



YEAR BOOK

2021-22



GOVERNMENT OF PAKISTAN
MINISTRY OF ENERGY (PETROLEUM DIVISION)
GEOLOGICAL SURVEY OF PAKISTAN

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1. Introduction

The Geological Survey of Pakistan (GSP) is an attached department of the Federal Ministry of Energy (Petroleum Division) with its headquarters office located in Quetta. As per the charter, GSP is responsible for the study of the geology of the country in all pertinent details. With a balanced, efficient, and competitive structure, GSP is capable to explore mineral resources and undertaking geological, geophysical, drilling, and geotechnical investigations. During recent years, the GSP's technical services were frequently availed by different organizations in the public and private sectors. To meet urgent demands in the areas of geological mapping and mineral exploration, GSP also undertakes development projects.

1.1 Functions and Core Activities

- Geological mapping and other geoscientific surveys.
- Scientific studies to accurately comprehend the nation's natural resources and ensure their wise management.
- Geotechnical investigations in connection with the construction of heavy civil engineering projects.
- Environmental and engineering geological studies.
- Estimates of geothermal energy resources.
- Description of on-shore and off-shore geological framework and understanding its formation, evolution, and resource potential evaluation.
- Studies of Natural hazards associated with earthquakes, volcanic activity, waste disposal, landslides, floods, subsidence, and recommendations for their prediction/mitigation.
- Provision of scientific support and technical assistance in legislative, regulatory, and management decisions to the federal, provincial, and local governments.

1.2 Institutional Structure

The GSP was established in 1947 with the creation of Pakistan. The department is headed by a Director General. The technical and other activities of the department are planned and controlled by the Management Advisory Committee (MAC) with all Deputy Director Generals (BPS-20), Chief Geophysicist (BPS-20) and Chief Chemist (BPS-20) as its members under the Chairmanship of the Director General.

TABLE 1: REGION-WISE DISTRIBUTION OF GAZETTED AND NON-GAZETTED STAFF OF GSP.

S.No.	NAME OF THE OFFICE	GAZETTED	NON-GAZETTED	TOTAL
1.	GSP Headquarters Office, Quetta.	141	378	519
2.	GSP Regional Office, Lahore.	43	97	103
3.	GSP Regional Office, Karachi.	54	109	163
4.	GSP Regional Office, Islamabad.	26	53	79
5.	GSP Regional Office, Peshawar.	21	53	74
6.	GSP Regional Office, AJK.	4	13	17
7.	Geoscience Lab, Islamabad.	24	39	63
	TOTAL	313	742	1055

TABLE 2: CATEGORY-WISE DISTRIBUTION OF GAZETTED AND NON-GAZETTED STAFF OF GSP

S.No.	CATEGORY	NUMBER
1.	Geologist	156
2.	Geophysicists	21
3.	Chemist	27
4.	Drilling Engineers	25
5.	Photogrammetrist	07
6.	Other Technical	08
7.	Administration and Accounts	09
8.	Technical Staff	313
9.	Ministerial Staff	132
10.	BPS 1-2 Staff	307
	TOTAL	1055

1.3 Budget and Finance

The GSP gets its annual budgetary allocation in the federal budget every year and additional allocation is gained from the federal Public Sector Development Project (PSDP) for executing development projects. The total budget of GSP for the year 2021-22 was 752.791 million.

FINANCIAL YEAR	2018-19	2019-20	2020-21	2021-22
Rs. (In Millions)				
REGULAR BUDGET	582.296	582.00	612	682.791
DEVELOPMENT BUDGET	463.175	433.852	26.524	70.000
SUPPLEMENTARY BUDGET (From PSDP Projects)				150.00
TOTAL	1045.471	1015.852	638.524	902.791

2. Activities, Progress, and Accomplishments (2021-22)

The Geological Survey of Pakistan (GSP) is an attached department of the Federal Ministry of Energy (Petroleum Division), that collects and provides detailed information on the geology and mineral resources of the country by carrying out different geological, geophysical, and geochemical surveys and exploratory drilling. The performance of GSP for the last Financial Year 2021-22, is given below.

2.1 Regional Geological Mapping on 1:50,000 Scale

The geology of Pakistan is characterized by the interaction of Indian, Arabian, and Eurasian plates in different regions formed under different tectonic settings. This complex interaction has not only created sky-scraping mountain ranges in the northern areas but concurrently fabricated significant geological and tectonic features in other regions of Pakistan.

GSP is the premier geoscientific organization in the country and has been implementing statutory obligations of geological mapping and other geoscientific surveys. During the year 2021-22, GSP executed the regional geological mapping and mineral investigation (640 Km²) on a 1: 50000 scale in different regions of the country.

