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Document Title and Description	Present Classification	Revised Classification
USGS -- TEI-41 (Part I)		
"Trace Elements Reconnaissance in the Candle Creek Area, Fairhaven District, Seward Peninsula, Alaska," by H. R. Gault, December 1949.	OFFICIAL USE ONLY	UNCLASSIFIED

March 20, 1952

Date

R. L. Faulkner, Acting Director  
Division of Raw Materials



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY  
WASHINGTON 25, D. C.

DEC 29 1949

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ASD-267/0

Dr. Phillip L. Merritt, Assistant Manager  
Raw Materials Operations  
U. S. Atomic Energy Commission  
P. O. Box 30, Ansonia Station  
New York 23, New York

Dear Phil:

Enclosed are copies 2, 4, and 5 of Trace Elements Investigations Report 41 (Shorter contributions to Alaskan trace elements studies for 1945), Part 1, "Trace elements reconnaissance in the Cardella Creek area, Fairhaven district, Seward Peninsula, Alaska", by H. R. Gault, December 1949.

Sincerely yours,

*Thomas B. Nolan*

Assistant Director

Enclosures 3

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UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

SHORTER CONTRIBUTIONS TO ALASKAN  
TRACE ELEMENTS STUDIES

1945

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Part 1

TRACE ELEMENTS RECONNAISSANCE IN THE CANDLE CREEK AREA,  
FAIRBANKS DISTRICT, BERING PENINSULA, ALASKA

by

H. R. Gault

December 1949

Trace Elements Investigations Report No. 43



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UNITED STATES  
DEPARTMENT OF THE INTERIOR  
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WASHINGTON 25, D. C.

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## TITLES OF PARTS

### Part I (in this volume)

Trace elements reconnaissance in the Candle Creek area,  
Fairhaven district, Seward Peninsula, Alaska

By H. R. Gault

### Part II (in preparation)

Reconnaissance for radioactive elements in the Cape Mountain  
area, Seward Peninsula, Alaska

By P. L. Killeen and W. S. West

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## ILLUSTRATION (at back of report)

Figure 1 Sketch map of the Candle Creek area, Fairhaven district, Seward Peninsula, Alaska

## Part 1

### TRACE ELEMENTS RECONNAISSANCE IN THE CANDLE CREEK AREA, FAIRHAVEN DISTRICT, SEWARD PENINSULA, ALASKA

By M. R. Gault

#### ABSTRACT

A black cubic mineral, questionably identified as uraninite-thorianite, is abundant in one of two significantly radioactive placer samples obtained prior to 1945 from the Candle Creek area on the Seward Peninsula. Only four of the 16 concentrate samples collected during the field season of 1945 from this area contain more than 0.01 percent equivalent uranium. Although mineralogical study of the samples collected in 1945 failed to isolate the radioactive mineral grains, additional reconnaissance in the Candle Creek area appears warranted.

#### INTRODUCTION

Preliminary radioactivity tests were made in the spring of 1945 on a small collection of placer samples obtained from the Candle Creek area, Seward Peninsula, Alaska, during earlier Geological Survey investigations. One sample contained more than 5 percent equivalent uranium, hereafter abbreviated to E. U., and a second sample contained 0.049 percent E. U. / On the basis of

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/ Harder, J. O., and Reed, J. C., Preliminary report on radioactivity of some Alaskan placer samples: U. S. Geol. Survey Trace Elements Inv. Rept. 6, p. 14, tables 1 and 2, appendix, unpublished, 1945.

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these results, the writer spent the last week of July 1945 in the

Candle Creek area collecting a representative group of samples from the placer workings along Candle Creek and its principal tributaries for the purpose of determining the advisability of a more detailed search for radioactive mineral deposits in the area.

#### LOCATION

The Candle Creek area is a part of the Fairhaven district in the northeastern corner of the Seward Peninsula (fig. 1). Candle Creek flows northeast and joins the Kivalik River at the site of the town of Candle. The Kivalik River continues north beyond Candle for 6 miles to the head of Kivalik Bay, an inlet of Kotzebue Sound which in turn opens into the Arctic Ocean.

