THE ROLE OF THE GEOLOGICAL SURVEY OF PAKISTAN TO FOSTER MINING DEVELOPMENT
The Geological Survey of Pakistan is responsible for the study of geology of the country in all pertinent details and to assess its geological resource potential. It undertakes:

- Geological mapping and other geoscientific surveys,
- Basic and applied research in earth sciences,
- Scientific investigations for an accurate understanding of the country’s geological resources and their prudent management, and
- Environmental geology and hydrogeological studies.
GSP’s Role Under The National Mineral Policy

1- To expedite the publication of geological, geophysical and geochemical data and maps

2- To produce Geological maps of the entire country on a 1:250,000 scale. Priority areas to be mapped on 1:50,000 scale

3- To operate an open file system for the potential investors

4- To undertake collaborative projects with the constituting provinces and the private sector

5- To establish the Geodata Centre of Pakistan for the collection, dissemination, storing and updating of data of the country as a whole and also to make it available in print and electronic formats
GSP
( Organisation )

- Headquarters at Quetta
- Divisional Offices at Lahore, Karachi & Peshawar
- Regional Office, Muzaffarabad
- Environment Division, Islamabad
- GSP Geoscience Research Centre, Islamabad
ACHIEVEMENTS

- Reconnaissance mapping on 1:250,000 scale of the entire outcrop region of the country has been completed.

- Systematic geological mapping of about 50% of the outcrop region on 1:50,000 scale has been completed apart from the large scale mapping of the priority areas of identified mineral deposits.

- Aeromagnetic survey of an area of 112,000 sq. km has been carried out in the Provinces of Balochistan & Sindh.
ACHIEVEMENTS
(Continued)

- About a 188,000 sq. km. of an area has been covered by different types of geophysical surveys and 15,000 sq. km. by geochemical surveys

- 2,746 bore holes with a cumulative depth of 525,000 metres have been drilled in support of mapping, research, mineral exploration, engineering & hydrogeological investigations
TOTAL OUTCROP AREA = 599,794 Km²
STATUS OF REGIONAL GEOLOGICAL MAPPING, BY GSP
UPTO 2003
Mapping Scale 1:250,000

LEGEND

- Indus Basin Alluvial Plain
- Area Mapped and Published
- Federal Capital
- Cities

STATUS OF REGIONAL GEOLOGICAL MAPPING ON 1:250,000 SCALE
## DATA ON REGIONAL GEOLOGICAL MAPPING COVERAGE IN PAKISTAN

(Scale 1:50,000)

<table>
<thead>
<tr>
<th>Province / Region</th>
<th>Total Area Km²</th>
<th>Outcrop Area Km²</th>
<th>Mapped till June, 2003 Km²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Punjab</td>
<td>205,345</td>
<td>50,000</td>
<td>55,680</td>
</tr>
<tr>
<td>2. Sindh</td>
<td>140,914</td>
<td>34,560</td>
<td>32,600</td>
</tr>
<tr>
<td>3. Balochistan</td>
<td>347,190</td>
<td>335,590</td>
<td>142,220</td>
</tr>
<tr>
<td>4. N.W.F.P.</td>
<td>74,521</td>
<td>70,788</td>
<td>35,980</td>
</tr>
<tr>
<td>5. FATA</td>
<td>27,220</td>
<td>25,000</td>
<td>6,000</td>
</tr>
<tr>
<td>6. Islamabad Federal Territory</td>
<td>906</td>
<td>360</td>
<td>906</td>
</tr>
<tr>
<td><strong>Sub Total</strong></td>
<td><strong>796,096</strong></td>
<td><strong>516,298</strong></td>
<td><strong>273,386</strong></td>
</tr>
<tr>
<td>7. Northern Areas</td>
<td>72,496</td>
<td>72,496</td>
<td>14,720</td>
</tr>
<tr>
<td>8. Azad Jammu &amp; Kashmir</td>
<td>13,297</td>
<td>11,000</td>
<td>10,757</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>881,889</strong></td>
<td><strong>599,794</strong></td>
<td><strong>298,863</strong></td>
</tr>
</tbody>
</table>
STATUS OF AEROMAGNETIC COVERAGE AND AREA PROPOSED FOR AIRBORNE SURVEY

