron, bismuth, cobalt, lead, zinc, tin, tungsten, uranium(?), platinum, and palladium have been reported. Despite this knowledge, there has been almost no exploration for lode deposits deeper than the shallow cuts made by bulldozers, and much remains to be learned about the district.

Most of the lode prospects and anomalies are centered around the intermediate intrusives on the western part of the ridge south of Livengood, especially in the Ruth, Lillian, and Olive Creeks drainages. Scattered mineralization has been detected both east and west of this locality. The source of the gold is scattered quartz veinlets, dikes, and possibly silica-carbonate rocks. Mercury occurs in decomposed monzonitic dikes and stocks. Nickel, chromium, and traces of platinum and palladium are associated with the serpentinite.

The minerals and their relations to the intrusives suggest that mineralization occurred at shallow depths and late in the geologic history of the area. Further study of the minerals, their origins, and ages is planned to aid in interpreting the economic geology and possibly to guide future exploration. High values of copper, lead, and zinc, in some samples collected by the DGGs, suggests certain areas may warrant exploratory work. These include Cleary Creek, the fault zone near the beginning of the trans-Alaska pipeline road, the area south of the Tolovana River between Rainey Hollow and Shorty Creek, and a trench on upper Olive Creek.

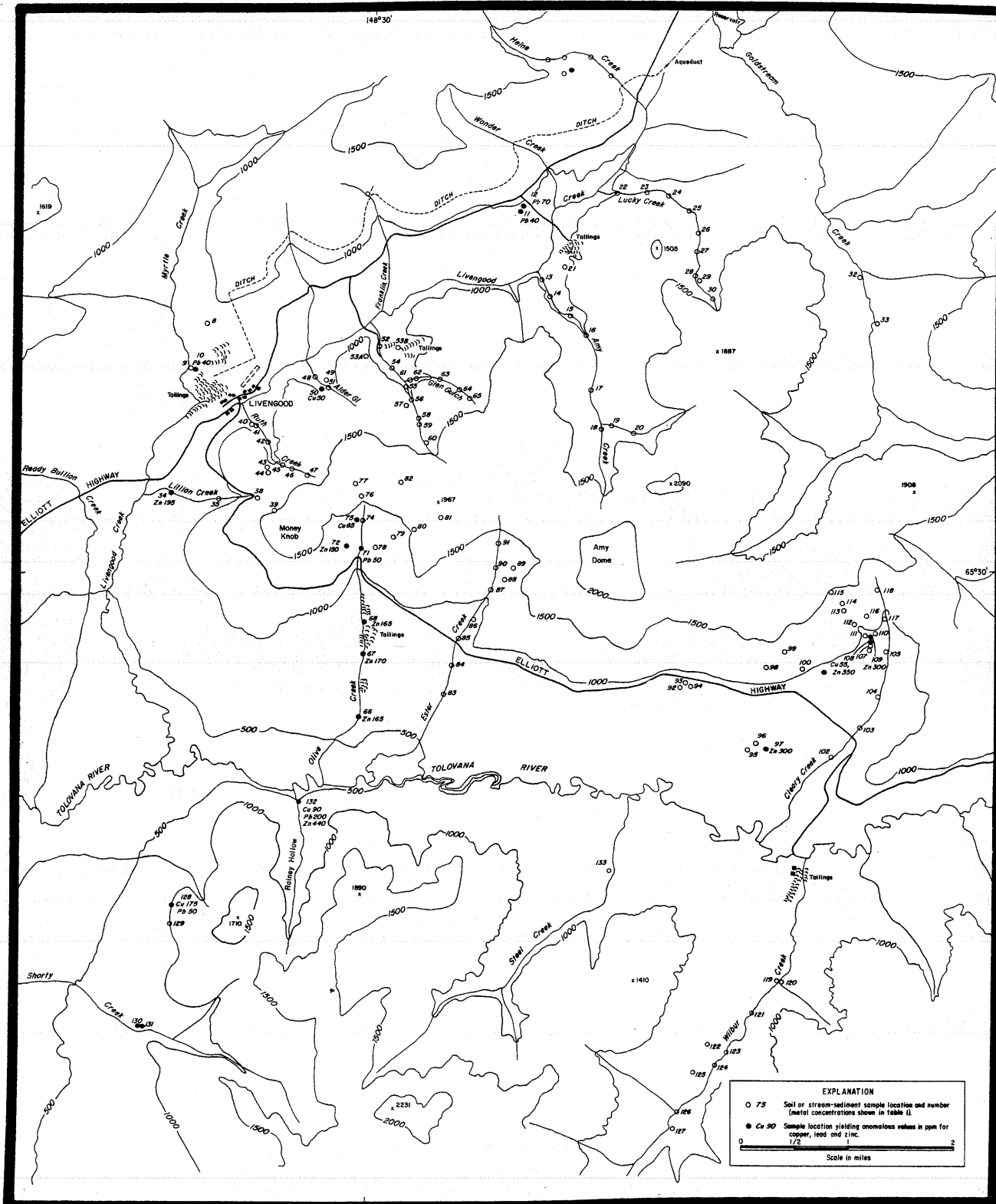


Figure 1 Atomic absorption analyses of stream-sediment samples, Livengood area

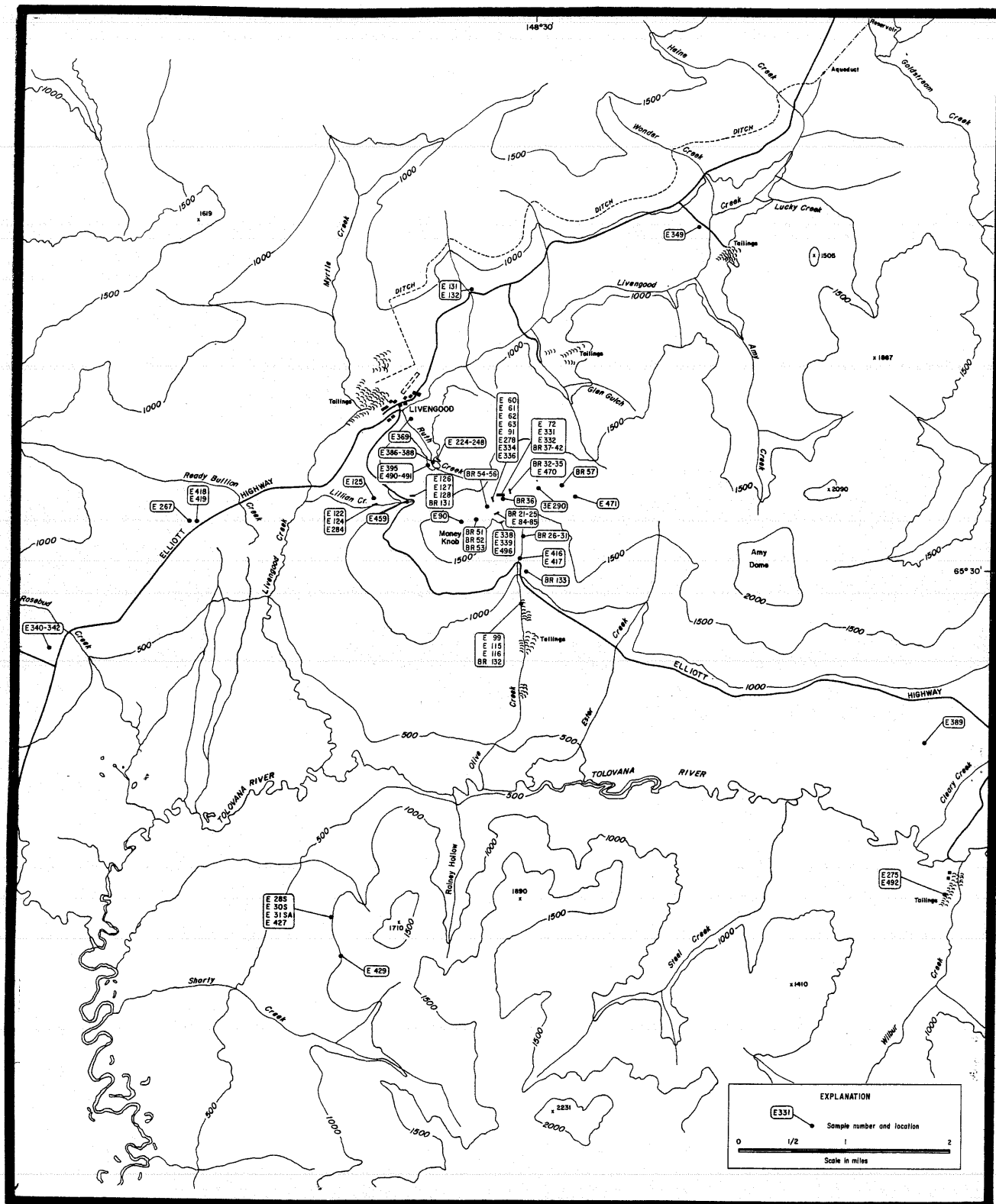
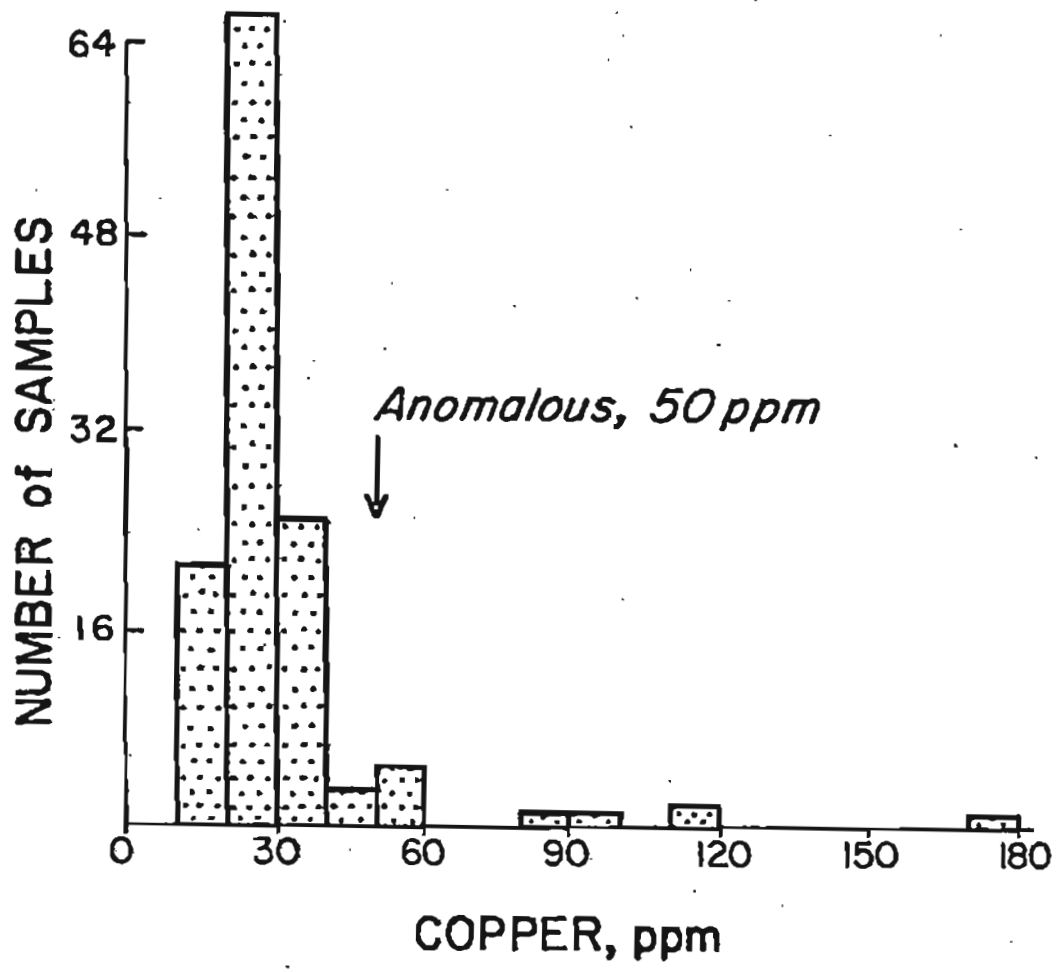
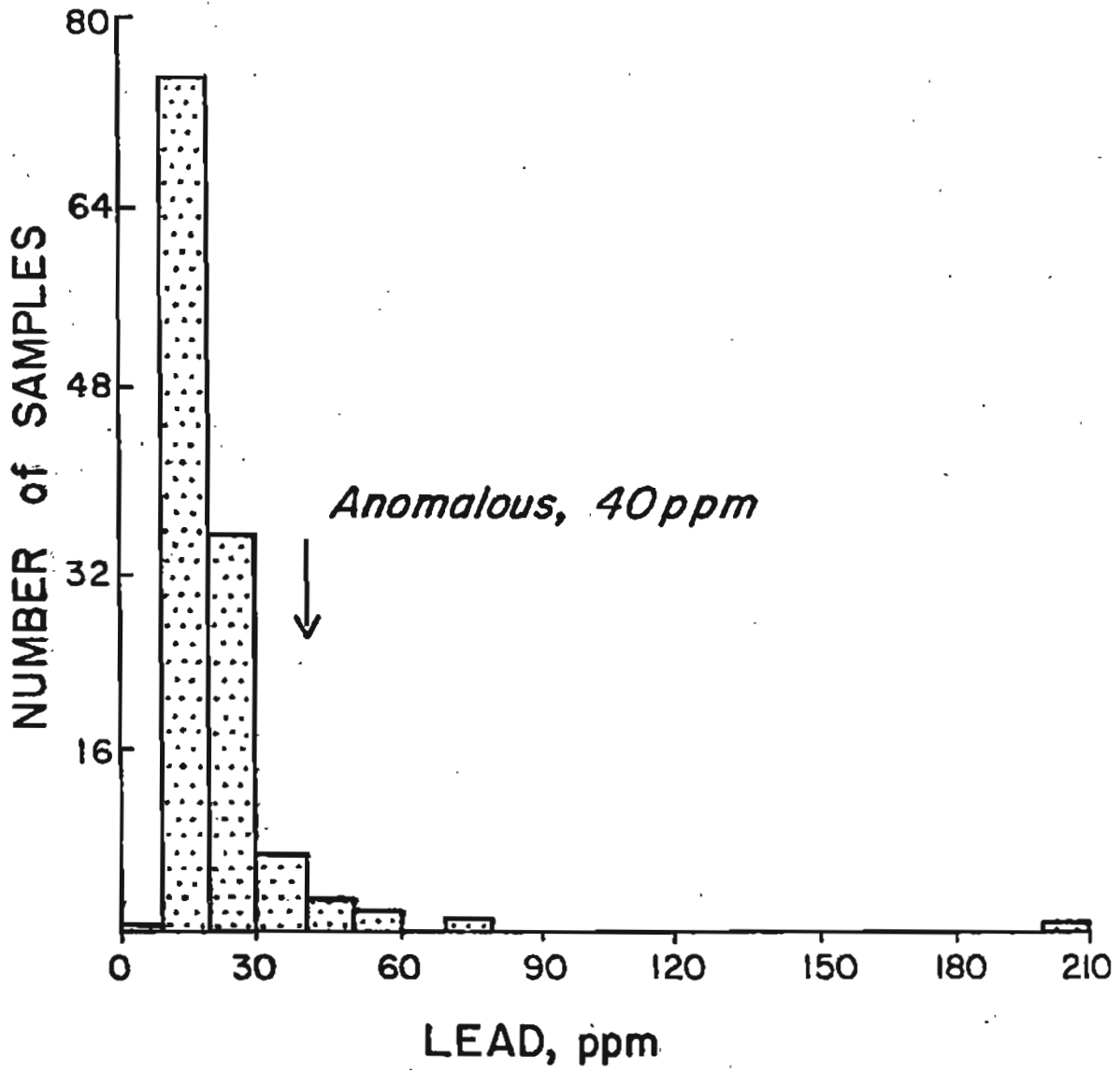