Candle is the chief settlement and source of supply for the placer mines in this area. It is about 140 airline miles northeast of Nome. The population is small and consists mainly of Eskimos, some white Government workers, and employees of the Arctic Circle Exploration Company. The latter company is the main placer-mining outfit in the area and has been operating since 1935. The town possesses two small landing fields, and many supplies are brought in by plane from Fairbanks. Small boats bring in supplies through Kotzebue Sound during the months of July and August.

A road leads up Candle Creek for a distance of about 5 miles from the town.

#### GEOLOGY AND PLACER MINING

The general geology of the Fairhaven district has been described by Moffit. / Along Candle Creek the bedrock is predominantly a mica



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✓ Moffit, F. H., The Fairhaven gold placers, Seward Peninsula, Alaska: U. S. Geol. Survey Bull. 247, 85 pp., 1905.

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schist cut by small quartz stringers. Small dikes and sills of rhyolite also cut the schist, and a few are exposed in the placer workings on the bench ground. A gneissic intrusive is mapped near the head of Potato Creek.

Placer mining in the Candle Creek area has been carried on since 1901, when a stampede followed the discovery of placer gold on Jump Creek and the rich spots along Candle Creek were worked by rocker. Gold-bearing gravels have been mined or are known along the lower 5 miles of Candle Creek; along Jump and Patterson Creeks, tributaries to Candle Creek from the west (fig. 1); and in the Kivalik River flats north of the town of Candle. Both creek and bench deposits occur along Candle Creek and its tributaries. The creek gravels are worked by dredge, and the bench ground is sluiced with hydraulic giants. The creek gravels are 12 to 18 feet thick and are covered by 10 to 20 feet of tundra. The bench gravels are 4 to 10 feet thick and are overlain by 5 to 10 feet of tundra. All of the ground is permanently frozen a few feet below the surface.

#### RADIOACTIVITY TESTS

##### Samples obtained prior to 1945 field investigation

Seven of the samples in the Alaskan concentrate collection that were tested for radioactivity in the winter of 1944-45 are from the Candle Creek area. As the data on these samples are scattered in various parts of the report on that work ✓ and are not



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✓ Harder, J. O., and Reed, J. G., op. cit., 1945.

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complete, the information is assembled herein. One sample in that collection, no. 327, was not listed in the preliminary report. Some doubt exists that sample no. 377 is actually from the Candle Creek area, as a Windy Creek is not shown on any of the maps of the area. The exact locations from which sample nos. 208 and 209 were obtained are uncertain, although both are from the Candle Creek area. The majority of these samples were obtained from placer mines operating in 1917 by G. L. Harrington of the Geological Survey while he was engaged in investigations farther south. ✓ The

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✓ Harrington, G. L., The gold and platinum placers of the Kivalik-Koyuk region (Alaska): U. S. Geol. Survey Bull. 692-G, pp. 369-400, 1919.

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data on these samples are given in table 1.

#### Samples obtained in 1945

Data on the 16 samples collected in the Candle Creek area in 1945 are presented in table 2. The sampling was designed to include:

- 1) All types of deposits over as wide an area as possible.
- 2) The various stages in the different recovery methods used in the placer-mining operations.

Of the 16 samples, 10 are from the main valley of Candle Creek, 3 are from the Kivalik River flats below Candle, and 3 are from tributaries of Candle Creek (fig. 1). The 10 samples from Candle

Creek were collected from various claims beginning at claim 6-Below and ending at claim 19-Above at the mouth of Patterson Creek. The location of the dredge concentrate sample (no. 1115), which is a composite of concentrates from claims 13- to 18-Above, is not plotted on the map. The dredge operating in 1945 was just below the mouth of Patterson Creek and was working upstream.

