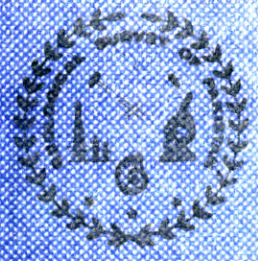
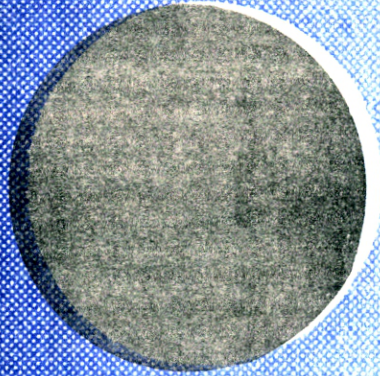


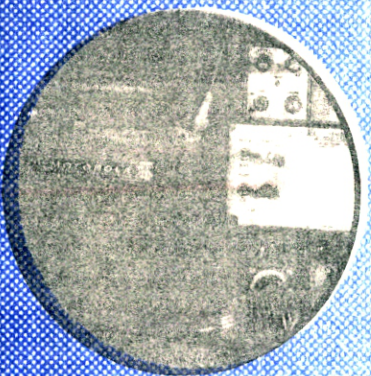
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HEAVY MINERAL ANALYSIS OF THE STREAM SAND SAMPLES FROM GILGIT AGENCY



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By
Nasir Ali Bhatti
& Atiq Alam

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HEAVY MINERAL ANALYSIS OF THE
STREAM SAND SAMPLES
FROM
GILGIT AGENCY

BY

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Issued by Director General Geological Survey of Pakistan,
Quetta

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FIGURE

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ABSTRACT

Stream sand sampling was carried out in the report area of Gilgit Agency under the Mineral Exploration program of the Geological Survey of Pakistan. 34 samples were collected by panning the detrital sands from the tributaries of the Gilgit River covering a drainage area of about 2,500 sq.miles. Heavy mineral concentrates from these samples were examined for the identification of their mineral constituents and their percentage composition. This report provides the locations of these samples and their percentage of mineral constituents.

Some anomalous values of certain minerals have been noted and as such, their pertinent areas of occurrence are recommended to be of consideration for further exploration work in the area.

INTRODUCTION

Purpose and Scope

Geological Survey of Pakistan carried out Mineral Exploration Program in the Northern Region of the country. As a part of this program stream sand samples were collected from the tributaries of the Gilgit river, covering an area of approximately 25,000 sq.miles. 34 samples of heavy mineral concentrates were thus collected which were further studied for their mineral constituents. This report provides locations of sampling sites and the heavy mineral analysis data of these samples.

Location and Accessibility

Area of this report lies within Longitudes $73^{\circ}30'E$ to $74^{\circ}30'E$ and Latitudes $35^{\circ}45'N$ to $36^{\circ}45'N$ and is located within the Survey of Pakistan's degree sheets 43I, 42H and 42L (in sets, Fig.1). Accessibility in the area is along the river and its tributaries. Through out the field work, horses were used for personal movement and

transportation of the camping gear. Route from Darkot to Ishkuman direct over the high mountains was hard and difficult and has been traversed very rarely in the past.

For locations of all the sampling sites Figure I may be seen.

ACKNOWLEDGEMENTS

Rajas of Gupis, Yasin and Ishkuman arranged to provide the men and horses for the transportation purposes. Their cooperation and help is gratefully acknowledged. Hube-Ali an assignee of Raja of Yasin accompanied during field work in Yasin Valley. Most of the work which involved days long journey's on foot and frequent shifting of the camps was done by Allah Ditta (from Jhang) a personal trustee of the senior author. An utmost appreciation is recorded for him.

Mr. Kamal Pasha helped in putting the data in a presentable form.

Dr. Farhat Hussain personally persuaded for the completion of this report, which is acknowledged with thanks.