Figure 2 Atomic absorption assays of channel and grab samples, Livengood area







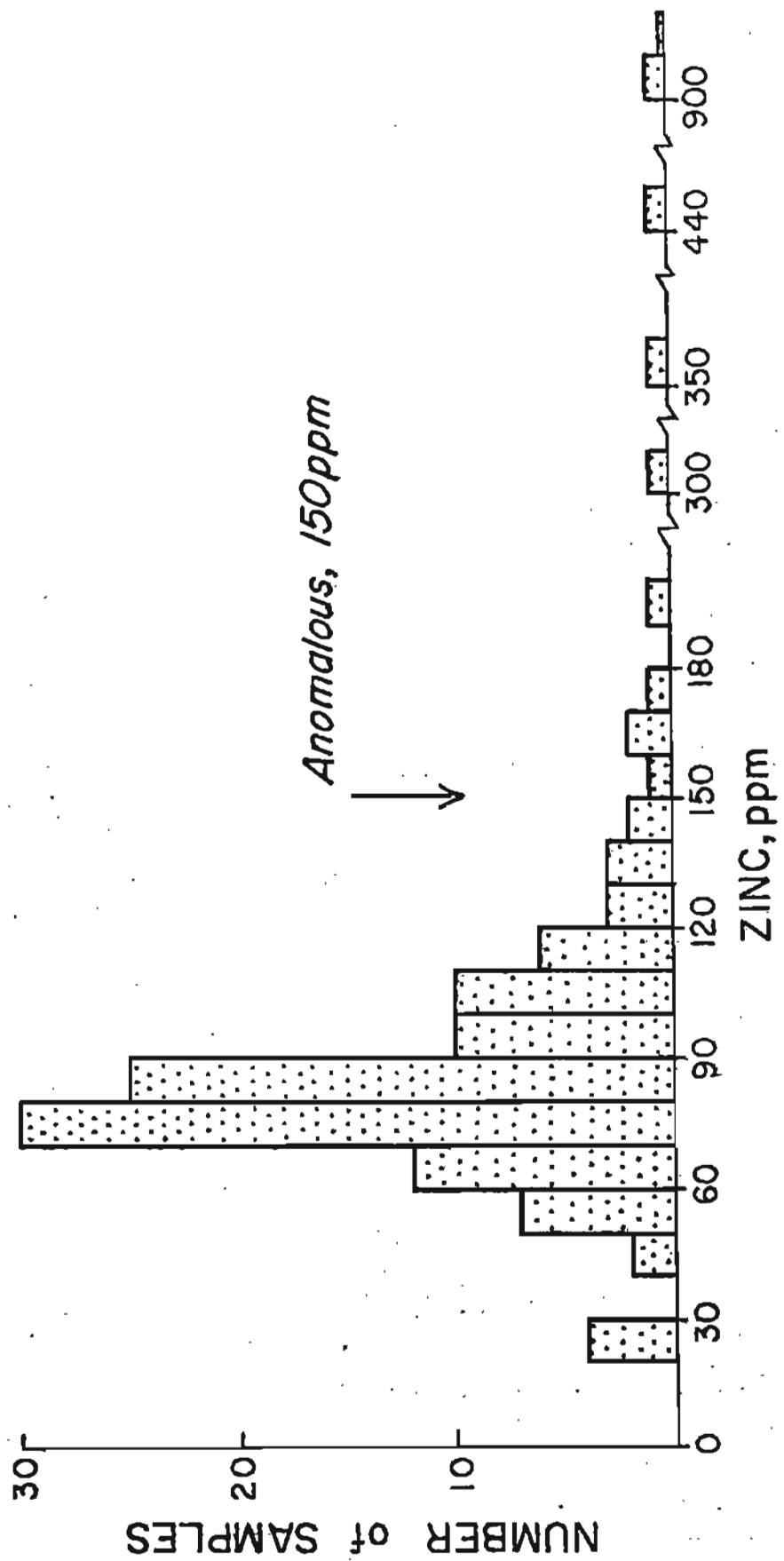


Table 1 Atomic absorption analyses of stream-sediment samples, Livengood area (1 of 4)  
 (Thresholds: Copper 50 ppm, Lead 40 ppm, Zinc 150 ppm)

