Sector Overview

Pakistan is endowed with significant mineral resources and emerging as a very promising area for exploration of mineral deposits. Based on available information, country’s more than 6,00,000 sq.kms of outcrop area demonstrates varied geological potential for metallic / non-metallic mineral deposits.

Exploration by government agencies as well as by multinational mining companies and various regional geological surveys, conducted in the recent past have confirmed the great potential of Pakistan in the metallic minerals like copper, gold, silver, platinum, chromites, iron, lead and zinc. As regards industrial minerals there is a vast potential of multi-coloured granite, marble and other dimensional stones of high quality for export purposes.

Currently about 52 minerals are under exploitation although on small scale. The major production is of coal, rock salt, and other industrial and construction minerals. The value addition in the mineral sector is mainly concentrated in five principal minerals, namely, limestone, coal, gypsum, sulphur, crude oil, and natural gas.

The current contribution of mineral sector to the GDP is about 0.5% and likely to increase considerably on the development and commercial exploitation of Saindak & Reco Diq copper deposits, Duddar Zinc lead, Thar coal and Gemstone deposits.

Realizing the vast potential of major reserves, there is great opportunity for the multinational companies to invest in this sector, which will be beneficial for the economy and the investors in the long run.

Top Fifteen Minerals of Pakistan

1. Aluminium
2. Iron Ore
3. Copper
4. Chromite Ore
5. Zinc / Lead
6. Coal
7. Gypsum / Anhydrite
8. Phosphates
9. Rock Salt
10. Solar Salt
11. Magnesite
12. Limestone for lime
13. Kaolin (China Clay)
14. Natural Stones as Building Materials
i). Granite

ii). Marble and Onyx

15. Gemstones

Mineral Map of Pakistan

**Mineral Resources in Punjab**

**Iron ore:**

Iron ores are present in large deposits in Punjab. The major deposits are in Kalabagh in Mianwali district.

**Coal:**
In Punjab coal is present in Salt Range and Markawal. The estimated deposits of coal in this region are 235 million tons. It is average quality coal found in Pakistan in comparison with other provinces.

Gypsum:

Punjab stands 2nd in gypsum deposits. The major deposit of it is in Dadukhel in Mianwali area which is about 53 million tons. Other resources are in Rakhi-Munh, Khewra and Safed Koh-Khod area. Gypsum is also found in Suleman Range of D.G. Khan, Punjab.

Salt:

In Pakistan salt deposits occur in the salt Range (160 kms in length, east and west trending mountainous arc between Rivers Jhelum and Indus). Rock salt is produced at Khewra, Warcha, Kalabagh, Bhadurkhel, Jatta and karak salt Mines by Pakistan Mineral Development Corporation.

Punjab Mineral Development Corporation operates Chakwal and Khushab salt mines. According to Pakistan Mineral Development Corporation, the rock salt reserves within the area of their mining operation are around 600 million tons.

Lime stone:

Lime Stone is present in salt Rang, Potwar Plateau, Margalla Hills and Zinda Pir (Attock) in large deposits.

Aluminum:

In Punjab Aluminium is found in Khushab district. It is graded as low quality Aluminium.

Calestine:

It contains about 83% Strontium Sulphate. In the year 1984-85 it was 650 tons. Celestite is used in signal rockets and flares, tracer bullets, transportation warning fused and fire-works. It also used in Strontium compound Ceramics, luminous paints, plastics industries. In Punjab It is found in Daud Khel in the Western Salt Range.

Natural oil:

In Punjab all large and renowned oil fields are located in potwar region. In following table a brief description of Oil fields is given.

<table>
<thead>
<tr>
<th>Oil Field</th>
<th>Location</th>
<th>Year of Discovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUHAMMAD OMAR NAWAZ</td>
<td>2009-PET-37</td>
<td>Page 3</td>
</tr>
</tbody>
</table>
Khaur | Attock | 1915  
Dhulin | Potwar | 1935  
Joya Mir | Potwar | 1944  
Balkassar | Jehlum | 1946  
Tut | Attock | 1968  
Meyal | Attock | 1968  
Adhi | Rawalpindi | 1978  
Fim Kassar | Jehlum | 1978

**Natural gas:**

In Punjab the only major gas resource is located in Uch near Multan. An other gas field is Adhi gas field located in Rawalpindi district, supplies 18Mcf/day of gas, 62 tons/day of LPG, 300 Barrels/day of Natural gas liquid (NGL).

