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Raw Materials Operations  
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P. O. Box 30, Argonne Station  
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Dear Sirs:

Enclosed are copies 2, 4, and 5 of Trace Elements Investigations Report 40, "Trace elements investigations in placer mining areas near Teller, Alaska", by H. G. White, 1947.

Sincerely yours,

*Thomas B. Lohay*  
Assistant Director

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**UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY**

**TRACE ELEMENTS INVESTIGATIONS  
IN  
PLACER MINING AREAS NEAR TELLER, ALASKA**

**by  
Max S. White**

**1947**

**Trace Elements Investigations Report 40**

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**ILLUSTRATION**  
(at back of report)

**Figure 1: Drainage map of placer gold area near Teller, Alaska, showing sample localities.**

# TRACE ELEMENTS INVESTIGATIONS IN PLACER MINING AREAS NEAR TELLER, ALASKA

By Max G. White

## ABSTRACT

Placer-mining areas and bedrock exposures near Teller, Alaska, were investigated during three weeks in June and July for possible sources of radioactive materials. The areas that were investigated are: Dese Creek southeast of Teller; Bluestone River basin south and southeast of Teller; Sunset Creek and other small streams flowing south into Grantley Harbor northeast of Teller; and, also northeast of Teller, Swanson Creek and its tributaries, which flow north into the Asiatic River basin.

No significant amount of radioactive material was found, either in the stream gravels or in the bedrock of any of the areas. A heavy-mineral fraction obtained from a granite boulder probably derived from a bench gravel on Gold Run contains 0.017 percent equivalent uranium, but the radioactivity is due to allanite and zircon.

The types of bedrock tested include schist, slate, and gneiss. Readings on fresh surfaces of rock were the same as, or only slightly above the background count. The maximum radioactivity in stream concentrates is 0.004 percent equivalent uranium in a sluice concentrate from Sunset Creek.

## INTRODUCTION

### Purpose and scope of investigation

One of the aims of the Alaskan Trace Elements Reconnaissance Program has been to test the radioactivity of concentrates from all of the placer-

mining areas in Alaska. Field investigation in the vicinity of Teller was undertaken early in the season of 1946 because no samples from placer-gold mining in surrounding areas were available for testing and because of the presence of radioactive materials in placers to the west, north, and east. At that time, work in the Teller area could be conveniently fitted in with the schedule of work elsewhere on the Seward Peninsula by the same party.

The field investigation was carried on from June 27 to July 17, 1946 by a party consisting of Max G. White, geologist, and E. D. Hamilton, campward. Frank Keelick, Edward Keelick, and Solomon Lopok, Eskimos, were employed individually for short periods during the investigation.

A portable Geiger-Mueller gamma-ray counter was used in the field for the determination of radioactivity in the stream gravels and bedrock outcrops or talus.

#### Location of area

The Teller area, latitude approximately  $65^{\circ}$  N., longitude approximately  $166^{\circ}$  W., is on the west coast of the Seward Peninsula, 60 miles southeast of Cape Prince of Wales and 50 miles northwest of Nome. Teller, population 125, is the trading center for the nearby placer mines. The area is accessible most conveniently by plane from Nome.

#### Specific areas investigated

Two placer-mining areas to the southeast of Teller and two areas northeast of Teller were investigated for radioactive materials. (See fig. 1).

One of the placer-mining areas southeast of Teller is the Blumstone

River basin, about 13 miles from Teller. The principal headwater streams within the area are Right Fork and Gold Run which unite to form the Bluestone River. The other placer-mining area is Dese Creek, about six miles southeast of Teller. This creek flows into Grantley Harbor. These two areas are accessible from Teller by truck on the narrow dirt road which extends along Dese Creek to within one mile of Right Fork. South of this point the old Teller-to-Nome trail can be travelled by tractor.

The areas that were investigated northeast of Teller are: the north shore of Grantley Harbor where several small streams debouch; and Swanson Creek and some of its tributaries which flow northward into the Aglayuk River.

