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## THE MINERALS AND THE PERCENTAGES OF THE CONSTITUENTS OF THE SANDS

Sand No. 1.

1. Garnet..............38.366 %
   *(a) Medium red.
   (b) Pink.
   (c) Wine red.
   * In order of importance.
2. Magnetite............22.837
3. Hornblende (Green)...19.420
4. Ilmenite.............. 8.447
5. Tourmaline........... 5.541
   (a) Brown.
   (b) Yellowish (rare)
6. Feldspar............. 2.608
   (a) Orthoclase (25%)
   (b) Microcline (rare)
   (c) Plagioclase (75%)

97.219+%

The remaining 2.780+% is made up of the following minerals, their percentages on the basis of 100%.

7. Quartz...............46.677%
   (a) Subangular.
   (b) Well-rounded. (rare)
8. Diopside.............21.474
9. Titanite.............12.560
10. Epidote.............. 7.293
11. Zircon............... 6.888
12. Andalusite........... 2.106
13. Pyrite............... 1.539
    (a) Unaltered. (rare)
    (b) Altered.
14. Galena............... 0.324
15. Rutile............... 0.162
16. Calcite.............. 0.162
17. Biotite.............. 0.081
18. Chlorite............. 0.081
19. Muscovite........... 0.081

Gneiss fragments.......... 0.972

Total 100.400%

Sand No. 2.

1. Feldspar.............68.175 %
   (a) Orthoclase. (35%)
   (b) Microcline. (rare)
   (c) Plagioclase. (60%)
2. Quartz...............27.270
   (a) Angular. (common)
   (b) Subangular. (")
   (c) Well-rounded. (rare)
3. Hornblende (Green)... 3.967

99.412+%

The remaining 0.587+% is made up of the following minerals, their percentages on the basis of 100%.

4. Garnet...............37.209 %
   (a) Pink.
   (b) Medium red.
5. Tourmaline..........34.888
   (a) Brown.
   (b) Yellowish. (rare)
6. Biotite.............. 9.309
7. Epidote.............. 6.976
8. Magnetite............ 6.976
9. Diopside............. 4.651

Total 100.009 %

The following minerals are found as traces in sand No. 2.

10. Ilmenite.
11. Titanite.
12. Zircon.
13. Calcite.
14. Muscovite.
15. Chlorite.

Mineral grains found in Sand No. 1, but absent in Sand No. 2 are: (a) andalusite, (b) ilmenite, (c) pyrite, (d) galena, (e) rutile, and (f) wine-red garnet.

## A MINERALOGICAL EXAMINATION OF BLACK SAND FROM NOME CREEK, ALASKA

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Very few mineralogical examinations have been made of black sands associated with the gold-placers of Alaska. The writer knows of no previous quantitative mineralogical examination of black sands from Nome Creek, Fairbanks Mining District, Alaska. The writer had the opportunity to study the sands from Nome Creek, and this article is the outcome of his studies.

A moment's thought regarding the time, expense, and labor involved in making any quantitative chemical analysis of such elements as tungsten, tin, titanium, zirconium, and platinum, will make it evident how very important a preliminary mineral examination is, where these rare elements are involved. It is, however, unnecessary to state that the detection of small values of platinum can be accomplished only by regular assay methods.

The method employed in examining the black sands may be briefly summarized as:

1. Drying.
2. Sizing with screens.
3. Separation into fractions with the aid of an electro-magnet.
4. Examination of these fractions.

Drying. The sand was placed in a suitable dish and allowed to stand in a warm location, gently heating at times, until all moisture was driven off. This prevented the sand particles from adhering to one another and also to the magnet.

Sizing. The sand was shaken and mixed thoroughly so as to get a representative sample. This was screened through a 20 to a 30-mesh (to the inch) sieve, yielding a size nicely suited for use with an electro-magnet, as well as being representative of the average size of the sand particles. It was also a size well suited to megascopic identification of the minerals.