**Marble:**

It is one of the country foreign exchange earning. In Punjab its reserves are in Dalbandin Hills in Attock District.

**MINERAL DEPOSITS OF SINDH**

**Coal:**

According to estimates prepared by the Geological Survey of Pakistan (GSP), Pakistan has total coal reserves of 185 billion tons, out of which 184 Million Tons Billion tons are in Sindh, one of the biggest good quality lignite deposit in the World.
Salt:

Bright prospects exist for the development of high purity solar salt facility around the coastal areas of Karachi. Solar salt so produced has export potential to the expanding southeast Asia Chemicals industries and for the growing industries established throughout.

Limestone:

Pakistan is bestowed with extensive deposits of suitable quality of limestone in Sindh. In Sindh it is found in Ganjo Takkar, Murli Hills, Mango Pir, Cape Monze, Kot Diji and Ranipir. It is used mainly in the manufacture of cement. Road making, building construction and in the chemicals industries.

Alum:

In Sindh Alum is found in Kirthar Nits.

Carbonate soda:
Present in large quantity in Nara Taluka of Khaipur State, in Nawabshah, Umerkot and Shah Bandar.

**Calestine:**

The estimated reserve is 300,000 tons. Celestite is used in signal rockets and flares, tracer bullets, transportation warning fused and fire-works. It also used in Strontium compound Ceramics, luminous paints, plastics industries. In Sindh its deposits are found in Thano BulaKhan.

**China clay:**

In Sind it is found in Nagar Parkar, in Tharparkar Distect. Is used in cement, paper, rubber filter. It contains 16-31% Clay. It is also known as Kaolin.

**Natural oil:**

There are three renowned oil fields in Sindh which are briefly described in tabular form below.

<table>
<thead>
<tr>
<th>Oil Field</th>
<th>Location</th>
<th>Year of Discovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khaskheli</td>
<td>Lower Sind</td>
<td>1981</td>
</tr>
<tr>
<td>Laghari</td>
<td>Lower Sind</td>
<td>1983</td>
</tr>
<tr>
<td>Tano Alam</td>
<td>Lower Sind</td>
<td>1984</td>
</tr>
</tbody>
</table>

**Natural gas:**

In Sindh Natural Gas is found in Khairpur, Kandkot, Mari, Golarchi and Khaskheli.

<table>
<thead>
<tr>
<th>Gas Field</th>
<th>Production(Mcf/Day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kand Kot</td>
<td>30</td>
</tr>
<tr>
<td>Marri</td>
<td>290</td>
</tr>
</tbody>
</table>

**MINERAL DEPOSITS OF NWFP**

**Chromite:**
Chromite deposits of Baluchistan and NWFP must be considered from a regional standpoint that could enable Pakistan to become a major exporter of chromite and/or ferrochrome. In NWFP its deposits are

1) In Dargai has been spectacular: estimated reserves 0.7 Mt of which 0.3 Mts are proven.
2) In Heroshah, open pit reserves of around 0.1 Mt have been proved.
3) Similarly in Jijal-pattan and Chilas areas (Kohistan) Shunghail prospect appear to contain 0.2 Mt reserves.

**Coal:**

In NWFP there is no large deposit of coal. Two small ones are present which are briefly described in tabular form.

<table>
<thead>
<tr>
<th>Location</th>
<th>Resource (Mts)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hangu / Orakzai</td>
<td>82</td>
<td>-</td>
</tr>
<tr>
<td>Cherat / Gulla Khel</td>
<td>9</td>
<td>Developed</td>
</tr>
<tr>
<td><strong>Sub Total:</strong></td>
<td><strong>91</strong></td>
<td><strong>Developed</strong></td>
</tr>
</tbody>
</table>

This coal is graded as good quality coal found in Pakistan.