METHOD OF SAMPLING

Selection of Sampling Site

In order to collect a representative sample of the detrital material from the drainage area of a stream, its confluence with the major water course makes a suitable site. As may be seen from Figure 1, almost all the sampling sites were chosen at the confluence of the streams. After having chosen the suitable site, a proper spot was selected by visual observation where a suitable sized detrital material had accumulated along the edge of the water course. Preferably a spot at an ox-bow bend of the stream course where natural washing and panning of the detrital material could have taken place, was chosen. In Figure 1, individual locations of the sampling sites with their reference number as well as local names of the stream courses where samples were collected, are given.

Sampling Method

An appropriate amount of the detrital material at the chosen spot along the stream course was dug and put on the conventional washing pan. While holding the pan in both the hands, the material was washed, panned and reworked till a heavy mineral concentrate accumulated on the edge of the pan. This material was thus collected and bagged for further study.

HEAVY MINERAL ANALYSIS

Heavy mineral concentrate samples collected as above were subjected to the petrological study for their mineral compositional analysis. For this purpose, standard methods and procedure as prescribed by Jone and Fleming (1965) for identification and percentage determination of heavy mineral grains, were followed. Minerals thus identified with their constituent percentage are given in Table 1.

TABLE 1. HEAVY MINERAL ANALYSIS DATA OF THE STREAM SAND SAMPLES IN PERCENTAGE CONSTITUENTS.

Sample No.	Sampling Site	Hornblende	Biotite	Muscovite	Garnet	Zircon	Epidote	Tourmaline	Ilmenite	Augite	Sillimanite	Monazite
1.	Gilgit river at Gilgit	50	20	10	5	1	5	2	1	3	-	-
2.	Bargu	55	20	5	1	1	2	-	Tr	-	-	-
3.	Shirot Gah	70	10	3	2	2	1	-	-	3	-	-
4.	Gulapur Gah	60	16	5	6	1	2	Tr	Tr	5	-	Tr
5.	Singal Gah	40	25	5	11	5	3	-	2	-	-	2
5a.	Gakuch Gah	65	6	2	-	3	2	-	7	-	-	Tr
5b.	Haim Nala	50	30	8	2	1	-	-	4	-	-	-
6.	Dalti Gah	10	40	20	1	2	3	-	5	-	-	-
7.	Bata Kush	10	30	16	3	3	9	-	8	-	-	-
8.	Khamit Bar	10	40	17	6	1	3	3	4	-	-	-
9.	Ghajalti Nala	5	7	10	27	7	-	-	7	-	-	2
10.	Qurkulti Bar	25	6	5	3	1	10	-	8	-	-	Tr
11.	Asam Bar	26	6	7	4	3	10	-	7	-	-	-
11a.	Das Bar	20	33	10	7	3	3	-	2	-	2	Tr
12.	Hundar Bar	10	36	8	4	1	7	-	8	-	-	-
13.	Umilsit Bar	3	50	26	16	-	1	3	-	-	-	-
14.	Ghamu Bar	5	35	12	16	2	10	-	2	2	-	-
15.	Dulung Bar	7	44	21	6	2	4	2	2	-	-	1
16.	Gekushi Bar	12	34	15	8	5	2	2	-	-	-	1
17.	Ghasho Gol	16	35	10	5	2	6	-	-	-	-	Tr
18.	Neo Bar	19	34	10	4	2	4	-	1	-	-	Tr
19.	Anesar Bar	19	23	5	7	5	7	1	3	-	-	1
20.	Holojut	10	24	7	Tr	Tr	2	-	3	-	-	Tr
21.	Phaiz Gah	5	38	12	1	1	3	-	4	-	-	-
22.	Handis Gah	3	49	7	-	Tr	1	-	2	-	-	-
23.	Mahthantir Gah	32	23	8	2	1	3	Tr	1	-	-	Tr
24.	Chhantir Gah	29	17	7	3	2	6	2	3	4	-	-
25.	Ishkamitar	8	39	5	-	1	3	-	2	-	-	-
26.	Shiniki Gah	13	35	19	7	4	6	3	4	-	-	1
27.	Haibar Gol	33	18	4	3	1	9	-	3	-	-	-
28.	Gishgish	23	33	9	4	1	7	3	3	-	-	-
29.	Asembar Gol	7	31	7	-	-	5	1	Tr	-	-	-
30.	Phakor Gol	27	15	6	2	1	6	1	3	-	-	-
31.	Hayul Gol	15	24	11	3	-	5	2	6	-	-	-

Cont..