LEGEND

- Completed Aeromagnetic Coverage
- Area Proposed for Airborne Survey
- Federal Capital
- Cities

Arabian Sea
Karachi
Quetta
Islamabad
Peshawar
Lahore
Jammu & Kashmir (Disputed Territory)
Gilgit

Scale
0 50 100 150 200

STATUS OF AEROMAGNETIC COVERAGE AND AREA FOR AIRBORNE SURVEY
Notes:-
1. The map shows only the major economic mineral deposits of Pakistan which are either presently in production or are likely to come into production by 2005.
2. Mineral showings and occurrences of academic importance are excluded.
3. Bulk minerals and building/construction raw materials like sand, gravels, limestone etc., are not shown.
Besides cement raw material, Pakistan had been producing only 5 minerals at the time of the independence.

At present Pakistan is producing 40 minerals; of these about 20 are being exploited in Balochistan.

Almost all the minerals now being mined in the country had been explored/discovered by the Geological Survey of Pakistan.
Major and Important mineral finds

* **Dilband Iron Ore Deposit**
  Haemetic Iron ore with above 40% Fe$_2$O$_3$
  Reserves > 200 million tonnes. 10% of Dilband ore blended with imported ore will save millions of rupees in foreign exchange for the country. GSP has helped BME to drill evaluate the deposit for beneficiation, and exploitation. Mining has already been started and supply to Pakistan Steel is in progress

* **Duddar-Gunga-Surmai Lead-Zinc Deposit**
  Combined Lead-Zinc Ore with 7% Zn & 3.2% Pb
  Reserves = 28 million tonnes
**ACHIEVEMENTS**

* **Saindak & Reko Diq Copper - Gold Deposit**

**Saindak**

- Reserves: > 400 million tonnes
- Copper: = 0.4 % with 1.7 million tonnes
- Gold: = 2.24 million ounces

**Reko Diq Copper – Gold Deposit**

- One of the world’s biggest deposit discovered by GSP in 1978-79
- Presently M/S TCC is investing 150 million US $ to develop the deposit which is expected to start production within 2 years.
- Reserves: > 800 millions tonnes
- Copper: = 0.64% with 50 million tonnes
- Gold: = 9 million ounces
ACHIEVEMENTS

* Thar Coal Deposit

Reserves > 175.00 billion tonnes
Coal Rank lignite to sub-bituminous
Proved Reserve in 360 sq. kms. area (Four Blocks) with > 200 boreholes > 2.70 billion tonnes
B.T.U. 5,780 to 6,398
Sulphur 0.92 % to 1.2 %
Moisture 43 % to 49 %
Indicated Reserves > 9.00 billion tonnes
Sufficient for generation of 40,000 MW Electric Power
• Based on the GSP’s investigations M/S Shenhua Group of China have selected a part of the area for development of a mine for installation of power plant. The work is to start during this month