**Bauxite:**

In the province of NWFP, Bauxite is found in Hazara District.

**Gypsum:**

The largest resources of gypsum found in Pakistan are in NWFP. It is mainly found in D.I.Khan & Kohat district. Detail is given below in table.

<table>
<thead>
<tr>
<th>Region</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.I.Khan</td>
<td></td>
</tr>
<tr>
<td>Saiduvali</td>
<td>20Mt.</td>
</tr>
<tr>
<td>Near Drazinda and Mughalkot</td>
<td>70Mt.</td>
</tr>
<tr>
<td>Kohat</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4442Mt.(Above surface)</td>
</tr>
<tr>
<td></td>
<td>472 Mt. (down to dip of 30)</td>
</tr>
</tbody>
</table>
Phosphates:

NWFP contains Cambrian sedimentary phosphates of marine origin, mainly in the upper clayey dolomite of Abbottabad Formation (cherty phosphate) 0-0 and underlying cherty – silty – sandy beds of Hazara formation.

Reserves and Grades:

Grades of two major ore types and their reserves are as under:

- Dolomitic ore (generally low to medium in P2 O5 & SiO2 and high in MgO).
- Siliceous ore (generally medium to high in P2O5 and SiO2 and low in MgO).

Types of Phosphate rocks And Their Reserves:

<table>
<thead>
<tr>
<th>Type of Rock</th>
<th>Reserves</th>
<th>% Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dolomitic</td>
<td>14Mts.</td>
<td>P2O5:23-32%, SiO2:3-10%, MgO:2-8%, R2O3:1.5-5%</td>
</tr>
<tr>
<td>Siliceous Ores</td>
<td>12Mts.</td>
<td>P2O5:24-35, SiO2:5-25%, MgO:0.5%, R2O3:1.5-4.5%</td>
</tr>
</tbody>
</table>

Magnesite:

PIDC who used to hold the lease for magnesite mines at Kumhar in District Abbottabad established around 11 million tons geological and 3 million tons mine able reserves containing acceptable 46% - 47% magnesium oxide.

Kumhar Magnesite Ore Deposit:

Location

Hazara at about 35 km west of Abbottabad 14 lenticular bodies of the magnesite ore found in kumhar area

Total Resources

12.0 million tons.

Limestone:

Pakistan is bestowed with extensive deposits of suitable quality of limestone in the province of NWFP and Northern Areas.

The average annual production of limestone is 8697 Metric tons used mainly in the manufacture of cement. Road making, building construction and in the chemicals industries.
China Clay:

Presently the major production comes from shah Dheri, Swat where an elutriation plant has been established. Country’s average yearly production of china clay is 61,403 metric tons.

Marbles:

Marbles of different classifications, fossiliferrous limestone, serpentine etc. occur in the provinces of NWFP and in Northern Areas. Out of 160.2 million tons of marble reserves estimated in Pakistan, 158 million tons are in the NWFP.

Gem Stones:

Pakistan ranks amongst leading gem-hosting countries. Owing to favorable geological environments, NWFP, AJ&K and Northern Areas are the major gem hosting regions of the country. The gemstones include; Emerald, Ruby, Pink Topaz, Peridot, Green Ruby deposits of Hunza and AJ&K all other gemstone deposits have not been studied scientifically and are undocumented.

<table>
<thead>
<tr>
<th>Gemstone</th>
<th>Location</th>
<th>Reserves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emerald</td>
<td>Swat</td>
<td>70 million carats</td>
</tr>
<tr>
<td>Pink Topaz</td>
<td>Mardan</td>
<td>09 million carats</td>
</tr>
<tr>
<td>Peridot</td>
<td>Hazara, Kohistan</td>
<td>10 million carats</td>
</tr>
<tr>
<td>Aquamarine, Tourmaline</td>
<td>Chitral</td>
<td>Not assessed</td>
</tr>
<tr>
<td>Garnet</td>
<td>Bajor</td>
<td>Not assessed</td>
</tr>
</tbody>
</table>

Soap Stone:

Soapstone is used in Ceramics, face powder and as filler in soap industry. In NWFP, its deposits are in Sherwan in Abbotabad district.

