COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF SUPPLY AND DEVELOPMENT.

BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS.

REPORT

RECORDS NO. 1952/2.

REPORT ON THE ALLUVIAL GOLD DEPOSITS OF MASTUJ AND CHITRAL RIVERS IN CHITRAL STATE, PAKISTAN.

by

J. F. Ivanac, D. M. Traves and D. King.

CANBERRA.

RECORDS 1952/1.

REPORT ON THE ALLUVIAL GOLD DEPOSITS OF MASTUJ AND CHITRAL RIVERS IN CHITRAL STATE, PAKISTAN.

by

J. F. Ivanac, D. M. Traves and D. King.

C O N T E N T S.

P L A N.

Title.	Scale.
Map showing distribution of Alluvial Deposits of Mastuj and Chitral Rivers between Mastuj and Drosh	1 inch = 2 miles.

TABLE I

Situation, Area, Maximum Length and Maximum Width of Present-day river gravels in Mastuj and Chitral Rivers.

SUMMARY.

The alluvial gold deposits of Mastuj and Chitral Rivers have been examined. Access to the deposits can be gained from Peshawar via Malakand and Dir. The Mastuj and Chitral Rivers flow south, through rugged, mountainous country. Present day river gravels are found as lenticular deposits along the main river courses, and surface gravels and sands are panned for their gold content by local inhabitants.

It is suggested that the Tordeh-Thamunaik Kuri-Gahirat and Drosh-Sardur deposits be tested. A Mining Engineer should inspect the deposits and carry out scout boring with hand drilling equipment. The results of testing should show whether or not the working of these deposits is economic.

INTRODUCTION.

The presence of alluvial gold in the river gravels of Mastuj and Chitral has been known for many years, and local inhabitants have realised the value of the gold and have worked the deposits.

Tipper (1923), Coulson (1937), Ikramuddin Ali (1951) and Tayyab Ali (1951), have reported on the placers but no accurate determinations have been made of their size or grade. In August, 1951, the Australian Geological Party, J. F. Ivanac, D. M. Traves, and D. King, examined the deposits between Mastuj and Drosh, with the objects of reporting on the size and nature of the placers, and if warranted, to suggest suitable sites for testing. This examination was made possible through the Technical Assistant to South East-Asia Scheme.

SITUATION AND ACCESS.

Chitral State lies in the north-west Frontier Province of Pakistan and adjoins Afghanistan to the west, Dir State to the south, the Gilgit Agency to the east, and adjoins the Union of Soviet Socialist Republics to the north. Access to the alluvial deposits can be gained by road from Peshawar via Malakand and Dir; over Lowarai Pass to Ziarat and thence to Drosh and Chitral, the capital of the State. Between Peshawar and a short distance beyond Dir, the road can be used by heavy vehicles. This road (Plate 1) is being extended to connect with the motor road from Chitral to Mirkhani. At present, the section of the road over Lowarai Pass is only a pack track, but will be converted to a motor road by December, 1951.

To supplement overland transport, an air-freighter service from Rawalpindi to Drosh and Chitral, was commenced in October, 1951. A private plane may be chartered for transport of personnel and equipment to Chitral.

Alluvial deposits along the Mastuj River may be reached from Chitral. Tracks, suitable for pack animals and horses, and in some sections suitable for jeeps, pass within a short distance of the deposits. Before the entire road could be used for jeeps, many bridges would have to be constructed and narrow pack tracks widened.

TOPOGRAPHY.

The topography is rugged and mountainous, and in the area examined heights range from 5,000 feet at river level at Chitral to 25,000 feet at Mt. Tirich Mir. The

The drainage system is well defined and consists of two main rivers, the Mastuj and Lutkho (Plate 2), which join four miles north of Chitral to form the Chitral River. These rivers drain south, and have a braided course in the wider, alluviated portions of their valleys. In other places the river courses are marked by rapids, and in these parts the valleys become gorges.

CLIMATE AND VEGETATION.

Chitral State is in the sub-tropical, continental highland belt of north-west Pakistan (Ahmad, 1951). Temperature ranges from 90 to 100degrees Fahrenheit, in summer, when the weather is oppressive, to 40 to 50 degrees Fahrenheit in winter. The average annual rainfall is 18.0 inches, most of which falls in the months of March and April. Thunderstorms may occur in the summer season, from May to October.

Vegetation is sparse in the lower parts of the valleys, but is more abundant on the higher slopes where pine trees are found between 8,000 and 10,000 feet. Pine forests are generally situated 3 to 5 miles from the alluvial placers.

LABOUR SUPPLY, ACCOMODATION.