• M/s Rein Braun of Germany are carrying out Bankable feasibility studies in one of the blocks.
<table>
<thead>
<tr>
<th>Engineering Geology</th>
<th>Hydrogeology</th>
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</thead>
<tbody>
<tr>
<td>• Site for the Quaid-e-Azam Mausoleum, Karachi</td>
<td>• Discovery of Hard Rock Aquifers in the Quetta Valley (2000)</td>
</tr>
<tr>
<td>• Dam site Studies</td>
<td>• Ziarat, Sanjavi and Kalat (2002)</td>
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<tr>
<td>• Warsak</td>
<td>• Ground Water Investigations in Mohmand Agency, NWFP; Rawla Kot</td>
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<tr>
<td>• Mangla</td>
<td>and Plandri Areas AJK (2003)</td>
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<td>• Tarbela</td>
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<tr>
<td>• Small dams in</td>
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<td>Balochistan, NWFP &amp; Punjab</td>
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<tr>
<td>• Delineation of Buried Karezes in the Satellite</td>
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<tr>
<td>Town, Quetta</td>
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<td>Engineering Geology</td>
<td>Hydrogeology</td>
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<tr>
<td>Karakoram Highway</td>
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<tr>
<td>Seismo-tectonic Zonation map of Pakistan</td>
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<tr>
<td>Strategic Sites Studies</td>
<td></td>
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<tr>
<td>Omara-Kalmat Kaur Area for a Naval Base</td>
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<tr>
<td>Geological studies of Islamabad</td>
<td></td>
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</tbody>
</table>
PROPOSED ORGANIZATIONAL STRUCTURE OF GEOLOGICAL SURVEY OF PAKISTAN
<table>
<thead>
<tr>
<th>Project Description</th>
</tr>
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<tbody>
<tr>
<td>Systematic Evaluation and Appraisal of Coal Resources of Four Specific Tracts in Thar Coalfield, Sindh, Pakistan</td>
</tr>
<tr>
<td>Exploration and Evaluation of Coal Field of Loralai and Kohlu District, Balochistan</td>
</tr>
<tr>
<td>Bankable Feasibility Study of Thar Coal Mining</td>
</tr>
<tr>
<td>Exploration of Hangu and Karak Coal Deposits, NWFP, Pakistan</td>
</tr>
</tbody>
</table>
Future Development Plans

1. Airborne Geophysical Survey and connected activities For Identification of Mineral Potential Areas of Pakistan

2. Accelerated Geological Mapping and Geochemical Exploration Studies of Prospective Areas of Pakistan

3. Accelerated Groundwater Studies in Balochistan


5. Ground Follow-up of Aeromagnetic Anomalies in Chagai District, Balochistan
Coordination between licensing Authority and GSP for feasibility study by private sector

THE MISSING LINK

GENERALIZED SCHEME SHOWING THE INTERFACE BETWEEN PUBLIC AND PRIVATE / CORPORATE SECTORS IN THE DEVELOPMENT OF A MINERAL DEPOSIT
Institutional Strengthening

- Establishment of a Geodata Centre of Pakistan.
- Setting up of a Gemmological Research Unit.
- Creation of a GSP Geoscience Research & Training Centre at Islamabad.
- Seismo-tectonic Network and Hazard Study Centre at Islamabad.
- International Geology Branch.
- Initiation of e-georesearch in Pakistan.
TRAINING FACILITIES REQUIRED

• Modern Techniques in All Disciplines of Earth Sciences especially in Geological Mapping, Coal Technology, Geophysical & Geochemical Surveys and Mineral Exploration & Economics

• GIS Applications in Geology and Mineral Exploration and Data Management

• Remote Sensing & Satellite Imageries interpretation and Analysis
SUGGESTIONS AND RECOMMENDATIONS

1. Besides geological mapping as per its charter GSP should be fully involved and entrusted to carry out the exploration of mineral deposits identified during mapping up to the pre-feasibility stage.

2. To make the GSP financially self-sustaining organization a mechanism has to be developed for having a share from the revenue earned from the commercial exploitation of mineral resources.

3. GSP should act as an agency for advising the Government of Pakistan on environmental issues developed as a result of mining activities and urbanization. Geochemical data will be generated of the mining areas to monitor the environmental degradation.

4. GSP should act as an advisory agency on the groundwater exploration particularly in hard rock aquifers in the country.
5. GSP should carry out seismo-tectonics studies and provide data to town planners in urban centres lying in the seismic risk zone.

6. GSP should act as an authentication agency for the geological data generated by different public & private sector. It should also act as geodata center in the provinces like GSP Geodata Centre in GSP Islamabad.

7. In order to safeguard the public interest it is suggested that areas identified and explored by GSP should not be leased to the private sector without consultation with GSP. A close coordination between provincial authorities and GSP is suggested in this regard.

8. GSP should commercialize its exploration activities and may provide consultancy services to local / foreign investors.

9. The re-organization of the service structure of GSP with time scale promotion to the officers to avoid stagnation of career in future.