

MINERAL DATA BASE SOURCES FOR PLANNING AND DECISION MAKING

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Abstract:

Planning sizable mineral development, private or public, in Pakistan or in any other country, requires a data base comprising various aspects of the mineral industry at large. Sources providing this kind of information invariably aided by their websites abound in the international mineral literature with variations in emphasis, weight units and currencies. Judicious sifting and care is needed to finally select the information providing source depending on the individual's options and requirement choices. Sources of information on mineral industry in Pakistan, though not as comprehensive as elsewhere, do provide enough information for the mineral developers to proceed further.

INTRODUCTION

In the post World War II years, the international mineral industry has seen greater involvement of the governments especially of the developing countries in the development of indigenous mineral resources. Industrial nations with their own dwindling mineral resources are concerned about the continued supply of minerals and metals to their economies. The multinational corporations involved in the international mineral industry are not there for any altruistic reasons, but for sheer economic considerations. The developing countries which perhaps own more than half of the world mineral wealth and considered as the future suppliers of minerals, on the other hand, wish to harness the benefits from the development of their mineral resources and bring them in line with their greeter national objectives [1]. Resolution of different perspectives and varying interests needs lot of information and data which is available in the international mineral literature. Further, internet surfing has added another dimension to the process of information gathering and has thus emerged as one of the fastest tools for information transfer from the websites of information providers. A comprehensive data base encompassing all facets of the prevalent state of the international as well as domestic mineral industry can thus be established to help in mineral development planning and decision making.

It is all the more important when a developing country like Pakistan decides to govern the direction and the pace of development of its mineral resources. Any sizable mineral development being under-taken through foreign participation or without, in the public sector or private, needs a strong back-up in terms of a variety of statistics and data collected not only locally but from the international sources as well especially if the proposed mineral development depends for its viability on international competitiveness. Information is needed on productions, consumptions, markets, pricing, finances, trends, technology, governmental policies and so on. Any decision made on incomplete or flawed information may prove short lived and perhaps very costly.

A CASE HISTORY

The international mineral literature can provide a variety of examples where correct information or lack of it has played vital role in the success or otherwise of the mineral projects. Because of paucity of space and time, only one case is cited which has been witnessed through personal experience.

In a developing country in the Middle East, a big mining project nearly ended in a fiasco when either adequate information was not available or the information collected was not deciphered

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properly by the personnel in charge for evaluating, monitoring and regulating the progress of the project. In the early 1970s, the government of this country negotiated with a European Supplier a one million ton cement plant, on a turn-key basis, using indigenous raw materials. Obviously some prior studies were conducted and accepted on the availability and suitability of lime stone deposit near the proposed plant site. When the construction and the installation of the plant was almost half-way through, it was discovered that the lime stone intended for cement production contained too high contents of dolomite thus rendering this deposit unfit for use in cement production. A possible financial disaster followed by prolonged litigations, was avoided only through acquiring and investigating a promising limestone area earmarked earlier for a nearby lime plant, although at additional costs to the project.

Whereas information is important for decision making, equally important is the ability of the people at the helm to assimilate and collate the available data and statistical information. Inadequate information or impaired interpretation of the results can lead to faulty decisions and eventually to damages, sometimes quite substantial.

USERS OF MINERAL DATA BASE

Planners and decision makers could use this information base to guide the course of mineral development in the country. Government departments and their functionaries need this information while negotiating foreign mineral development agreements, along with regulating and monitoring the performance of domestic mineral industry. Mineral consultants will need such information to advise their clients. Top and middle management could use this information to effectively run the indigenous mineral industry, while R&D establishments and academic institutions will need to be up-to-date on the latest technology and new ideas to make any meaningful contribution to the mineral industry of the country

INTERNATIONAL SOURCES OF INFORMATION

There are numerous publications and periodicals around the world and it is therefore, imperative that proper selection is made to serve the real objective for which the information is being collected. It is also essential to avoid unnecessary duplication especially on statistical data which abounds in the international mineral literature.

