REGIONAL GEOCHEMICAL EXPLORATION FOR GOLD AND BASE METALS IN HAZARA DIVISION N.W.F.P, PAKISTAN

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ABSTRACT

Sarhad Development Authority (S.D.A) a Provincial Organization of North West Frontier Province (NWFP). Pakistan is playing its role in the exploration, development and exploitation of various economic mineral deposits of the North West Frontier province, Pakistan since 1972.

In the recent past, SDA in joint collaboration with Australian International Development Bureau (AIDAB) has launched an exploratory programme on the modern scientific techniques for the exploration of preceious and base metals in Chitral District NWFP with the objective to create a data base to provide necessary informations regarding un-explored areas and investigate metallic mineral deposits of economic significant for further regional systematic minerals exploration to attract foreign investors.

Keeping in view the positive and encouraging results of the AIDAB programme in Chitral the Sarhad Development Authority started geochemical exploration for Gold and Base Metals in the remaining Northern parts of NWFP i.e Hazara Division and Malakand Division on the pattern of AIDAB programme since October, 1993.

The objective of the scheme "Regional Exploration for Gold and Base Metals Hazara Division" was to conduct first phase exploration in about 12000 sq. kms of Hazara Division NWFP on Regional scale i..e 1:250,000 with density of each pan concentrate and -80# stream sediment samples in 10-50 km^2 area.

Geologically the area is related to the Indian plate and Island Arc assemblages known as Kohistan Island Arc Both the Indian plate and Island Arc are separated from each other by a deep reaching thrust known as the Main Mantle Thrust (M.M.T). Along the MMT the Indian plate subjected under the Island Arc assemblages probably during the cretaceous period.

The project team collected 1788 Nos of drainage samples from different streams of Hazara Division on scale 1:250,000 in the first phase of the project (1993-98). These samples were chemically and mineralogical studied.

Encouraging results were obtained and anomalous values of Au and other base metals in different parts of hazara Division were found specially in Kohistan valley, Jalkot valley, Siran and Kunhar valley (Kaghan).

Based on these achievements Hazara Division has been divided into nine priority areas recommended for further detailed geo-chemical exploration in order to locate and pin point the Gold and bsae metals economic deposits in their respective areas of interest.

It is worth mentioning here that a multinational company MINARCO showed their interest in the data collected by the SDA Geological team. The MINARCO analyzed the duplicate samples for 32 elements in Autralia and found the same areas of interest anomalous in Au and base metals as were found by the project geo-scientists.

Keeping in view the afore-mentioned results another scheme was launched to explore the areas of interest of Hazara Division in more detail i.e. on scale 1:50,000. The scheme has been commenced from 1998 and shall be completed in the year 2001.

INTRODUCTION

To prepare a geochemical data base of Hazara Division for gold and base metals a scheme was launched to achieve its targets on the modern geochemical pattern of exploratory studies carried out by SDA at Chitral in joint collaboration with Australian experts (1991-94) under the AIDAB Govt: of Australia's technical and financial assistance "Gold Exploration and Mineral Analysis Project" (GEMAP).

To conduct initial regional geochemical mineral exploration in Hazara Division covering about 12000 sq.kms area in 5 years by collection of about 3500 samples to create the essential mineral exploration data of Gold, Copper, Lead, Zinc, Silver, Nickle, Chroium, Tungsten etc by collecting stream sediments (pan concentrate and -80# fine sediments) at appropriate distance/ locations, mineralogical studies and chemical analysis of these samples interpretation and preparation of geochemical maps of Hazara Division.

The scheme implemented on the pattern of AIDAB exploration programme. The SDA's Geologists have undertaken the exploration very effectively and despite the hindrance of logistics, access difficulties, weather severencess, the project teams of geologists and its supporting staff during three years of implementation of the project have been successful in achieving the physical progress in accordance with the targets set-out in the scheme.

During its three years period of operations had completed collection of 894 Nos of pan concentrate and 894 Nos of -80# stream sediments samples from all the accessible streams of the area. Geological, mineralogical record and float description of all the samples have been recorded alongwith their chemical analysis and pin-pointing the anomalous samples/areas of gold and other base metals as per Australian Geologists field exploration manual. These samples were analysed for Gold, Silver, Copper, Lead Zinc, Nickel, Chromium, Bismith and Cobalt.