Sample No.	Sampling site	Allamite	Barite	Diopside	Smethsonite	Staurolite	Hypersthene	Carbonates	Casseterite	Actinolite	Rutile	Scheelite	Titanite	Tyuyamunite	Apatite	Zoisite	Iron Oxide
1.	Gilgit river at Gilgit	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-
2.	Bargu	-	5	-	-	-	-	Tr	-	6	-	3	1	Tr	Tr	-	-
3.	Shirot Gah	-	2	-	-	Tr	Tr	-	Tr	5	-	1	-	Tr	-	Tr	Tr
4.	Gulapur Gah	-	-	-	-	Tr	-	1	1	3	Tr	-	-	-	-	-	-
5.	Singal Gah	-	1	-	-	-	-	-	-	6	Tr	-	-	-	-	-	-
5a.	Gakuch Gah	-	4	-	-	-	5	1	-	-	-	-	-	-	-	-	3
5b.	Haim Nala	-	2	-	-	-	1	-	-	-	1	-	-	-	-	-	-
6.	Dalti Gah	-	-	-	-	-	-	1	-	2	-	-	-	-	-	-	3
7.	Bata Kush	-	2	-	-	1	-	-	Tr	-	-	3	-	-	-	-	5
8.	Khamit Bar	-	Tr	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.	Ghajalti Nala	-	5	-	-	-	2	-	-	-	-	1	-	-	-	-	10
10.	Qurkulti Bar	-	3	-	-	-	-	-	-	4	-	1	-	-	-	-	-
11.	Asam Bar	-	-	-	-	-	-	-	-	-	-	Tr	-	-	-	-	-
11a.	Das Bar	-	5	-	-	-	-	-	-	-	-	2	-	-	-	-	-
12.	Hundar Bar	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-
13.	Umilsit Bar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14.	Ghamu Bar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15.	Dulung Bar	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16.	Gekushi Bar	-	2	-	-	-	-	-	Tr	-	-	1	-	-	-	-	-
17.	Ghasho Gol	-	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-
18.	Neo Bar	-	2	4	-	-	-	-	Tr	-	-	-	-	-	-	-	-
19.	Anesar Bar	-	4	-	-	-	-	-	-	-	-	1	-	-	-	3	-
20.	Holojut	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21.	Phaiz Gah	-	1	-	4	-	-	-	-	-	-	-	-	-	-	-	-
22.	Handis Gah	-	1	-	-	-	-	14	-	-	-	2	-	-	-	-	-
23.	Mahtantir Gah	-	1	-	-	-	-	9	-	-	-	-	-	-	-	-	-
24.	Chhantir Gah	-	2	2	-	-	-	8	-	-	-	-	-	-	-	-	-
25.	Ishkamitar	-	-	-	-	-	2	14	1	-	-	1	-	-	-	-	-
26.	Shiniki Gah	-	-	-	-	-	-	3	-	-	-	2	-	-	-	-	-
27.	Haibar Gol	-	Tr	-	-	-	-	10	-	-	-	-	-	-	-	-	-
28.	Gishgish	-	1	-	-	-	-	5	-	-	-	-	-	-	-	-	-
29.	Asembar Gol	-	2	-	-	-	2	16	-	-	-	-	-	-	-	-	-
30.	Phakor Gol	-	-	-	-	-	3	12	-	-	-	-	-	-	-	-	-
31.	Hayul Gol	-	3	4	-	-	-	11	-	-	-	-	-	-	-	-	-

Cont..