Separating. After weighing 200 grams of the size chosen, it was divided into several parts, each part in turn was spread out very thinly on a smooth-surfaced board. The board was then placed in the field of a strong electro-magnet. As dried sand whose particles were approximately the same size was used, sharp magnetic fractions were obtained by varying the distance, previously determined by using known mineral mixtures, between the board and the terminals of the magnet.

Repetition of such treatment resulted in fractions consisting practically of a single mineral species. As magnetic fractions often owe their impurity to included or adhering grains, these fractions were later studied in detail by means of a hand lens, and by testing their various physical properties. A few wet tests were always used to supplement other tests.

The minerals determined in the magnetic fractions were the following: magnetite, and with it as films, or adhering to it in minute quantities, were hematite and limonite; ilmenite; wolframite; pyrrhotite; and garnet (small percentage of the garnets, however).

The non-magnetic portion of the sand was next studied. Small portions were successively gone over with a hand lens. The physical properties of the various constituent minerals were used to identify them, using, as was done with the magnetic portion, wet tests where identification was in question.

The minerals identified in the non-magnetic portion were the following: feldspar, garnet, quartz, zircon, pyrite and marcasite, cassiterite, hematite and limonite, galena, and scheelite. Mica schist was about the only rock constituent of the sand.

The weight of the various mineral constituents and their respective percentages are here listed:

| Name of Mineral | Weight in Grams | Percentages (corrected to 100%) |
|---|---|---|
| 1 magnetite with little hematite and limonite | 80.0174 | 40.81 |
| 2 garnet | 40.5902 | 20.69 |
| 3 schist | 22.1110 | 11.27 |
| 4 pyrite and marcasite | 20.1994 | 10.30 |
| 5 quartz | 18.2652 | 9.31 |
| 6 wolframite | 9.7780 | 4.99 |
| 7 scheelite | 4.1868 | 2.13 |
| 8 feldspar | 0.3116 | 0.16 |
| 9 cassiterite | 0.2110 | 0.11 |
| 10 ilmenite | 0.1550 | 0.08 |
| 11 pyrrhotite | 0.1090 | 0.06 |
| 12 zircon | 0.0816 | 0.05 |
| 13 galena | 0.0718 | 0.04 |
| | 196.0880 grams | 100.00% |

A large percentage of the minerals was sub-angular to angular in shape, signifying that the sand had not been transported any great distance.

No minerals of economic importance in commercial quantities were detected. Minerals of economic importance not in commercial quantities, that were found are: cassiterite, wolframite, and scheelite—the main tin and tungsten ores of the world. There was only 0.11% of cassiterite and 7.12% of the tungsten minerals. These minerals cannot be extracted from sands at profit, but the presence of these minerals points favorably to lodes of the same minerals at a not far distant point.

The writer has not had the opportunity to visit the region of the headwaters of Nome Creek, but various reports of the United States Geological Survey, dealing with the Mineral Resources of Alaska, state that intruded into the pre-Ordovician schists of this region are various granitic rocks. It is in these intrusives at the headwaters of Nome Creek that the writer would place the source of the tungsten minerals found in the black sands.

Alaska, and the United States as a whole, are not favored with an abundance of tungsten minerals or of cassiterite. The Alaskan prospector knows gold, silver, copper and lead when he sees them, but few of the prospectors know cassiterite in its various forms, and fewer still know the tungsten ores. The Alaska School of Mines twice a year trains prospectors in various essential fields, including an extensive training in recognizing minerals and methods of determining unknown minerals.

It is the hope of the writer that the attention of the prospectors of Alaska will be drawn to other minerals of importance while on their untiring search for gold. The rare minerals are here in Alaska. Some of them have been found and others will be found in the future. A mineralogical examination of numerous black sands from numerous parts of the Territory would not be entirely amiss.

## DUMORTIERITE IN RIVERSIDE COUNTY, CALIFORNIA

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An occurrence of dumortierite, heretofore undescribed so far as known, is in the vicinity of the Cajalco tin mine, property of the American Tin Corporation,