The data interpretation and evaluation has been done both manually and by utilizing the MICROMINE Computer softwear package provided to SDA under AIDAB grant assistance programme.

Based on these studies certain conclusion have been drawn and priority for further detailed geochemical exploration have been recommended in order to be able to explore and located economic deposits of gold and base metals in Hazara Division and present the same in shape of reports and maps to the interested foreign and local entrepreneur who intend to invest in the mineral exploration and mine development. Besides this it will create and update the necessary required geochemical data base for further studies.

It is to be pointed out that a memorandum of understanding (MOU) was signed by SDA and M/S MINORCO B.V. Holland a multinational Mineral Exploration Company based at Hungary, during 1997 whose experts made field visits with our geologists in Hazara Division and analysed 1767 Nos duplicate geochemical samples in Australia and other countries. M/S MINORCO have analysed our samples for 32 elements and have submitted their report to SDA for further utilization.

OBJECTIVES

The main objective is to conduct systematic first phase exploration in about 12000 sq.kms area of District Kohistan, Mansehra and Abbottabad (Hazara Division) for gold and base metals. The exploratory programme has been designed to locate, identify any significant mineral deposits present in the region and to generate a comprehensive geological - geochemical data base which will form the basis for and to encourage future mineral exploration of the region.

In order to provide full regional geochemical coverage to the area on the scale of 1:250,000 and to identify anomalous minralized targets samples (both pan concentrate and -80# stream sediment) from all accessible drainage cells collected and analysed. Using existing aerial photographs and Satellite Images, existing geological knowledge of the area, existing literatures evolving a geological and ore deposits model for finding and locating gold, copper, lead, zinc and other base metals. This study would lead to identification of anomalous mineralized targets. Based on the studies, followed by examination and priority rating of the anomalous mineralized areas to select them for follow-up survey for locating the mineralized rock units. This exploration process would be added by mineralogical studies of pan concentrate, chemical analysis of selected float samples. Representative rock samples would be collected for chemical, mineralogical and mineral processing studies.

GENERAL GEOLOGICAL SETTING OF THE AREA.

On tectonic-Lithological basis the whole of Northern Pakistan can be divided into three broad domains as shown in the map from south to north.

1. The Indo-Pakistan plate.
2. The Island Arc assemblage.
3. The Eurasian plate.

The two major structures that separated the above three regional plates are:

a. The main Mantle Thrust (MMT).
b. The main Karakuram Thrust (MKT).

Both the Northwardly dipping regional thrust/suture zones, and are the the southward bifurcated extension of the Indus suture zone.

The techtonic picture of the northern Pakistan shows that the Indo-Pakistan plate to the south subduct under the Island Arc assemblages along the main mantle thrust (MMT).