2.2 Economic Geology

During this period investigations were carried out for the following Economic Geology project.

- Exploration of Porphyry and Epithermal Mineral occurrences of Karakoram batholith, Hunza valley, Gilgit-Baltistan, Pakistan.
- Mineral Exploration of Drazinda-Daraban and Surrounding areas, KPK.
- Spot Investigation of Barite deposit around morkhund village northern sedimentary belt, Gilgit-Baltistan.
- Exploration of copper & emerald along the MMT zone in village olandar and surrounding areas, district shangla.
- Prospecting for new placers of gold and associated indus river in district of nowshera and kohat, KPK.
- Identification and demarcation of accessible mineralized zones in Batagram to Besham, and surrounding areas.
- Preliminary geophysical investigations for the placer minerals at darband area, district mansehra KPK.

2.3 Research Studies

- Integrated field Geological Studies of Kala Chitta Range, upper Indus basin, Pakistan.
- Compilation of District Geological Maps of Gilgit-Baltistan, Gilgit District Phase-1.

2.4 Geophysical Exploration

2.4.1 Magnetic & IP Survey

Exploration of Placer Gold and base metals through geophysical techniques (Magnetic at District Attock, Punjab and Darband area, district Mansehra, KP, Pakistan. Similarly, Geophysical studies were conducted for the exploration of Iron ore deposits at Spezand, Quetta.

2.5 Chemical Analyses

The Geological Survey of Pakistan has state-of-the-art research facilities for geochemical analysis. Various methods have been developed for the analysis of different samples, ranging from solid fuel (coal) to water, ores to minerals, and stream sediments.

Analyzed 1076 samples by using XRD/DTA, ED-XRF, and Scanning Electronic Microscope (SEM-EDS) for 5164 estimations in GSP labs at Geoscience Lab, Islamabad, Quetta, and Lahore.

2.6 Drilling Operations

The Geological Survey of Pakistan undertakes drilling operations under PSDP and Annual Field Programs. Recently purchased new drilling rigs have been deputed on PSDP projects to boost the drilling operations.

2.7 Internships

The Geological Survey of Pakistan is the main stakeholder in mineral exploration and is committed to professional excellence. During the period, 2021-22, 15 internees have got internships in different offices (both headquarters and regional offices) of GSP.

3. Public Sector Development Programmes (PSDP)

Following PSDP Projects executed during 2021-22.

3.1 Ongoing (PSDPs)

1. “Geological Mapping of 50 Toposheets out of 354 Unmapped Toposheets of Outcrop Area of Balochistan Province” (2020-2023) (Total Cost: 127.595 Million).

2. “Pakistan National Research program on geological hazards (earthquakes and landslides), data acquisition along active faults and identification of potential landslide hotspot zones” (2021-24) (Total Cost: 412.769 Million).

1. “Geological Mapping of 50 Toposheets out of 354 Unmapped Toposheets of Outcrop Area of Balochistan Province”.

Objectives:

To geologically map the outcrop area in detail on a 1:50,000 scale and to maintain the database for the future exploration of the occurrences of metallic and non-metallic mineral potential, dimension stones, aggregates, and limestone reserves for the industry in the targeted potential areas of Balochistan.

Up to date Cumulative Progress:

Unmapped areas including parts of the Chagai, Khuzdar, and Lasbela Districts were selected for detailed mapping based on mineral potential and geological complexity. An initial study of geological maps, topo-sheets, aerial photographs, and satellite imageries was conducted and field parties are being departed to carry out field works. Previous literature and maps are being studied by the field parties and about 50% technical work has been completed. Around 24 toposheets have been mapped that are sent for review and amendments to Director General, GSP, and field officers are busy preparing the remaining geological maps of the areas. Reconnaissance geological fieldwork/mapping had been carried out in the Khuzdar, Lasbela, Chaghi, and Quetta districts and surrounding areas. Rock samples and geochemical stream sediments are also collected from Khuzdar, Chaghi, and Quetta Valley. Some samples (both rock and stream) are also sent to analyse their geochemical concentration. More than 80 rock and stream sediment samples, collected from different rock units in District Chaghi, are sent for analysis to explore their potential for Indium, Molybdenum, and Lithium. Similarly, the rock samples are thin-sectioned and are under investigation.

2. “Pakistan National Research program on geological hazards (earthquakes and landslides), data acquisition along active faults and identification of potential landslide hotspot zones”.