All of the known older mining localities as well as all of the present mining operations were visited during the investigation. The principal sites of operations southeast of Teller in the Bluestone basin include: Gold Run from its mouth to about two miles above Sullivan; Alder Creek, a tributary of Gold Run at Sullivan; and the headwater portion of Igloo Creek, a tributary of the Right Fork of the Bluestone River. In recent years Gold Run was dredged from a point within a few hundred feet of Right Fork to a point about one mile above Sullivan. In 1946 mining in the Bluestone basin was confined to pick and shovel work on Alder Creek by Banning Johnson, caretaker for the Bartholomew Oil Corporation, owners of the mining property on Gold Run; ground sluicing by Ulie Martinson and the Fidaland brothers at the mouth of Bull Pup on Gold Run; and hydraulicking by the Tweet brothers on Igloo Creek at the mouth of Bering Creek.

A dredge was operated on Dese Creek in recent years from a point one

mile below Soda Creek to about a quarter of a mile above Soda Creek.

Northeast of Teller, only Sunset, Offield, and Suneson Creeks were ever mined extensively. The gravels on Sunset Creek were worked by dredge and dragline in the past, but are now being hydraulicked by Frank Rice. Former mining on Offield Creek was confined to the western headwater tributary, and in recent years some of the gravel has been reworked. The Suneson Creek gravel has been dredged twice, and at present the ground is leased to Bernard Vogen who is mining the gravel above the highest point reached by the dredges.

## GEOLOGY

### Time of bedrock

The general geology of the Teller area has never been studied in detail. All that is known has been acquired from brief examinations during reconnaissance of the placer deposits. Brooks / in 1900, Collier / in 1902, and Collier and others / in 1908 summarized the

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/ Brooks, A. H., et al., Reconnaissance in the Cape Nome and Norton Bay regions (Alaska) in 1900: U. S. Geol. Survey Special Publication, pp. 14, 128-132, 1901.

/ Collier, A. J., A reconnaissance of the northwestern portion of the Seward Peninsula, Alaska: U. S. Geol. Survey Prof. Paper 2, p. 45, 1902.

/ Collier, A. J., et al., The gold placers of parts of the Seward Peninsula, Alaska: U. S. Geol. Survey Bull. 328, pp. 270, 271, 274, 276, 1908.

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general geology of the Klutovia basin and the area north of Grantley Harbor.

The bedrock of the area is considered a part of the lower undifferentiated portion of the Eozo group. These rocks are mainly sedimentary in origin and are probably early Paleozoic in age. The lithologic types



present are mica and chlorite schist, limestone, gray and black slate, and intrusive greenstone hills. The gray slate and the schist differ mainly in the greater metamorphism of the schist. Much of the schist is garnetiferous. Calcareous schist grades into limestone in the walls of the Bluestone River canyon. Highly graphitic schist crops out opposite the mouth of Ten Gulch in Gold Run. Black slate is moderately widespread north and south of Grantley Harbor and is especially well exposed on Coyote Creek two miles east of Toller. At this locality the slate appears partly baked, through close proximity to a basaltic dike, and bears a resemblance to coal. It is not abundant in the Bluestone basin, though it is present in the vicinity of the junction of Gold Run and Right Fork. The greenstone caps many but not all of the higher hills in the area.

Quartz veins and stringers are common in the schist, slate, and greenstone, both crossing the cleavage and parallel to it. The quartz is silky white, and most of the veins are apparently barren of mineralization. Nevertheless, some of the minerals found in the stream gravels must have their source in the quartz veins.

Shoshone Mountain, at the head of Sunset Creek north of Grantley Harbor, and two adjacent peaks are basaltic volcanic necks of pre-Pleistocene age. Lava flows of like age cover the area between the peaks and California Creek to the west. These rocks were not examined during the 1946 investigation.

#### Concentrates from stream gravels

**Sampling:** A total of 35 samples representing the gravels of 21 different streams were collected for radioactivity tests. Of these, 25 samples are from the Bluestone River basin, one from Base Creek, seven

from the creeks entering Grantley Harbor from the north, and two from  
Swanson Creek.

Bridge and sluice concentrates were taken from all placer-mining  
operations except that on Offield Creek and, thus, represent the pay streak  
in the lower part of the gravels. All other samples were taken by panning  
the upper part of the creek gravels in bars or creek banks. Most of the  
samples are from 20 to 40 pounds of gravel and were panned only to a sand-  
concentrate of about 25 cubic inches so as to be comparable in volume to  
a radioactive field standard used in the determination of the equivalent  
uranium content.