MINERAL RESOURCES OF BALOCHISTAN

At present Pakistan is producing 50 minerals; of these about 40 are being exploited in Baluchistan. Almost all the minerals now being mined in the province had been explored/discovered by the Geological Survey of Pakistan.
Aluminum:
Aluminum is present in Baluchistan in large deposits. It is found Kalat, Ziarat and Loralai districts. The mine at Khakhan-China spring in Loralai district produces 2000 tons annually.

Iron Ore:
More than 903.4 million tons of iron ores are found in Pakistan and potential ore deposits in Baluchistan are the following:

<table>
<thead>
<tr>
<th>Location</th>
<th>Potential</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dilbandin (Chagai)</td>
<td>3 million</td>
<td>Good (55% iron)</td>
</tr>
<tr>
<td>Nok kundi</td>
<td>-</td>
<td>Good (+64% iron)</td>
</tr>
<tr>
<td>Mastung</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Copper:
The significance of copper resources of Pakistan is widely known because of huge investment made in development of Saindak copper deposit. Copper reserves are present in Saindak and Reko-diq in Baluchistan.

<table>
<thead>
<tr>
<th>Copper Project</th>
<th>Location</th>
<th>Reserves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reko Diq</td>
<td>Distt Chaghi, Balochistan</td>
<td>837 million tons</td>
</tr>
<tr>
<td>Saindak</td>
<td>40 km West of Reko Diq</td>
<td>400 millions tons</td>
</tr>
</tbody>
</table>
Chromite Ore:

Chromite occurrence is wide-spread yet its potential is far from being fully assessed judging from the favorable geological environment. For this reason, chromite deposits of Baluchistan and NWFP must be considered from a regional standpoint that could enable Pakistan to become a major exporter of chromite and/or ferrochrome.

In Baluchistan, Muslim Bagh, Noshki, Ras-koh, Dilbadin, Miran shah, Wana, Khuzdar, Bela, chromite deposits are of the major commercial source of chromite.

Zinc:

The Jurassic rocks of the Lasbela – Khuzdar Belt have the potential to host several World class’ zinc – lead ore deposits. Its deposits are also found in Duddar Gunga which are estimated over 160 million tons.

Coal:

In Baluchistan about 217 million tons of coal are estimated. These Resources are distributed in Hamai, Duki, Mach-Abegum Pir Ismail Ziarat Bar khan – Chamalang.

Natural Gas:

Total Natural gas reserves in Pakistan is estimated about 31 trillion cubic feet. In Province of Baluchistan, its reserves are in Pirkok, Sui, Mazarani, Golarchi. Sui gas field is the largest field of Pakistan, which covers over 75 sq. miles.

Manganese:

In Baluchistan Manganese is found in Lasbela and Khuzdar Total estimated resources in these two regions are 0.477 million tons.

Limestone for Lime:

Pakistan is bestowed with extensive deposits of suitable quality of limestone in the province of Balochistan. The average annual production of limestone is 8697 Metric tons used mainly in the manufacture of cement. Road making, building construction and in the chemicals industries. It is graded as high quality limestone found in Pakistan.

Magnesite:

In Baluchistan it is found in Muslim bagh and Bela.
Gypsum:

According to geological survey of Pakistan, about 2000 million ton gypsum resources are present in different areas of Baluchistan.

Marble:

Large deposits of marble are present in Baluchistan, About 2 million ton high quality Marble is present in Chagai district.

Gems:

Early discoveries of most of Gem materials in Balochistan by GSP in connection with investigations for other mineral commodities, during the course of geological mapping

- In Chagai: Malachite, Azurite, Garnet, Brown Garnet, Zircon, Obsidian, Jade, Jasper, Lapis
- In Panjgur: Auriferous Quartz
- In Kalat: Brown Garnet, Fluorite
- In KillaAbdullah: Aragonite
- In Khuzdar: Agates
- In Loralai: Amethyst