#### Results and conclusions

The K. U. content of the samples collected in 1945 ranges from 0.001 to 0.025 percent. Radioactivity exceeds 0.01 percent K. U. in only four samples. The minimum concentration ratios for these four samples with respect to the original gravels range between 7,500 and 25,000 to 1 by volume. The best recovery per cubic yard obtained in sampling was approximately three-fifths of a pound of concentrate containing 0.025 percent K. U.

Heavy-mineral studies of several samples collected in 1945 failed to isolate the radioactive grains, and the identification of the mineral or minerals carrying the radioactive elements is still uncertain. Nevertheless, mineralogical examination of sample no. 371 made by Larsen for Harder and Reed's report / showed that

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/ Harder, J. O., and Reed, J. C., op. cit., appendix, p. 1, 1945.

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a highly radioactive, black cubic mineral, questionably identified as uraninite, makes up the larger part of the active portion of the concentrate. Zircon and apatite, both of which may carry radio-

active elements, are also present. The black cubic mineral also occurs in samples from the Sweepstakes Creek area of the Koyuk basin about 30 miles south of Candie. Field work subsequent to the 1945 investigations has indicated that this mineral is widely distributed in the eastern part of the Seward Peninsula. /

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/ Gault, H. R., Black, R. F., and Lyons, J. B., Preliminary report on trace elements investigations in the Sweepstakes Creek area, Koyuk district, Seward Peninsula, Alaska: U. S. Geol. Survey Trace Elements Inv. Rept. 25, unpublished, 1946.

Killeen, P. L., and White, H. G., Trace elements investigations on the south fork of Quartz Creek, eastern Seward Peninsula, Alaska: U. S. Geol. Survey Trace Elements Inv. Rept. 42, pt. 2 (in preparation).

West, W. S., and Matsko, J. J., Trace elements reconnaissance in the Backlund-Kivalik area, Seward Peninsula, Alaska: U. S. Geol. Survey Trace Elements Inv. Rept. 49 (in preparation).

West, W. S., Trace elements reconnaissance in the Darby Mountains area, Seward Peninsula, Alaska: U. S. Geol. Survey Trace Elements Inv. Rept. 53 (in preparation).

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No evidence of the bedrock sources of the radioactive materials present in the Candie Creek placer concentrates was obtained during the brief field investigation.

#### RECOMMENDATIONS

The sampling in the Candie Creek area, although not extensive, included all of the mining operations active at the time. If an opportunity occurs, further sampling on Potato Creek probably is warranted. A small area of schistose or gneissic rock mapped near the head of Potato Creek was believed to be an altered acidic intrusive rock should also be sampled or checked for radioactivity by field traversing with a Geiger-Mueller counter. Additional study in



the Potato Creek area might yield information on the bedrock source of the radioactive material.

After the completion of the Geological Survey's 1945 field work in the Candle Creek area, Fritz Weinard is said to have begun mining with a 3-man dozer-hydraulic outfit on Bad Creek near Candle. /

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/ Stewart, B. D., Biennial report of the inspector of mines, Territory of Alaska, 1945-46.

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Samples from this new site have not been requested for radioactivity tests.

Older sites of mining from which no samples have been obtained and which could probably be reached from Candle include:

- 1) The placers near the mouth of Alder Creek on the coast west of Kivalik Bay that have not been worked since 1903
- 2) The placers of Glacier Creek and Gold Run, western tributaries of the Kivalik River, where the last recorded mining was in 1927 and 1929.

Further mineralogical work is needed on the samples that are available. These laboratory studies are being carried on and will be incorporated in a summary report on the distribution of the radioactive black cubic mineral in the eastern Seward Peninsula.