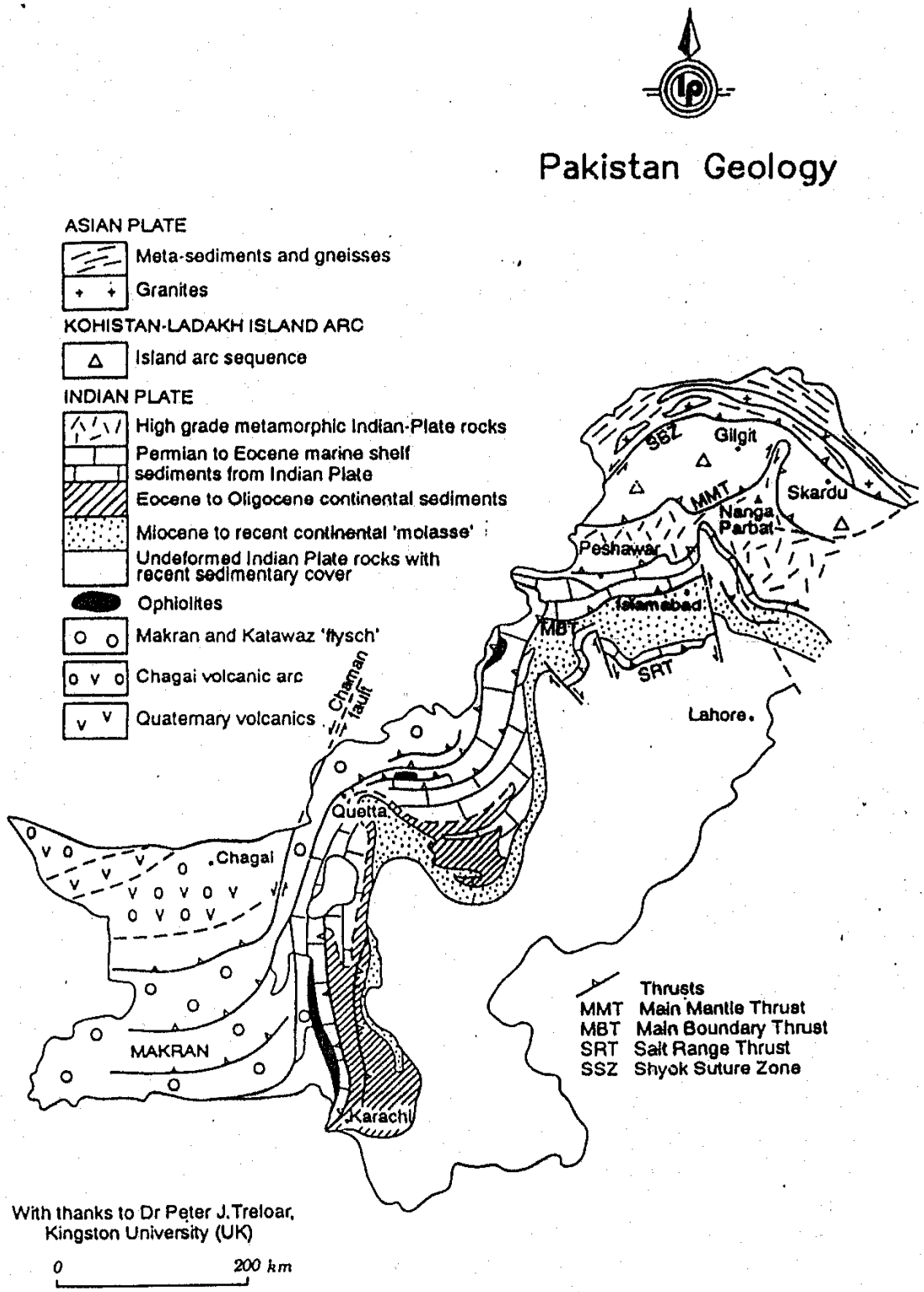
The Island Arc assemblages in turn subduct under the Eurasian plate to the north along the other suture zone of the Main Karakuram Thrust (MKT). Both the MKT and MMT zones run some what parallel to each other in this part of Pakistan.

These two suture zones present different lithological units and are marked by the presence of a member of ophiolite complexes, ultramafic and melange zone in scattered form along their length. These bodies can be traced at Waziristan, Dargai, Alpuri, Jijal, Chilas etc, attributed to the MMT while those found at Drosh, Dir, Yasin, Chalt etc belongs to the Northern Mega Shere (N.M.S).

The main mantle thrust in addition to ultramafics has got a zone of blue schists at Shangla and high pressure mafic Garnet granulite near Jijal. The lithological assemblages belonging to the Eurasian plate including the meta-sedimentary rock of Darkot group, comprising of pelitic and calcareous rocks and an Igneous rock of Karakuram grano-diorite group consisting of grano-diorites, pegmatites aplites and quartz veins.

The Lithological assemblage between the main mantle thrust and the main Karakuram thrust which is about 30 to 40 km thick zone comprises of metasedimentary rocks, calc-alkaline intrusives, volcanics and ultramafic rocks. The sequences has been regarded to represent a complete cross section of a fossil Island Arc abducted on the Indo-Pakistan plate during late cretaceous to early tertiary times.

The Lithological assemblages belonging to the Indo-Pakistan plate consists of metasedimentary, sedimentary, meta-igneous and Igneous sequence of rock. The metasediments are composed of metapolites and psammites showing progressive increase in metamorphic grade towards MMT from chlorite to sillmanite schists and gneisses. The Igneous rocks mostly comprise of granite and granite gneisses and cluster around the plate boundary near the Suture zone. The granite of N.Pakistan has been divided into pan African and Alpine types. These granites are alkaline in nature and are found at Loe-Shilman, Warsak, Sheva-Shahbaz Garhi, Koga-Ambela, Malakand and Mansehra etc



ORE DEPOSITS IN THE REGION.