Sample No.	Sampling site.	Aragonite	Pyrite	Limonite	Willenite	Witherite	Carnotite	Uraninite	Pyrobtite	Spinel	Alunite	Strontianite	Calcite	Beryl
1.	Gilgit river at Gilgit	-	-	-	-	-	-	-	-	-	-	-	-	-
2.	Bargu	-	-	-	-	-	-	-	-	-	-	-	-	-
3.	Shirot Gah	-	Tr	-	-	-	-	-	-	-	-	-	-	-
4.	Gulpur Gah	-	-	-	-	-	-	-	-	-	-	-	-	-
5.	Singal Gah	-	-	-	Tr	-	Tr	-	-	-	-	-	-	-
5a.	Gekuch Gah	-	-	-	-	-	Tr	-	-	-	-	-	-	-
5b.	Haim Nala	-	-	-	-	-	-	-	1	-	-	-	-	-
6.	Dalti Gah	-	13	-	-	-	-	-	-	-	1	-	-	-
7.	Bata Kush	-	4	-	-	-	-	-	1	-	-	-	-	-
8.	Khamit Bar	-	7	-	-	-	-	-	-	-	-	-	-	-
9.	Ghajalti Nala	-	-	-	-	-	Tr	-	-	-	Tr	-	5	-
10.	Qurkulti Bar	-	-	-	-	-	-	-	-	-	-	-	8	1
11.	Asam Bar	-	-	-	-	-	-	-	-	-	-	-	10	1
11a.	Das Bar	-	5	-	-	-	-	-	-	-	-	-	-	-
12.	Hundar Bar	-	-	-	-	-	Tr	-	-	-	-	-	10	-
13.	Umilsit Bar	-	-	-	-	-	-	-	-	-	-	-	5	-
14.	Ghamu Bar	-	-	-	-	-	-	-	-	7	-	Tr	3	-
15.	Dulung Bar	-	-	-	-	-	-	-	-	-	-	-	5	-
16.	Gekushi Bar	-	5	-	-	-	-	-	-	3	-	-	-	-
17.	Ghasho Gol	-	4	-	-	-	-	-	-	-	-	-	6	-
18.	Neo Bar	-	2	-	-	-	Tr	-	-	-	-	-	6	-
19.	Anesar Bar	-	2	-	-	3	-	Tr	2	-	-	-	3	-
20.	Holojut	-	7	3	-	-	-	-	-	-	-	-	7	-
21.	Phaiz Gah	2	3	5	-	-	-	-	-	-	-	-	5	-
22.	Handis Gah	-	*8	3	-	-	-	-	-	-	-	-	-	-
23.	Mahthantir Gah	-	*5	-	-	-	-	-	-	-	-	-	-	-
24.	Chhantir Gah	-	*6	-	-	-	-	-	-	-	-	-	-	-
25.	Ishkamitar	-	*10	5	-	-	-	-	-	-	-	-	-	-
26.	Shiniki Gah	-	1	-	-	-	Tr	-	-	-	-	-	-	-
27.	Haibar Gol	-	*3	-	-	-	5	-	-	-	-	-	-	-
28.	Gishgish	-	4	2	-	-	-	-	-	-	-	-	-	-
29.	Asembar Gol	-	*5	2	-	-	-	-	-	-	-	-	-	-
30.	Phakor Gol	-	*10	-	-	-	-	-	-	-	-	-	-	-
31.	Hayul Gol	-	*4	-	-	-	-	-	-	-	-	-	-	-

* Sulphides in total mainly pyrite.

Cont..

Sample No.	Sampling site.	Chalcopyrite	Hematite	Chlorite	Serpentine	Chromite	Lecontite	Remarks
1.	Gilgit river at Gilgit	-	-	-	-	-	-	
2.	Bargu	-	-	-	-	-	-	
3.	Shirot Gah	-	-	-	-	-	-	
4.	Gulapur Gah	-	-	-	-	-	-	
5.	Singal Gah	-	-	-	-	-	-	
5a.	Gekuch Gah	-	-	-	-	-	-	
5b.	Haim Nala	-	-	-	-	-	-	
6.	Dalti Gah	-	-	-	-	-	-	2 specks of gold present.
7.	Bata Kush	-	-	-	-	-	-	
8.	Khamit Bar	3	6	-	-	-	-	
9.	Ghajalti Nala	-	-	-	-	-	-	
10.	Qurkulti Bar	4	5	8	8	-	-	
11.	Asam Bar	3	8	10	4	Tr	-	
11a.	Das Bar	-	3	-	-	-	-	
12.	Hundar Bar	-	6	-	-	1	-	
13.	Umilsit Bar	-	16	-	-	-	-	Rock grains 10%
14.	Ghamu Bar	-	1	3	-	-	2	
15.	Dulung Bar	-	4	-	-	-	-	Rock grains 5%
16.	Gekushi Bar	-	-	-	-	-	-	
17.	Ghasho Gol	-	7	7	-	-	-	
18.	Neo Bar	-	3	5	-	-	-	
19.	Anesar Bar	-	4	7	-	-	-	
20.	Holojut	-	9	9	-	-	-	
21.	Phaiz Gah	-	5	5	-	-	-	Rock grains 6%
22.	Handis Gah	-	5	3	-	-	-	
23.	Mahtantir Gah	-	3	12	-	-	-	
24.	Chhantir Gah	-	-	4	-	-	-	Cooting on same grains
25.	Ishkamitar	-	4	-	-	-	-	
26.	Shiniki Gah	-	2	-	-	-	-	
27.	Haibar Gol	-	-	5	-	-	-	
28.	Gishgish	-	2	3	-	-	-	
29.	Asembar Gol	-	4	-	-	-	-	
30.	Phakor Gol	-	4	11	-	-	-	
31.	Hayul Gol	-	3	11	-	-	-	