Objectives:

The main focus of the project is to identify Earthquake-prone areas on the basis of active faults margins assisted by identification of landslide hotspots along the active fault margins, and establishment of new network of Globe Navigation Satellite Stations - GNSS (permanent as well as periodic), along with the establishment of a countrywide landslide inventory database.

Up to date Cumulative Progress:

Previous literature and maps are being studied by the field parties and about 65% of technical work has been completed. GNSS sites have been selected in parts of Gilgit-Baltistan, AJK, Khyber Pakhtunkhwa, and Salt Range (Punjab). Field works are also conducted for GNSS based studies in parts of Gilgit-Baltistan, AJK, and Salt Range (Punjab). Similarly, landslide studies are carried out in parts of Azad Kashmir and Gilgit-Baltistan. The reports are being prepared and are under review. Furthermore, the procurement process for the FY 2021-2022 has been completed and the budget required for the purchase of 24 units of GNSS has been credited to the National Bank of Pakistan (NBP) for establishing LC.

4. Work Deposit Projects (WDP)

The Work Deposit Financial Arrangement for contractual work has been approved by the finance division, dated September, 11 2020. The provinces now have the access to GSP for services for mineral exploration through Geology, Geophysics, Geo-chemical Analysis and Drilling, Geohazard assessment, Ground water investigations, and Geo-technical Investigations. Under the Work Deposit, GSP has already provided services in Mineral Exploration, Groundwater, Geo-hazard Assessment, Geo-Technical Investigation, and Drilling to a number of Organizations.

4.2 Ongoing Work deposit projects

The following Work Deposit Projects are being executed during 2021-22.

4. 1. “Potential evaluation of Placer Gold in River Indus at District Attock”.

Objectives:

To pinpoint possible potential sites for placer gold accumulation by applying geological, geophysical, and geochemical techniques.

Up to date Cumulative Progress:

1. The Geophysical survey reports (magnetic and IP) have been completed and submitted to the Mines and Minerals Department of Punjab, Lahore.
2. The surface geochemical sampling (Pan + sluiced concentrates) has been completed and 133 collected samples have been sent to Geoscience Advance Research Laboratories (GARL), GSP, Islamabad for Lab analysis. Some of the samples (~20) have been analysed using Atomic Absorption Spectroscopy (AAS) and the results have been shared with the Mines and Minerals Department of Punjab, Lahore.
3. The drilling will be planned and executed based on the Lab analysis; the Lab analysis will be integrated with the Geophysical data and field survey and drilling points will be pinpointed.
4. The drilling operation will be completed and the final report will be submitted within the given time.

5. Future Plans

5.1 Major Activities planned for FY 2022-23

5.1.1 Regular Field Projects 2022-23

- i. Regional Geological Mapping.
- ii. Mineral Exploration.
- iii. Geophysical Surveys/Exploration.
- iv. Geochemical Investigation.
- v. Engineering Geology/Geo-hazard studies.

The above mentioned studies are planned under regular and (R & D) setup. Research and Development Funds of about 300 million have been approved for Technical Activities.

5.1.2 Approved PSDP Projects 2022-23:

1. “Geological Mapping of 50 Toposheets out of 354 Unmapped Toposheets of Outcrop Area of Balochistan Province” (2020-2023) (Total Cost: 127.595 Million). (Ongoing).

2. “Pakistan National Research program on geological hazards (earthquakes and landslides), data acquisition along active faults and identification of potential landslide hotspot zones” (2021-24) (Total Cost: 412.769 Million). (Ongoing).

5.1.3. Proposed PSDP Projects 2022-23:

1. “3D Mineral Survey to Evaluate Potential Economic Mineral Resources of District Chagai, Balochistan.” (2021-2024) (Total Cost: 638.402 Million).
2. “Feasibility Studies for Up-Gradation of Geoscience Advance Research Laboratories (GARL), GSP, Islamabad.” (2021-2022) (Total Cost: 4.00 Million).
3. “Exploration of Mineral Resources and Geological Mapping of 25 Toposheets, Gilgit Baltistan.” (2021-2024) (Total Cost: 250.291 Million).
4. “Integrated geophysical investigations for the exploration of mineral deposits and groundwater potential in Cholistan, District Bahawalpur, Punjab.” (Total Cost: 357.478 Million).
5. “Instrumental upgradation of Geoscience Advance Research Laboratories (GARL), GSP, Islamabad.” (Total Cost: 508.431 Million).
6. “Repair and maintenance of existing buildings and construction of a new bachelors’ hostel at GSP, HQ, Sariab Road, Quetta Balochistan.” (Total Cost: 250.291 Million).