The precambrian crystalline sequences of the Indian plate are situated between the Main Boundary Thrust (MBT) in the south and the Kohistan Arc in the North.

These crystalline rocks of the areas consists of sedimentary and a large number of Igneous bodies of different composition and of different ages, which have been metamorphosed to varying degrees. Sills, dykes and stocks which are mafic to salicis in nature have intruded the rock above. Known minralization in the Indian plate crystalline sequences are:

LEAD ZINC MINERALISATION.

i. In Besham Lead Zinc mineralization of sedimentary exhalative origin is found at Lahore and pazang localities within 12 km linear belt on both sides of the Indus River. The mineralization occurs in the metamorphosed and complexly deformed volcanic rocks.

ii. Close to the Lead Zinc mineralization at Lahore and Pazang areas Pyrrhotite mineralization within the carbonate rocks is running some what parallel to the Lead Zinc mineralization. Both the Lead Zinc and Pyrrhotite mineralization has an interpreted sedimentary exhalative origin and could indicate potential for substantial deposits of the Brocken hill type Pb Zn deposits (Australia).

ALKALINE AND SUB ALKALINE COMPLEXES.

Economic mineral deposits found in Allai and surrounding areas are magnetite (in Skaran, Hornblendites and Ultramafics).

Sphalerite/galena (in skarns, veins and altered granites) and molybdenite mineralization appears to be associated with the precamberian Lahore granitic rocks.

ISLAND ARC RELATED DEPOSITS.

Epithermal Gold deposits are associated with Geothermal systems volcanic centres and Calc-Alkaline volcanic sequences. Potential for this type of mineralization could be expected in the Geothermal Systems and volcanics sequences of Hazara Division.

KUROKO TYPE, CU, ZN AND VOLCANOGENIC Mn, Fe DEPOSITS.

Sulphide mineralization can be expected in the Island Arc marine volcanics and sediments of the area.

ISLAND ARCAND BACK ARC DEPOSITS POLY METALLIC VEINS.

Hydrothermal galena suphalerite and gold silver are usually associated with regional faults and are expected to occur along batholithic intrusives. Search for these minerals along the area of intrusive rocks may yield good results.

KAMILA AMPHIBOLITES.

The Kamila Amphibolites may have potential for podiform chromite, nickel sulphide and platinum group elements associated with ultramafics and for structurally controlled metamorphic concentration of gold and base metals.

JIJAL ULTRAMAFICS.

The Jijal ultramafics complexes located to the north of southern suture at Jijal, Sapat, Babusar etc having Island plutonic nature may have potential for chromites, copper, nickel sulphide, platinum group elements and Bushveld type Fe-Ti deposits beside the known podiform chromite mineralization at Jijal.

CHILAS COMPLEX.

The Chilas Complex is a vast (300 km by upto 40 km) stratiform plutonic mafic-ultramafic complex, interpreted to possilby represent the root zone magma chamber of the Kohistan Island Arc (Jan el al., 1991).

As well as known chromite-layered dunites, the complex could have potential for Stillwater type massive and matrix disseminated Cu-Ni sulphides, Merensky Reef-Type platinum group elements (PGE's), Bushveld-type FE-TI-V deposits.

THE ALLAI TECTONIC MELANGE.

The Allai tectonic melange (oceanic + Island Arc components) located to the south of southern suture. These different type of magnetite deposits are located in Allai and Besham areas.

KNOWN MINERALIZATION OF THE AREA (GOLD AND BASE METALS).

A number of already known metallic and non metallic mineral occurrances and deposits are present in the area. Some of these deposits have been subjected to detail mineral exploration/evaluation by SDA, while others are reported by various reports or locals.