The data for all of the samples collected in the Teller area in 1946  
are given in table 1. The concentration ratios listed in the table refer  
to the amount of heavy minerals recovered from the stream concentrates by  
using the heavy liquids, bromoform or methylene iodide. The ratios  
indicate that from 6 to 84 pounds of heavy minerals per cubic yard can be  
recovered from the gravels in the creeks southeast of Teller, and from  
3 to 20 pounds can be recovered from the gravels in the creeks north of  
Teller. However, a considerable amount of the heavy concentrate consists  
of fragments of schist and gneiss. The densities of these rocks are  
sufficiently high to allow them to sink in heavy liquids; thus, the actual  
amount of clean heavy minerals present in the gravel is somewhat less than  
the pounds of concentrate given in the table.

Mineralogy of the concentrates: In addition to platy fragments of  
schist and rounded grains of gneiss composed of amphibole and chlorite  
altered from pyroxene, metamorphic minerals such as garnet, mica, epidote,  
and clinzoisite are abundant in the heavy-mineral fraction of the concen-  
trates. Unclassified

**RADIOACTIVITY****Tests of bedrock**

Although the principal stress in the field investigations in the Teller area was on the determination of radioactivity in the stream gravels, every opportunity was taken in all traverses to test the radioactivity of outcrops and talus of bedrock. Readings of gamma-ray activity were made with the counter tube placed against fresh surfaces of the rock. No significant amount of radioactive material was found in any of the bedrock.

Counter-readings on greenstone, gray slate, and schist gave counts the same as, or only slightly above the background count. Highly graphitic schist showed no radioactivity. Black slate was tested at several localities and generally exhibited little or no radioactivity. A laboratory reading of 0.004 percent E. U. (abbreviation for equivalent uranium) was obtained from a bromoforn concentrate of sample no. 46430 2a. This sample was taken from talus of a black slate outcrop 1,000 feet above Gold Run on the Right Fork of the Bluestone River.

**Tests of concentrates**

No significant amount of radioactivity was detected in any of the stream gravels in the Teller area in the course of the field investigations.

In order to check the lack of significant radioactivity as determined in the field, all samples (semi-concentrates) were further concentrated in the laboratory by using the heavy liquids, bromoforn and methylene iodide. The E. U. <sup>Unclassified</sup> content of the heavy-mineral fractions was then

determined with a laboratory beta-gamma counter.

A content of 0.004 percent K. U. was found in one sample from Smart Creek (no. 4/line X3), north of Grantley Harbor. The samples from Offield Creek and Igloo Creek, also north of Grantley Harbor; from Hinky Creek and Little Hinky Creek on the Right Fork of the Bluestone River; and from Alder Creek on Gold Run all contain 0.002 percent K. U. The remaining samples contain 0.001 percent K. U. or less.

In the gravels of Gold Run the occurrence of granite boulders was noted. These boulders, ranging from 3 to 10 inches in diameter, are well-rounded and somewhat weathered. They are probably derived from an old beach deposit, as Gold Run does not traverse any granite in its present course. An 8-inch boulder of the granite was crushed, and the sample (Alaskan Concentrate File no. I757) brought in from the field for examination. Beta-count of a mineral fraction heavier than bromoform shows 0.017 percent K. U. The minerals in this fraction are biotite, albite, magnetite, garnet, and niroca, in order of decreasing abundance. The radioactivity is attributed primarily to the albite and secondarily to the niroca.

#### CONCLUSION

On the basis of the information obtained during this investigation of the Saller area, it is assumed that there are no significant deposits of radioactive materials in the localities examined.

TABLE I

Data on samples from the Keller area, Alaska.