Map	Field	Area or Stream	Copper (ppm)	Lead (ppm)	Zinc (ppm)	Silver (ppm)	Gold (ppm)
1	E 17 S	Franklin Ck.	10	10	50	ND*	NA*
2	BR 139	Heine Ck.	20	15	75	ND	NA
3	BR 144	Heine Ck.	20	10	70	ND	NA
4	BR 143	Heine Ck.	15	10	80	ND	NA
5	BR 142	Heine Ck.	20	10	70	ND	NA
6	BR 141	Heine Ck.	25	5	20	0.5	NA
7	BR 140	Heine Ck.	<u>50</u>	25	60	0.5	NA
8	BR 123	Myrtle Ck.	<u>10</u>	15	60	ND	NA
9	BR 122	Myrtle Ck.	10	30	25	0.5	NA
10	BR 121	Myrtle Ck.	10	<u>40</u>	25	0.5	NA
11	BR 120	Amy Creek	10	<u>40</u>	40	1.0	NA
12	BR 119	Road	20	<u>70</u>	25	1.5	0.1
13	BR 84	Amy Creek	20	<u>10</u>	90	ND	NA
14	BR 77	Amy Creek	25	10	75	ND	NA
15	BR 78	Amy Creek	25	10	70	ND	NA
16	BR 79	Amy Creek	30	10	90	ND	NA
17	BR 80	Amy Creek	25	10	75	ND	NA
18	BR 81	Amy Creek	30	10	80	ND	NA
19	BR 82	Amy Creek	20	10	100	ND	NA
20	BR 83	Amy Creek	30	10	70	ND	NA
21	BR 76	Amy Creek	25	15	75	ND	NA
22	BR 100	May Gulch	10	10	60	ND	NA
23	BR 99	May Gulch	10	15	50	ND	NA
24	BR 98	May Gulch	15	10	70	ND	NA
25	BR 97	May Gulch	20	15	70	ND	NA
26	BR 96	May Gulch	20	15	70	ND	NA
27	E 12 S	May Gulch	15	15	130	ND	NA
28	E 13 S	May Gulch	15	10	100	ND	NA
29	E 14 S	May Gulch	20	15	80	ND	NA
30	E 15 S	May Gulch	20	15	80	ND	NA
32	E 43 S	Goldstream	25	15	50	NA	NA
33	E 42 S	Goldstream	20	15	70	ND	ND
34	BR 19	Lillian Ck.	30	20	<u>195</u>	NA	NA
35	BR 20	Lillian Ck.	30	25	<u>145</u>	NA	NA
38	BR 17	Lillian Ck.	25	15	140	NA	NA
39	BR 18	Lillian Ck.	35	20	95	NA	NA
40	BR 12	Ruth Ck.	30	35	130	NA	NA
41	E 18 S	Ruth Ck.	15	35	80	ND	NA
42	BR 11	Ruth Ck.	30	30	125	NA	NA
43	E 26 S	Ruth Ck.	20	20	90	ND	0.3
44	E 27 S	Ruth Ck.	20	15	60	ND	0.1
45	BR 10	Ruth Ck.	25	20	95	NA	NA

\* ND - Not detected; NA - No analyses

Table 1 Atomic absorption analyses of stream-sediment samples, Livengood area (2 of 4)  
 (Thresholds: Copper 50 ppm, Lead 40 ppm, Zinc 150 ppm)

Map	Field	Area or Stream	Copper (ppm)	Lead (ppm)	Zinc (ppm)	Silver (ppm)	Gold (ppm)
46	BR 85	Ruth Ck.	20	15	105	ND	NA
47	BR 9	Ruth Ck.	20	15	70	NA	NA
48	E 7 S	Alder Gulch	20	15	80	ND	NA
49	E 6 S	Alder Gulch	20	15	75	ND	NA
50	E 4 S	Alder Gulch	<u>50</u>	15	75	ND	NA
51	E 5 S	Alder Gulch	20	15	70	ND	NA
52	BR 95	Gertrude Ck.	20	15	75	ND	NA
53A	E 9 S	Gertrude Ck.	20	20	85	ND	NA
53B	E 11 S	Gertrude Ck.	20	15	80	ND	NA
54	BR 94	Gertrude Ck.	20	15	70	ND	NA
55	BR 89	Gertrude Ck.	25	10	50	ND	NA
56	BR 88	Gertrude Ck.	20	15	50	ND	NA
57	E 48 S	Gertrude Ck.	15	15	65	ND	NA
58	E 49 S	Gertrude Ck.	25	15	70	ND	NA
59	BR 87	Gertrude Ck.	30	15	85	NA	NA
60	BR 86	Gertrude Ck.	20	15	90	ND	NA
61	BR 90	Glen Gulch	20	10	70	ND	NA
62	E 10 S	Glen Gulch	20	15	80	ND	NA
63	BR 91	Glen Gulch	25	15	70	ND	NA
64	BR 92	Glen Gulch	20	15	60	ND	NA
65	BR 93	Glen Gulch	20	10	85	ND	NA
66	BR 6	Olive Creek	40	25	<u>165</u>	NA	NA
67	BR 7	Olive Creek	40	25	<u>170</u>	NA	NA
68	BR 8	Olive Creek	30	25	<u>165</u>	NA	NA
71	BR 1	Olive Creek	30	<u>50</u>	<u>100</u>	NA	NA
72	BR 5	Olive Creek	35	<u>25</u>	<u>150</u>	NA	NA
73	BR 4	Olive Creek	35	15	<u>110</u>	NA	NA
74	BR 2	Olive Creek	25	15	80	NA	NA
75	E 2 S	Olive Creek	<u>85</u>	25	130	ND	0.1
76	BR 3	Olive Creek	<u>25</u>	15	80	NA	NA
78	BR 16	Olive Creek	25	20	110	NA	NA
79	BR 15	Olive Creek	30	20	110	NA	NA
80	BR 14	Olive Creek	30	20	100	NA	NA
81	BR 13	Olive Creek	30	20	85	NA	NA
82	E 47 S	Olive Creek	25	25	55	ND	ND
83	BR 66	Ester Creek	25	20	95	NA	NA
84	BR 65	Ester Creek	25	20	80	NA	NA
85	BR 58	Ester Creek	25	15	80	ND	NA
86	BR 59	Ester Creek	25	15	65	ND	NA
87	BR 60	Ester Creek	25	20	70	ND	NA
88	BR 64	Ester Creek	20	15	65	ND	NA
89	BR 63	Ester Creek	25	15	70	ND	NA
90	BR 61	Ester Creek	20	15	60	ND	NA
91	BR 62	Ester Creek	25	20	65	ND	NA
92	BR 103	S. Side	20	15	60	0.3	NA
93	BR 102	Elliott Hwy.	20	15	50	0.3	NA