Table 1

Data on samples obtained prior to 1945 field investigation,  
Candle Creek area, Fairhaven district, Seward Peninsula, Alaska

Alaskan Concentrate File no.	Collector's Field no.	E. U. content (in percent)	Location and description
371	17Ala 51a	> 5.0	Candle Creek, claim 19-Above; mainly magnetite, ilmenite(?), sirocon, garnet, hematite, uraninite-thorianite(?), and sphene.
22	17Ala 52	0.049	Candle Creek, claim 12-Above; donated by Ed. Hanson; contains magnetite, ilmenite, sirocon, garnet, and rutile.
271	17Ala 51	0.006	Candle Creek, claim 19-Above; mainly galena (coated with cerussite), chalcocopyrite, arsenopyrite, ilmenite, magnetite, rutile, garnet, limonite, hematite, pyrite, and sirocon.
208	17Ala 54b	0.003	Candle Creek or vicinity; contains galena, rutile, garnet, titanite or sirocon(?), magnetite, pyrite, little arsenopyrite, and very little ilmenite.
209	17Ala 54a	0.001	Candle Creek; contains hematite, limonite, magnetite, pyrite, arsenopyrite, galena, sirocon, garnet (wine-colored), and very little ilmenite and rutile.
377	---	0.003	Windy Creek(?) near Candle(?); donated in 1918 by L. A. Sundquist accompanied by letter of 3/9/18; contains ilmenite, limonite, garnet, and stibnite(?).
327	---	0.000	Kivalik Flats, about half a mile below mouth of Candle Creek; donated in 1907 by John Griffin; minerals not identified.

Table 2

Data on samples obtained in 1945,  
Candle Creek area, Fairhaven district, Seward Peninsula, Alaska

Alaskan Con- centrate File no.	Col- lector's field no.	R. U. content (in percent)	Mesh size	Concen- tration/ ratio	Location and description
1119	4540a 38	0.001	-20	> 10,000:1	Kivalik River flats; reject from first jig- ging of dredge concentrates.
1121	4540a 40	0.002	-20	> 75:1	Kivalik River flats; panned concentrate of sand from blue mud brought up by dredge.
1122	4540a 41	0.001	-20	> 10:1	Kivalik River flats; panned concentrate of sand from tundra uncovered by drag-line.
1120	4540a 39	0.002		112:1	Candle Creek, claim 6-Below; panned concen- trate of pay streak on bench.
1112	4540a 30	0.004	-20	100:1	Candle Creek, claim 2-Below; panned concen- trate of pay streak on bench.
-	4540a 29	0.003	-20	117:1	Candle Creek below Jump Creek; panned con- centrate of pay streak on bench.
1109	4540a 26	0.001		103:1	Candle Creek, claim 13-Above; panned concen- trate of pay streak on bench.
1118	4540a 37	0.006	-20	> 1,000:1	Candle Creek, claim 15-Above; cleaned hydraulic concentrate from bench ground.
1115	4540a 33	0.007		> 10,000:1	Candle Creek, claims 13- to 18-Above, sample is composite from all claims; concentrate from first jigging of dredge concentrate, gold removed.
1117	4540a 35	0.003		27:1	Candle Creek, claim 18-Above; panned concen- trate from dredge tailings.
1113	4540a 31	0.018	-20	> 14,000:1	Candle Creek, claim 19-Above; reject from first jigging of dredge concentrate.

1/ Concentration ratio of original gravels to  
concentrate by volume.

Table 2 (continued)

Data on samples obtained in 1945,  
Candle Creek area, Fairhaven district, Seward Peninsula, Alaska

Alaskan Con- centrate File no.	Col- lector's field no.	E. U. content (in percent)	Mesh size	Concen- tration $\frac{1}{2}$ ratio	Location and description
1114	4540a 32	0.025		>15,000:1	Candle Creek, claim 19-Above; final cleaned dredge concentrate from second jigging.
1108	4540a 92	0.013	very fine	>25,000:1	Candle Creek, claim 19-Above; blowings from final dredge concentrate.
1110	4540a 27	0.019	very fine	>7,500:1	Jump Creek near Candle Creek, Mn. French workings; blowings from hydraulic sluice- box concentrate.
1111	4540a 28	0.001	-20	>5,000:1	Jump Creek near Candle Creek, Mn. French workings; hydraulic sluice-box concentrate.
1116	4540a 34	0.032	-20	112:1	Patterson Creek near Candle Creek; panned concentrate from old tailings and creek gravels.

$\frac{1}{2}$  Concentration ratio of original gravels to concentrate by volume.