Field No.	Location	Weight of sample taken in grams	Weight of gravel in grams	Weight of concentrate in grams	Concentrate value per cu. ft.	Points of concentrate	Percent Pb.
10	1944 Baby Creek at the mouth of Elizabeth Creek.	30	85.9	1584.1	19		0.01
11	1945 Baby Creek, one mile above Elizabeth Creek.	35	79.3	2021.1	15		0.01
12	1946 Elizabeth Creek one mile above Baby Creek.	30	27.1	5081.1	6		0.01
13	1947 Gold Standard Creek 300 feet below junction of headwater forks.	30	28.0	4851.1	6.3		0.01
14	1948 Elizabeth canyon, 1/2 mile above lower end of canyon.	30	211.1	641.1	67		0.01
15	1949 Junction of Eight Fork and Gold Run.	35	200.4	1381.1	15		0.01
16	1950 Eight Fork, 1000 ft. above junction with Gold Run. Blank slate talus.	20	8.8	10301.1	2.8		0.01
17	1951 Stream concentrate of same location as No. 16.	20	141.4	641.1	47		0.01
18	1952 Eight Fork, 300 ft. below Slate Creek.	20	249.5	341.1	64		0.01
19	1953 Slate Creek, 1000 ft. above mouth.	34	99.8	2591.1	11		0.01
20	1954 Eight Fork at mouth of Windy Creek.	40	69.9	2591.1	11		0.01
21	1955 Eight Fork, 400 ft. above Windy Creek.	30	144.8	941.1	32		0.01
22	1956 Junction of Little Windy Creek and Windy Creek.	40	99.1	1631.1	16.5		0.01
23	1957 Windy Creek, 500 ft. above Little Windy Creek.	20	40.8	2211.1	13.5		0.01
24	1958 Windy Creek, one mile above Little Windy Creek.	30	75.5	1801.1	14.8		0.01

TABLE I (continued)

Data on samples from the Baller area, Alaska.

Field Number	Location (except those otherwise indicated, samples taken are mid-concentrate of stream gravel)	Height of gravels packed, in pounds	Height of concentrate in grams	Concentrate minus solids per cent.	Percent S.F.S. of heavy mineral fraction
2577	LITTLE Windy Creek, half way between mouth and head.	20	19.8	454.1	6.5
2578	Little Creek sluice-box concentrate, a width from cleanup of West mine.	very large			
2579	Gold Pan of Peltier Pcp.	40	157.4	1154.1	26.3
2580	Gold Pan of Tom Gulch.	26	219.6	514.1	59
2581	Tom Gulch, 60 ft. above mouth.	20	86.5	1054.1	29
2582	Little Creek at mouth.	20	232.3	364.1	77.5
2583	Alley Creek, near mouth, 1 pan concentrate from E. Johnson's crib, 1946.	25	72.6	1504.1	9.5
2584	Gold Pan below Ball Pcp, from Hartmann-Fitzgibbon pit, 1946	40	131.0	1364.1	28.0
2585	Gold Pan drudge concentrate, mine slough.	very large			
2586	Gold Pan drudge concentrate, plus slough.	very large			
2587	Gold Pan at upper end of drudge operation, 4 miles above Baller's Mine Creek drudge concentrate donated by Scouts of Baller.	40	309.7	594.1	29
2588	Small Creek fine sluice-box concentrate, donated by Frank Blair.	very large			
2589	Small Creek, coarse sluice-box concentrate.	very large			
2590	Small Creek, coarse sluice-box concentrate.	very large			

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TABLE I (continued)

Data on samples from the Teller area, Alaska.

Field Alaska No. placer 46 has file No.	Location (Except those otherwise indicated, samples taken are sand-concentrates of stream gravel.)	Height of gravels panned, in pounds	Weight of concentrate, minus 20-mesh, in grams	Concentrate-concentrate ratio per cent.	Pounds of concentrate	Percent S.F.S. of heavy mineral fraction
36	1624 Igloo Creek, north of Grantley Harbor, 1/2 mile above mouth.	30	91.8	144:1	20.5	.002
37	1625 McKinley Creek, 2 miles from mouth.	40	95.7	190:1	16.0	.001
38	1626 Grizzly Creek at junction of the two main headwater forks.	40	66.5	277:1	10.9	.001
39	1627 Grizzly Creek, 300 ft. above lagoon at mouth.	15	7.3	675:1	3.6	.002
44	1628 Shannon Creek, 1/2 mile below Saturday Creek.	45	112.0	162:1	16.6	.001
45	1629 Shannon Creek, 1/2 mile below Saturday Creek.	30	66.5	157:1	19.3	.001
3760	Shannon Creek, sluice-box concentrate donated by B. Vegen from his placer cut, June 1947.	very large				.001

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FOOTNOTES