Table 1 Atomic absorption analyses of stream-sediment samples, Livengood area (3 of 4)  
 (Thresholds: Copper 50 ppm, Lead 40 ppm, Zinc 150 ppm)

Map	Field	Area or Stream	Copper (ppm)	Lead (ppm)	Zinc (ppm)	Silver (ppm)	Gold (ppm)
94	BR 101	S. Side	30	15	90	0.3	NA
95	BR 135	Elliott Hwy.	35	20	80	ND	NA
96	BR 136	S. Side	20	10	80	ND	NA
97	BR 137	Elliott Hwy.	55	40	<u>300</u>	NA	NA
98	BR 118	Cleary Ck.	10	15	<u>50</u>	ND	NA
99	BR 117	Drainage area	30	25	80	ND	NA
100	BR 116	Cleary Ck.	15	25	85	ND	NA
101	BR 124	Drainage area	<u>50</u>	30	<u>900</u>	0.3	0.15
102	BR 75	Cleary Ck.	<u>20</u>	15	<u>100</u>	ND	NA
103	BR 74	Drainage area	35	15	85	ND	NA
104	BR 73	Cleary Ck.	25	15	100	ND	NA
105	BR 72	Drainage area	30	15	100	ND	NA
106	BR 126	Cleary Ck.	20	20	125	ND	NA
107	BR 125	Drainage area	20	15	110	ND	NA
108	BR 67	Cleary Ck.	<u>55</u>	25	<u>350</u>	1.0	NA
109	BR 127	Drainage area	<u>45</u>	20	<u>300</u>	ND	0.07
110	BR 128	Cleary Ck.	15	20	<u>70</u>	ND	NA
111	BR 129	Drainage area	15	15	60	ND	NA
112	BR 68	Cleary Ck.	25	15	90	NA	NA
113	BR 69	Drainage area	30	15	75	ND	NA
114	E 20 S	Cleary Ck.	15	25	70	ND	NA
115	E 21 S	Drainage area	20	25	70	ND	NA
116	E 19 S	Cleary Ck.	15	25	40	ND	NA
117	BR 71	Drainage area	30	20	100	ND	NA
118	BR 70	Cleary Ck. drainage area	30	15	65	ND	NA
119	E 16 S	Wilbur Ck.	20	10	70	ND	NA
120	BR 111	Wilbur Ck.	25	25	110	ND	NA
121	BR 110	Wilbur Ck.	15	15	85	ND	NA
122	BR 105	Wilbur Ck.	10	10	70	ND	NA
123	BR 109	Wilbur Ck.	25	20	110	ND	NA
124	BR 108	Wilbur Ck.	15	15	80	ND	NA
125	E 15 S	Wilbur Ck.	25	10	70	ND	NA
126	BR 107	Wilbur Ck.	20	30	110	0.6	NA
127	BR 106	Wilbur Ck.	20	15	80	0.4	NA
128	E 29 S	N. of	<u>175</u>	<u>50</u>	85	0.8	ND
129	E 32 S	Shorty Ck.	<u>30</u>	<u>10</u>	70	ND	ND
130	E 30 S	Shorty Ck.	<u>110</u>	25	105	NA	NA
131	E 31 S	(B) Shorty Ck.	<u>110</u>	30	95	ND	ND
132	E 40 S	Rainey Hollow	<u>90</u>	<u>200</u>	<u>440</u>	0.5	0.3
133	E 41 S	Steel Ck.	<u>25</u>	<u>25</u>	<u>85</u>	ND	ND

Table 1 Atomic absorption analyses of stream-sediment samples, Livengood area (4 of 4)

<u>Area</u>	<u>Field</u>	<u>Copper</u> <u>(ppm)</u>	<u>Lead</u> <u>(ppm)</u>	<u>Zinc</u> <u>(ppm)</u>	<u>Silver</u> <u>(ppm)</u>	<u>Gold</u> <u>(ppm)</u>
OUTSIDE OF MAP AREA						
Cleary Ck.	E 22 S	20	20	65	ND	NA
Cleary Ck.	E 23 S	30	20	65	ND	NA
Cleary Ck.	E 24 S	25	15	70	0.3	NA
Cleary Ck.	E 25 S	25	25	85	0.3	NA
Slate Ck.	E 33 S	20	15	80	ND	NA
Slate Ck.	E 34 SA	55	55	110	ND	NA
Tolovana	E 34 SB	25	15	90	ND	NA
Hot Springs	E 35 S	45	<u>55</u>	115	ND	NA
Helen Gulch	E 46 S	25	15	60	0.4	ND
Sawtooth Mtn.	E 37 S	50	20	135	ND	ND
Sawtooth Mtn.	E 38 S	30	15	80	ND	NA
Sawtooth Mtn.	E 39 S	50	20	100	ND	ND
Manley Hot Springs	BR 112	20	20	90	ND	NA
Road	BR 113	20	15	90	ND	NA
Manley Hot Springs	BR 114	15	10	60	ND	NA