S.No.	Name of Mineral		Location
1.	Chromite (Cr)		Jijal Dubair Kohistan Distt:
2.	Copper (Cu)		Showings at Batera Kohistan Distt:
3.	Gold (Au)		Placer deposits along Indus River
4.	Iron Ore (Fe)	i.)	Langrial, Abbottabad
		ii.)	Galdanian, Abbottabad
		iii.)	Chora Gali, Mansehra Distt:
5.	Lead (Pb)	i.)	Lahor (Kohistan)
		ii.)	Pazang (Kohistan)
		iii.)	Pashwal (Kohistan
6.	Manganese Ore (Mn)	i.)	Chora Gali, Mansehra Distt:
		ii)	Galdanian, Abbottabad Distt:
7.	Molybdenum (Mo)	i.)	Lahor, Kohistan Distt:
		ii.)	Pazang Kohistan Distt:
8.	Tungsten (W)		Oghi, Mansehra Distt:
9.	Zinc (Zn)		Lahor and Pazang: Kohistan Distt:

GEOCHEMICAL SAMPLING METHODOLOGY.

Systematic regional exploration programme was undertaken by conducting drainage sediments survey. The survey was conducted with a view that any significant mineral deposit of the area will be reflected in the sediments of the drainage system covering the deposits. Heavy pan concentrate samples and fine sediments -80# size samples were collected both in duplicate from various pre-planned streams (each of the stream covering 10-30 km drainage cell). The original pan concentrate and -80# size samples were collected for the geochemical analysis and mineralogical studies respectively. It is worthmentioning here that each pan concentrate sample (20 litres original and 20litres duplicate) were collected from active drainage channel, from at least three natural traps. The above weighted samples were collected in a self sealed plastic bags. For the collection of heavy panned concentrate samples 7 mm and 2 mm sieves were used.

-80# samples upto 200 gm each were collected from at least 5 localities, two locations being heavy mineral traps and the rest from a fine sediment area in the active channel.

The samples collected above were assigned proper number from a numbered series of samples ticket book. These were throughly studied mineralogically using a pocket microscope 25 x at the spot. The stream floats were also studied and local geology was noted. Information complete in all respect were recorded on the prescribed ticket book, for future references.

DATA COMPILATION AND EVALUATION.

a. Sample Data.

Sample data from the sample ticket books, analysis order books and the laboratory analysis results were compared and checked with each other. Necessary entries where required were made and were plotted on samples summary data sheets. Furthermore, a regional as well as separated toposheet drainage cell maps were prepared, all the samples were plotted on these maps alongwith their respective numbers and chemical analysis results.

b. Analytical Data.

The analysis data received from the laboratory (Chemistry + Mineralogy) were checked with the analysis books and filed in chronological order of analysis order number in an "Analysis master file" represented complete analytical work of all the samples in a very systematic way.

c. Analysis Results File (1:250,000 Sheet Area).

Separate copies of analytical results for separate toposheets covering area on the scale 1:250,000 were arranged and filed in respective analysis files.

1:250,000 sheets area analytical results filed, representing a chronological order of analytical work order and results obtained for each toposheet area (Toposheet No.43-A, 43-B, 43-C, 43-E, 43-F, 43-G).

DATA INTERPRETATION.

a. Stream Sediments -80# Geochemical Data.

From the analysis results histograms and frequency distribution curves were prepared for each element using the Micromine Software Package. The distribution for the elements Au, Cu, Pb, Ni, Co, Cr, Bi were based on the analytical data for 894 samples.

Preliminary threshold values were determined for each element such as:-

Elements		Threshold value	No. of samples above threshold value
Au	>	0.05 PPm	04 Nos
Ag	>	0.5 PPm	01 No.
Pb	>	30 PPm	26 Nos
Cu	>	80 PPm	92 Nos
Zn	>	90 PPm	110 Nos
Co	>	25 PPm	20 Nos
Ni	>	80 PPm	31 Nos
Cr	>	125 PPm	31 Nos
Bi	>	5 PPm	Nil

Values equal/greater than threshold have been considered anomalous at this stage. Elements wise distribution curves prepared are given from page No.107 to 115.

b. Stream Sediments Panned Concentrate Data.

From the analytical data of pan concentrate samples it can be assessed that the value for each element varies greatly from each other, due to the variation in weight of samples used for analytical purpose.

In order ot facilitate interpretation of the data on a comparative basis, the analytical data were "Standardised" to weight of 100 grms. From this standardised analytical data frequency distribution curve were prepared for each element.