OBSERVATIONS

It has been observed from heavy mineral analytical data given in Table 1, that:

1. Hornblende, biotite and muscovite are in an overall abundance.
2. Two specks of gold are seen in Sample 9 from Dalti Gah - a tributary of Naz Bar in Yasin Valley.
3. Barite has been found to be present in most of the samples.
4. Uraninite is present as traces in sample 19 from Anesar Bar.
5. Constituent values of actinolite being 5 to 6% in Samples 2, 3 and 5, respectively from Bargu, Shirot and Singal, are significant.
6. Zoisite occurs as 3% in Sample 19 from Anesar Bar.
7. Carnotite is identified as 5% in Sample 27 from Haibar Gol.
8. 1% Beryl in Sample 10 and 11 respectively from Qurkulti Bar and Asam Bar; 7 and 3% Spinel from Sample 14 and 16, respectively from Ghamu Bar and Gekushi Bar are anomalous to the background values.
9. 2% Monazite in Sample 5 from Singal and Sample 9 from Ghojalti Nala appear to be significant.

It has been noted with interest that some of the minerals, which occur though in small quantity but relatively anomalous, in the study area, make potential deposits of economic value in Southern U.S.S.R - a region further north of Gilgit across Karakorum Ranges. Such minerals are :

1. Actinolite which occurs in its grass green nephrite (Jade) variety at Kara Zhelga - south of Baikal Lake and in Eastern Pamir at Roskom Darya (Agol and Gure Vich p.498-99)
2. Zoisite - at Mount Urma (Urals) - (above reference p.469)
3. Rutile - at Ilmen Mountains, Central Kazakhstan (above reference p.283)
4. Beryl of Izumurd (Emerald) mines in the Ural and Attai Mountains - Baikal Province (above reference p.476)

It appears proper to point out that under this situation, it will be highly beneficial for the Pakistani geologists to examine and study the above said mineral deposits of Southern U.S.S.R., so that they may look for similar geological aspects and indications for the exploration of these minerals in Pakistan.

RECOMMENDATIONS

Based on the observation of this report, it is recommended that the drainage areas of the tributaries mentioned below may be considered for their respective mineral prospects during further exploration work in the area. Location of these tributaries is given in Figure 1.

1. Dalti Gah - a stream of Naz Bar in Yasin Valley for gold.
2. Ghajalti Bar-northeast of Yasin for Zircon and Garnet.
3. Anesar Bar-east of Darkot for Uraninite and Zoisite.
4. Bargu, Shirot and Singal Gah for Actinolite.
5. Qurkulti Bar and Asam Bar (northeast of Yasin) for Beryl.
6. Ghamu Bar and Gekushi Bar (west and north of Darkot) for Spinel.
7. Pakistani Geologists engaged in exploration for the Gemstones may be provided with an opportunity to examine the mineral deposits of Actinolite, Zoisite, Rutile and Beryl which are located in contiguous region of Eastern Pamir and South of Baikal in U.S.S.R. so that they may look for the similar indications and geological associations in Northern Region of Pakistan.

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