Table 2 Atomic absorption assays of channel and grab samples, Livengood area (1 of 5)

<u>Sample</u>	<u>Location</u>	<u>Copper</u> <u>(ppm)</u>	<u>Lead</u> <u>(ppm)</u>	<u>Zinc</u> <u>(ppm)</u>	<u>Silver</u> <u>(ppm)</u>	<u>Gold</u> <u>(ppm)</u>
LILLIAN CREEK AREA						
E122	Pit at C. Parker's	55	45	380	0.4	ND*
E124	Placer Mine	55	25	260	ND	ND
E284		45	215	30	3.5	ND
Concentrates	+9 Mesh	150	30	145	11.7	41.6
Concentrates	+80 Mesh	160	195	240	11.5	41.2
Concentrates	-80 Mesh	70	460	240	14.5	20.6
Concentrates	Total	155	180	230	11.6	40.7
E125	Parker Access Rd.	60	20	150		
E126	Fault in Highway Cut	135	25	540	0.4	TR*
E127	Fault in Highway Cut	135	25	460	0.6	ND
E128	Fault in Highway Cut	30	10	200	0.2	0.9
BR131	Fault in Highway Cut	100	10	300	1.7	0.9
E459	Gulch Below Highway	65	10	155	ND	ND
WILBUR CREEK AREA						
E275	At Placer Mines	65	10	20	ND	ND
E492	Placer Concentrates					
	+9 Mesh	65	10	130	ND	ND
	-9+80 Mesh	65	100	90	0.2	0.6
	-80 Mesh	35	40	140	1.6	33.6
	Composite	60	85	100	0.3	3.6
OLIVE CREEK AREA						
E99	Fault Zone, Lower	90	20	195	ND	0.1
E115	Olive Creek	95	100	530	0.5	0.2
E116	Olive Creek	40	10	220	ND	NA*
BR132	Olive Creek	70	5	440	ND	ND
BR133	Big Cut E. of Hudson Mailbox	60	5	180	ND	ND
E416	Dike at Hudson House	35	100	10	ND	0.3
E417	Dike at Hudson House	80	115	300	0.2	0.3
BR26	Trench 32E	30	530	195	-	0.4
BR27	Trench 32E	25	75	195	-	-
BR28	Trench 32E	30	555	75	-	0.1
BR29	Trench 32E	60	220	400	-	-
BR30	Trench 32E	10	720	35	-	0.2
BR31	Trench 32E	10	100	90	-	0.1

\* ND - Not detected, NA - No analysis, TR - Trace

Table 2 Atomic absorption assays of channel and grab samples, Livengood area (2 of 5)

<u>Sample</u>	<u>Location</u>	<u>Copper</u> (ppm)	<u>Lead</u> (ppm)	<u>Zinc</u> (ppm)	<u>Silver</u> (ppm)	<u>Gold</u> (ppm)	
OLIVE CREEK AREA (cont.)							
BR21	Sunshine 2 (TrE-9)	30	20	80	ND	NA	
BR22	Sunshine 2 (TrE-9)	35	60	140	ND	NA	
BR23	Sunshine 2 (TrE-9)	20	40	125	ND	NA	
BR24	Sunshine 2 (TrE-9)	30	15	95	ND	NA	
BR25	Sunshine 2 (TrE-9)	35	15	130	ND	NA	
E84	Sunshine 2 (TrE-9)	35	35	130	NA	NA	
E85	Sunshine 2 (TrE-9)	25	45	55	ND	ND	
Hudson Mercury							
E338	Prospect. Trench 15W	55	100	20	ND	0.5	
E339	Prospect. Trench 15W	40	25	90	ND	0.2	
E496	Prospect. Trench 15W	35	45	100	0.4	ND	
BR36	Trench E-4	60	60	165			
E60	Old Smokey Claim, on ridge at Head of Olive Creek	50	110	45	0.2	1.0	
E61		180	100	30	0.4	4.2	
E62		300	20	50	1.2	7.7	
E63		40	30	50	0.8	6.9	
E91		50	40	75	ND	ND	
E278		155	35	20	ND	0.6	
E334		55	40	20	ND	1.1	
E336	135	35	40	0.5	6.8		
Dikes on Slope East of Old Smokey Claim							
E72	Dikes on Slope East of Old Smokey Claim	30	45	50	ND	0.2	
E331		30	35	90	ND	ND	
E332		70	35	100	0.5	0.2	
BR37		35	50	125	ND	NA	
BR38		40	30	145	NA	NA	
BR39		35	50	115	NA	NA	
BR40		25	45	95	NA	NA	
BR41		35	35	90	NA	NA	
BR42		30	30	85	NA	NA	
"Loop Road" Trenches							
BR32		"Loop Road" Trenches	20	75	75	ND	NA
BR33			70	65	125	ND	NA
BR34	90		150	300	ND	NA	
BR35	25		20	85	ND	NA	
E470	40		15	20	ND	ND	
MONEY RIDGE, EAST OF OLIVE CREEK							
BR57	N. Side of 3rd Knob	20	20	70	ND	NA	
E290	Trench A	90	15	20	ND	ND	
E471	Station M14	100	10	45	ND	ND	

Table 2 Atomic absorption assays of channel and grab samples, Livengood area (3 of 5)