A preliminary threshold for visible Gold counts was at 3 colours of equivalent assuming 1 speck = 2 colours and 1 piece = 5 colours. The standardised values were also used in determining preliminary threshold values for the following elements:-

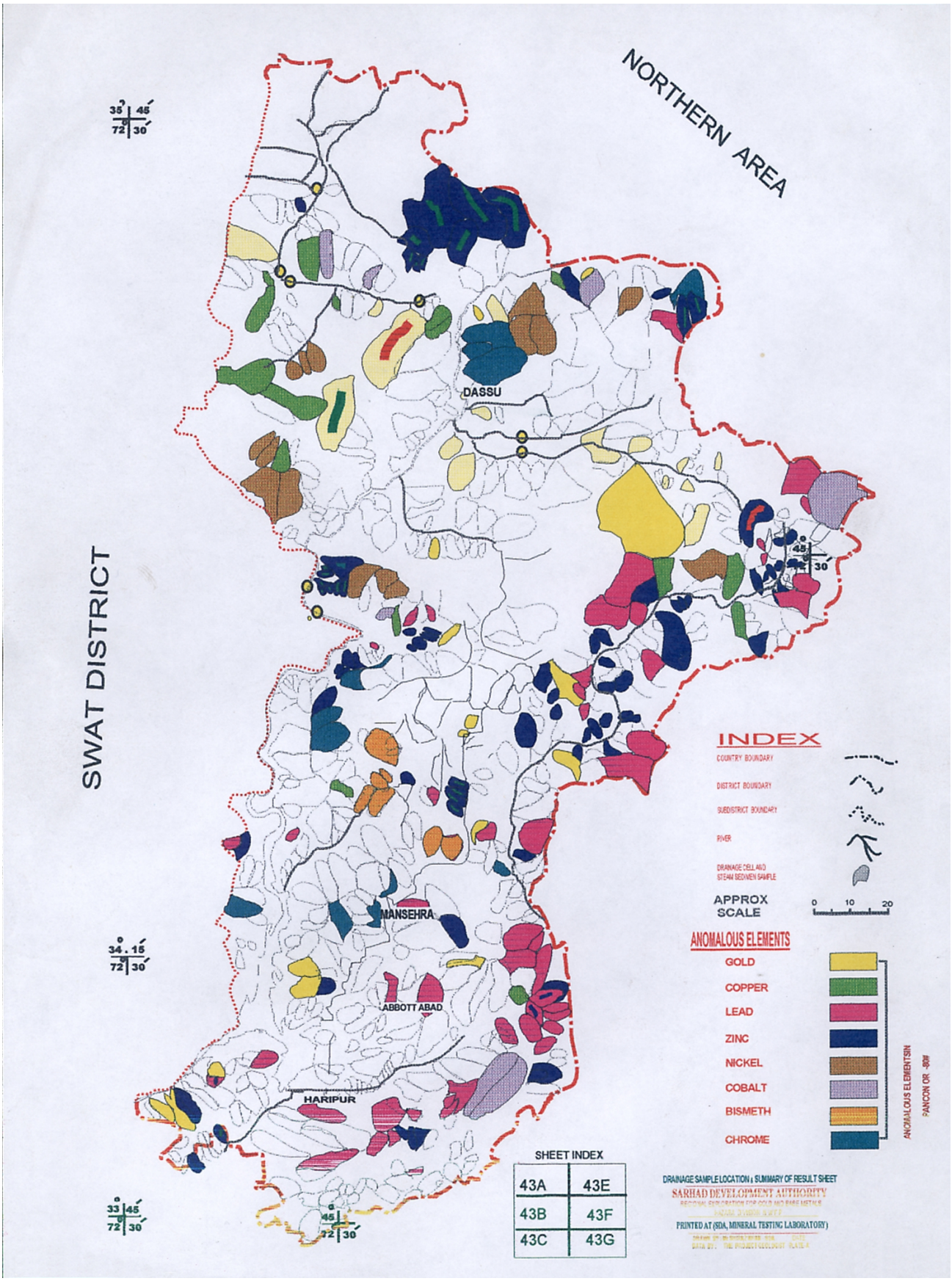
Elements		Threshold value	No. of samples above threshold value
Au	>	2 PPm	22 Nos
Ag	>	0.05 PPm	02 Nos
Pb	>	70 PPm	55 Nos
Cu	>	90 PPm	41 Nos
Zn	>	100 PPm	62 Nos
Co	>	60 PPm	7 Nos
Ni	>	110 PPm	35 Nos
Cr	>	300 PPm	11 Nos
Bi	>	10 PPm	13 Nos

Value equal/greater than threshold were considered as anomalous at this stage.