Labour is scarce, and in all cases is unskilled. The villagers are mostly farmers and have had no experience of mechanical methods of work. Arrangements for labour can be made through the State Governor or village headman.

Accommodation is available at Government and Mehtari* Rest Houses which are situated at Drosh, Gahirat, Chitral, Barenis, Reshun, Buni, Sanoghar and Mastuj. Food in small quantity can be obtained in most villages and the Government Officials and local chieftain usually arrange the purchases.

ALLUVIAL DEPOSITS.

The alluvial deposits are described under the headings:-

(a) Sub-Recent Terraces

(b) Recent Terraces

(c) River Gravels

(d) Illuvial Screes

(e) Moraine.

(a) Sub-Recent Terraces.

Sub-Recent Terraces and fans, composed of boulders, pebbles and fine sands occur from 30 to 100 feet above present river level. They are mostly under cultivation but in a few places, where water for irrigation is not available, have been left untilled. The north-west portion of a terrace 100 feet above river level at Sanoghar village is uncultivated, and may be suitable for sluicing provided sampling results are favourable. Gold is obtained from present day gravels both upstream and down-stream from the deposit, and it is possible that this terrace contains some gold. This deposit should be tested, if more accessible alluvials downstream on the Chitral River give favourable results on sampling.

(b) Recent Terraces.

Recent terraces are irregular, lenticular

---

* Rest House of the local Ruler or Chieftain.

accummulations of boulders, pebbles and sand, generally at a height of approximately thirty feet above river level. These deposits fringe the Sub-Recent terraces and are under cultivation in some places. They do not warrant testing because of their small size and irregular distribution.

(c) Present-day River Gravels.

River gravels are distributed along the main river channels and occupy a more extensive area than uncultivated Sub-Recent and Recent terraces and fans. The deposits are generally lenticular and consist of boulders, pebbles and sands. The boulders range in size from one to two feet diameter but in some places boulders over 6 feet in diameter were found in the gravels.

These gravel deposits are approximately at river level, are uncultivated, and are therefore available for testing without interfering with the agricultural pursuits of the villagers. Table I shows the location, area, maximum length and maximum width of the largest placers in the area. Three of these deposits, the Tordeh-Thamunaik, Kuri-Gahirat and Drosh-Sardur deposits, are sufficiently large to warrant testing, and are very close to a motor road (suitable for vehicles by December, 1951) from Peshawar to Chitral State.

For many years, gold has been washed from sands of these river gravels, particularly along the edges of the Mastuj and Chitral Rivers. Sands and gravels are collected in a cane basket, and tipped into a sieve which has two to three-inch walls on three sides, and is open on one side for convenient ejection of pebbles. Water is poured onto the gravels by hand and the sand content washed through the sieve intoa "buttia" or long wooden cradle. This cradle is approximately three feet long and one and a half feet wide, and is walled on three sides. During the washing process the "buttia" is continuously rocked by hand, until a concentrate is collected. This concentrate is then poured in a wooden dish until most of the unwanted heavy minerals are eliminated. Gold is then amalgamated with mercury, which is later vaporized by heating the amalgam in an open pot.

The average earnings of a gold washer and his assistant range from 40 to 80 rupees (£13 Australian) per month, but in some cases may be as much as 120 rupees (£17 Australian) per month. Rahman (1950) reports that 160 lb. of gravels and sands can be washed by two men per half hour, which amounts to approximately 1600 lb. per day. If it is assumed that two-thirds of the gravel is rejected by hand when collecting material for washing then 4,800 lb. (approximately 1 cubic yard) of wash would be treated per day. The value of gold obtained from such quantity of sand according to the above figures averages about 10/- Australian.

The gold occurs as thin laminae and scales, irregular to oval in outline, which range in size from 0.6 mm. to 2 mm. diameter. The majority of flakes are of the 0.6 mm. size*. However, this gold is won only from the resorted surface sands, and no attempt is made to treat the placers in depth.

(d) Illuvial Deposits.

Illuvial deposits, resting at a high angle on hill sides, accummulate on the slopes below the mouths of narrow valleys. The deposits abut upon the alluvial placers.

(e) Moraine.

A dissected terminal moraine was mapped near

---

* From S. Ikramuddin Ali's Preliminary Report on Alluvial Gold in Chitral.

Sanoghar. Such moraines have dammed the rivers in Sub-Recent times, possibly leading to the formation of some of the Sub-Recent alluvial terraces.

SOURCE OF THE GOLD.