<u>Sample</u>	<u>Location</u>	<u>Copper</u> (ppm)	<u>Lead</u> (ppm)	<u>Zinc</u> (ppm)	<u>Silver</u> (ppm)	<u>Gold</u> (ppm)
MONEY RIDGE, WEST OF OLIVE CREEK						
BR51	G-10 Trench	45	30	100	ND	NA
BR52	G-7S Trench	20	10	65	ND	NA
BR53	G-7S Trench	35	25	80	ND	NA
BR54	G-4S Trench	20	15	70	ND	NA
BR55	G-3S Trench	30	15	75	ND	NA
BR56	G-3S Trench	25	20	70	ND	NA
E90	Hudson's Pit 5	80	15	120	1.1	17.4
RUTH CREEK AREA						
E224	Upper Trench	110	25	10	ND	ND
E225	Upper Trench	10	20	20	ND	NA
E226		20	25	95	ND	NA
E227	Near Forks	15	55	85	ND	NA
E228	Near Forks	15	55	90	ND	NA
E229	Near Forks	10	150	30	ND	0.1
E230	Near Forks	10	170	20	2.0	0.2
E231	Near Forks	10	280	10	1.0	0.1
E232	Near Forks	10	140	15	0.2	0.1
E233	Near Forks	20	70	15	Nil	0.2
E234	Near Forks	10	60	30	Nil	0.1
E235	Near Forks	20	45	30	Nil	0.1
E236	Near Forks	20	80	45	Nil	0.1
E237	Near Forks	25	100	30	1.0	0.1
E238	Near Forks	25	70	15	0.4	0.1
E239	Near Forks	25	65	25	Nil	0.1
E240	Near Forks	20	25	25	Nil	0.1
E241	Near Forks	15	20	15	Nil	0.1
E242	Near Forks	15	110	50	1.0	0.1
E243	Near Forks	30	170	50	1.0	0.2
E244	Near Forks	15	190	50	2.4	0.2
E245	Near Forks	15	25	15	Nil	0.15
E369	Lower Stream Course	40	15	135	ND	ND
E386	Lower Stream Course	90	25	170	ND	0.1
E387	Lower Stream Course	130	15	10	ND	ND
E388-1	Lower Stream Course	65	40	200	ND	ND
E388-2	Lower Stream Course	70	20	120	ND	0.3
E395	Concentrates From Placer Operations					
	+9 Mesh	60	55	115	ND	ND
	-9+80 Mesh	40	40	130	ND	0.5
	-80 Mesh	30	45	115	ND	0.1
	Composite	50	45	120	ND	0.2



Table 2 Atomic absorption assays of channel and grab samples, Livengood area (4 of 5)

<u>Sample</u>	<u>Location</u>	<u>Copper</u> (ppm)	<u>Lead</u> (ppm)	<u>Zinc</u> (ppm)	<u>Silver</u> (ppm)	<u>Gold</u> (ppm)
RUTH CREEK AREA (cont.)						
E395	Concentrates from Placer Operation					
	+9 Mesh	60	55	115	ND	ND
	-9+80 Mesh	40	40	130	ND	0.5
	-80 Mesh	30	45	115	ND	0.1
	Composite	50	45	120	ND	0.2
E490	Concentrates from Placer Operation					
	+9 Mesh	85	200	120	0.2	1.0
	-9+80 Mesh	66	115	240	8.0	70.0
	-80 Mesh	30	40	180	1.7	20.4
	Composite	55	105	205	5.0	44.9
E491	Concentrates from Placer Operation					
	+9 Mesh	90	445	170	2.5	2.6
	-9+80 Mesh	75	115	200	13.5	127.5
	-80 Mesh	70	30	190	1.6	19.9
	Composite	75	155	190	8.8	80.1
SHORTY CREEK AREA						
E28S	Drill Hole Cuttings	950	60	640	1.0	ND
E30S	Drill Hole Cuttings	1050	25	105	1.1	ND
E31SA	Drill Hole Cuttings	730	20	300	0.5	0.1
E429	Drill Hole Cuttings	170	40	120	ND	NA
E427	Surface Bedrock	150	20	60	ND	ND
MISCELLANEOUS LOCATIONS						
E131	Livengood Creek Rd.	350	10	800	ND	ND
E132	Cut	190	20	600	ND	ND
E135	Goldstream, at Dam	290	15	55	ND	ND
E349	Amy Creek Access	150	100	775	0.2	ND
E389	Road South of	70	20	160	ND	ND
E267	Mile 62, Elliott	35	10	30	ND	0.1
E418	Highway Quarry, 2.3	120	10	10	ND	ND
E419	miles w. of Livengood	100	15	10	ND	ND
E340	Highway Quarry at	250	20	160	1.5	0.1
E341	Start of Trans-Alaska	170	20	35	0.5	0.2
E342	pipeline road	150	10	25	0.5	0.2

Table 2 Atomic absorption assays of channel and grab samples, Livengood area (5 of 5)

<u>Sample</u>	<u>Location</u>	<u>Copper (ppm)</u>	<u>Lead (ppm)</u>	<u>Zinc (ppm)</u>	<u>Silver (ppm)</u>	<u>Gold (ppm)</u>
LOCATIONS NOT ON MAP						
E305	Trans-Alaska pipeline road,	15	25	70	ND	ND
E307	near Hess Creek	30	25	40	ND	ND
	Burges Construction Camp	120	90	700	ND	ND
E445	Beaver Creek Area	10	20	20	ND	ND
	Serpentinite					