Any other information such as presence of ore mineral or secondary derivaties and indicator minerals were noted.

DATA PRESENTATION.

All the stream sediments samples and drainage cell boundaries were obtained on 1:250,000 scale drainage maps. Stream sediments geochemical analysis data and pan concentrate visible gold have been tubulated on the geochemical maps (Fig.2).


NORTHERN AREA
SWAT DISTRICT
35° 45′
72° 30′
DASSU
MANSEHRA
ABBOTT ABAD
HARIPUR
34° 15′
72° 30′
33° 45′
72° 30′
45
72° 30′
INDEX
COUNTRY BOUNDARY
DISTRICT BOUNDARY
SUBDISTRICT BOUNDARY
RIVER
DRAINAGE CELL AND STEAM SEDIMEN SAMPLE
APPROX SCALE
0 10 20
ANOMALOUS ELEMENTS
GOLD
COPPER
LEAD
ZINC
NICKEL
COBALT
BISMETH
CHROME
ANOMALOUS ELEMENTSIN PANJCON DR. -BW
SHEET INDEX
43A 43E
43B 43F
43C 43G
DRAINAGE SAMPLE LOCATION & SUMMARY OF RESULT SHEET
SARHAD DEVELOPMENT AUTHORITY
PRINTED AT (SDA, MINERAL TESTING LABORATORY)

CONCLUSION AND RECOMMENDATIONS

The data collected during the five years period indicated that gold was found above threshold values (>2 ppm) in 22 Nos of pan concentrate samples and the same was found anomalous (> 0.05 ppm) in 04 Nos of -80# stream sediment samples in different valleys/streams of Hazara Division. Important of these are Kandian valley of Kohistan district where gold is anomalous in 04 Nos of pan concentrate samples and in 02 Nos of -80# stream sediment samples. While presence of gold is also observed in Kandian valley in another 11 Nos of pan concentrate samples Out of which 07 Nos are having 2 colours of visible gold (the limit of threshold for visible gold).

In Jalkot valley of Kohistan district gold is found above threshold values in 08 Nos of pan concentrate samples in which 03 Nos having 2 ppm and 05 samples have shown > 2 colours of visible gold. On the other hand gold was found above threshold values (> 0.05 ppm) in 01 No. of -80# stream sediment sample.

In the Siran river valley of Mansehra district gold is found anomalous (> 2 ppm) in 06 Nos of pan concentrate samples while visible gold was 2 colours in 08 Nos pan concentrate samples. Near Ghazi of Haripur district gold was found anomalous in the 02 Nos of pan concentrate samples having 9.33 ppm and 3.88 ppm values the source of which is considered to be the placer deposits of the area between river Indus and mountains of Ganger ranges.

Lead was found anomalous (> 70 ppm) in 55 Nos of pan concentrate samples and in -80# stream sediment found to be above threshold values (> 30 ppm) in 26 Nos of samples. The important area for the lead values are upper Kaghan (including Kawai to Kaghan, Naran upto Babu Sar) where lead is found anomalous (> 70 ppm) in 20 Nos of pan concentrate samples and in 06 Nos (> 30 ppm) of -80 # stream sediment samples.

In Siran valley of Mansehra district lead is anomalous in 04 Nos of pan concentrate samples; Mangal stream area of Abbottabat district is found to be anomalous in 03 Nos of pan concentrate samples while in Dor rivr of Haripur district lead is anomalous in 03 Nos of -80# stream sediments samples; In Kanpur area of (Haro river) Harpur lead is anomalous in 04 Nos of pan concentrate samples and in 03 Nos of -80# stream sediment samples.

Copper was found anomalous (>90 ppm) in 41 Nos of pan concentrate sample and in -8# stream sediments it was found above threshold (> 80 ppm) in 92 Nos of samples.