The gold generally occurs in the river gravels as flattened grains and fine dust, indicating that the gold has travelled some distance from the source. The source of the gold is not known but it may well be derived from the quartz veins and stringers disseminated throughout the sedimentary rocks in the area. Quartz veins are commonly concentrated in sediments marginal to intrusive rocks but it is not known whether this applies to this area. However, in some places in the adjacent Gilgit Agency an increase in the number of quartz veins near igneous contacts has been noted. The three streams - Roman, Reshun and Kuragh - along which auriferous gravels occur have their headwaters near a granodiorite-sediment contact. The age of granodiorite intrusions has been suggested as Tertiary and it is probable that this mineralization is of similar age.

SAMPLING PROBLEMS.

Some of the difficulties likely to be encountered when sampling the deposits, are listed below:

1. Previous investigators have found that pitting is an unsuitable method of testing the deposits because the gravels are so loose that the walls of pits will not stand, and because of the large and rapid inflow of water, due to the nearness of the river.

2. Drilling equipment should be light, and of a kind suitable for ferrying across the many channels in the braided portions of the rivers.

3. Labour is not readily available, and is unskilled. However, wages are very low and seldom more than 2 rupees (about six shillings Australian) per day.

4. The rivers have their greatest flow and maximum width in the summer months, due to water derived from melting snow; in the cold, winter months more gravels are exposed because of the reduced amount of melt water from snow and glaciers. However, the summer months, when there is less likelihood of rain, would probably be the most suitable season for testing the placer deposits.

The problems outlined above suggest that the engineer examining the deposit should have hand-drilling equipment with him. Enough labour to operate such a drill could be obtained from nearby villages.

RECOMMENDATIONS.

It is recommended that a mining engineer visit the deposits and carry out preliminary testing of the Tordeh-Thamunaik, Kuri-Gahirat and Drosh-Sardur deposits. Simple hand-boring apparatus is suggested. The local supply of labour is probably adquate to operate this equipment. If scout-boring results are favourable in these placers, systematic testing should be carried out, and the more inaccessible deposits sampled.

REFERENCES.

Coulson, A.L., 1937-38 - Gold in the North-west Frontier Province. Trans.Min.Geol. and Met.Inst. India. 33 Pt. 1-4. 192-206.

Fermor, L.L., 1922 - General Report for 1921 (Chitral Gold, etc.) Rec.Geol.Surv.India, 54, p.16.

Ikramuddin Ali, S., 1950 - Preliminary Report on Alluvial Gold in Chitral. Geol.Surv. Pakistan.

Rahman, A.Y.M.H., 1950 - Extract from Preliminary Report on Drosh District, Chitral. Geo.Surv. Pakistan.

Tayyab Ali, S., 1950 - Preliminary Report on the Economic Mineral Occurrences in parts of Lutkho, Turikho, Mulikho and Chitral Districts of Chitral State, N.W.F.P. Geol. Surv. Pakistan.

TABLE 1.

Situation	Reference Plate	Area Square Miles	Maximum Length in Yards	Maximum Width in Yards	Miles from Chitral.	
Mastuj - 1 mile west of Sanoghar	1	0.8	7,040	352	70	
Krui Mulogh-Buni	"	0.8	3,872	440	53	
South Buni-Rom Kili	"	0.9	6,336	440	48	
Bumbogh	"	0.3	1,760	264	44	
Singur-Dania	"	0.4	4,224	360	1	Depth unknown but at least 15 ft.
Tordeh-Thamanaik	"	1.0	5,280	440	5	
Kuri-Gahiret	"	0.9	4,928	440	10	
Drosh-Sardar	"	0.8	3,520	440	19	

MAP SHOWING
ALLUVIAL DEPOSITS OF MASTUJ AND CHITRAL RIVERS BETWEEN DROSH AND MASTUJ

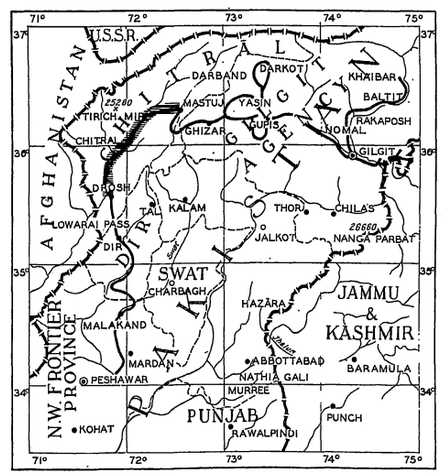
SCALE

2 0 2 4 6 MILES

REFERENCE

- Cultivation
- Alluvial fans
- Present river gravels
- Recent river gravels
- Sub-Recent gravels and alluvial fans
- Moraine
- Geological boundary
- Track
- Motor road
- Bridge
- Rapid
- Swift water

LOCALITY MAP



BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS, CANBERRA, JANUARY 1952