Zinc was found above threshold values (> 100 ppm) in 62 Nos of pan concentrate samples and the same was found anomalous (>90 ppm) in 110 Nos of -80# stream sediment samples in different parts of Hazara Division.

Kandian valley of Kohistan district is found anomalous for Zn in 09 Nos of -80# stream sediment samples; Basha to Dassu is found anomalous for Zn in 05 Nos of -80# stream sediment samples while Batera area of Kohistan is found anomalous in all 04 Nos of -80# stream sediment samples and in 01 no of pan concentrate sample.

In upper Kaghan valley Zinc was found anomalous in 27 Nos of pan concentrate and 29 Nos of -80# stream sediment samples. While in lower Kaghan only 05 Nos of pan concentrate and 02 Nos of -80# stream sediment samples were found anomalous in Zinc. In the adjacent Kohala area zinc is found anomalous in 06 Nos of pan concentrate samples.

In Dor river valley of Haripur district zinc is found anomalous in 07 nos of -80# stream sediment samples. While in Haro river valley of Khanpur, Zinc is anomalous in 06 Nos of pan concentrate samples and in 06 Nos of -80# stream sediment samples.

In Ghazi area of Haripur 04 Nos of -80# stream sediment samples and 01 No of pan concentrate samples were found anomalous for zinc.

Nickel is found anomalous (> 110 ppm) in 35 Nos of pan concenrate and in 31 nos above threshold (> 80# ppm) of -80# stream sediment samples. Nickel was anomalous in Dassu to Basha area where 05 Nos of pan concentrate and 02 Nos of -80# stream sediment samples were found above threshold values; In Jalkot valley (due to Sapat ultramafic) Nickel is found anomalous in 04 Nos of pan concentrate saples and 05 Nos of -80# stream sediment samples; while in Dubair area of Kohistan Nickel is anomalous in 11 Nos of pan concentrate samples and in 07 Nos of -80# stream sediment samples.

Chromium is found anomalous (> 30 ppm) in 04 nos of pan concentrate and in 31 Nos of -80# stream sediment samples (>125 ppm) in Hazara Division. Important areas are:- In Basha to Dassu Chromium is found anomalous in 08 Nos of pan concentrate and in 01 No. of -80# stream sediment sample; In Dubair area Chromium is found anomalous in 02 Nos of pan concentrate samples and in 06 Nos of -80# stream sediment samples.

Bismith is found anomalous (> 10 ppm) in 13 Nos of pan concentrate samples in the area mainly of Siran river valley, Unhar river valley of Mansehra District.

On the basis of the above priority wise recommendations for further follow-up detailed geochemical drainage survey in future in order to able to pinpoint and locate economic deposits of gold and other base metals in different parts of Hazara Division and offer the same to local/foreign investors for follow-up detailed exploration, mine development and exploitation of economic mineral deposits. The areas are as follows:

S.NO	NAME OF THE AREA	TOTAL NO OF SAMPLES COLLECTED IN THE AREA (PAN CON: + -80#)	NOS OF ANOMALOUS SAMPLES IN THE AREA	ANOMALOUS ELEMENTS
1.	Jalkot Valley Kohistan (500 sq.km.)	120 Nos	26 Nos	Au, Cu, Ni, Zn, Co
2.	Kandian Valley Kohistan (673 sq.km.)	150 Nos	47 Nos	Au, Cu, Zn, Co, Cr
3.	Kaghan area (591 sq.km)	279 Nos	11 Nos	Pb, Zn, Ni, Au
4.	Allai Area District Batagram (150 sq.km)	132 Nos	94 Nos	Au, Cu, Zn, Pb, Ag, Ni, Co
5.	Kohala Area (100 sq.km)	16 Nos	11 Nos	Pb, Zn
6.	Havelian Area	112 Nos	37 Nos	Pb, Zn
7.	Dubair, Jijal, Kolai Area Kohistan (130 sq.km)	86 Nos	36 Nos	Ni, Cr, Co, Pb, Cu
8.	Siran Valley District Mansehra (100 sq.km)	86 Nos	43 Nos	Au, Pb, Cu, Zn, Cr, Bi
9.	Unhar and Oghi Area Mansehra	52 Nos	07 Nos	Au, Pb, Cu, Zn, Co, Bi, W.

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