Ransburg and Bambrick [2] provide general outlines for information sources and the kind of information available from these sources. There are other compilations as well but the one offered by Society of Mining Engineers [3] of the American Institute of Mining & Metallurgical Engineers is a useful guide on the subject. Whereas all the conventional sources of information are listed on their websites as well, numerous other such sites are also available covering a wide variety of mineral related subjects. The following sections, though brief in description, are thus drawn to help compile the proposed mineral database:

A. General Sources of Statistical Information

A variety of publications are available which generally cover topics such as reserves, productions, consumptions, imports, exports, prices etc. of minerals/metals on a world- basis. Some of these publications are as under:

World Mineral Statistics (www.ukge.co.uk)

Published annually by the Geological Survey of Britain, and comprises descriptive statistics for individual countries, by mass or volume, on the production and trade of 65 mineral commodities and approximately 170 sub commodities.

Metallstatistik (In German Language) (www.wvmetalle.de/welcome.asp)

Sections include: productions and consumptions of aluminium, lead, copper, zinc, tin, antimony, cadmium, magnesium, nickel, mercury and silver; detailed statistics by countries; price tables; graphs. Published annually, since 1913, by the Metallgesellschaft AG., P.O. Box 3724, Reuterweg 14, Frankfurt am Main, Germany.

Metal Bulletin Handbook (www1.metalbulletin.com)

Sections, on world and country basis, include: prices, productions; imports, exports and consumptions, covers iron and steel, ferrous and non-ferrous metal industries. Published annually, since 1913, by the Metal Bulletin Ltd., 46 Wigmore Street, London W1H 0BT.

World Metal Statistics (www.world-bureau.com)

Sections include: primary and secondary production; consumption; stocks; international trade: prices; detailed world and country tables covering aluminium and bauxite, antimony, cadmium, copper, lead, nickel, tin and zinc. Contains figures for the current year and the previous four years. Published monthly, since 1948, by the World Bureau of Metal Statistics, Bathurst Street, Sussex Square. London.

Annuaire Statistique Minerals et Metaux (In French Language)

(www.mineralinfo.org/substance/statistiques)

Sections include; production and consumption; detailed statistics by countries; prices; uranium and nuclear power. Published by the Marketing, Imetal, 1 Boulevard de Vaugirard, 75751 Paris Cedex 15, France.

International Steel Statistics: Country Books (www.mesteel.com)

Sections include: 25 individual country volumes each containing data on production, materials consumed, deliveries of steel imports and exports by country of origin and destination. Published annually by the Iron and Steel Statistics Bureau, P.O. Box 230, 12-16 Addiscombe Road, Croydon CR9 6BS, England.

International Steel Statistics: World Tables (www.mesteel.com)

Sections include: series of world tables relating to iron ore, pig iron, scrap, crude steel, finished steel imports and exports. Published annually, by the same Steel Statistics Bureau as above.

International Steel Statistics (www.lib.curtin.edu.au/reference/statistics)

Published by the International Steel Statistics Bureau of OECD. Covers UK, EU and global statistics including production, demand, exports and markets. Since 1906, by the Fairchild Publications Inc., 7 East 12th Street, New York 10003.

Mining Annual Review (www.miningjournal.net)

Contains figures for more than 50 metals and minerals (including abrasives, oil and gas, rare earths etc.) for some 130 countries; technical progress reports, and LME. Published annually, since 1935, by the Mining Journal Ltd., 15 Wilson Street, London EC2M 2TR.

London Metal Exchange (LME) (www.basemetal.com)

LME covers prices of base metals and also gives out international market news, historical charts, data and graphs for copper, aluminium, nickel, zinc, lead etc.

The American Bureau of Metal Statistics (ABMS) (www.abms.com)

Publishes monthly reports and yearbooks on non-ferrous metals, covering productions, consumptions, prices (LME) etc for the U.S. market and globally.

Minerals Yearbook (3 vols) (www.minerals.usgs.gov/minerals/pubs/myb)

Volume I includes general review and commodity reviews of over 100 minerals, metals and fuels; volume II deals with domestic area reports; contains chapters on each of the 50 states; volume III deals with international area reports; gives latest available statistics for other countries. Published annually, by the U.S. Government

Mineral Commodity Summaries

(www.minerals.usgs.gov/minerals/pubs/mcs)

Contains figures (for the last four years), units of measure and definitions for well over 100 metals, mineral, and fuels. Published annually by the U.S. Government.

Australian Mineral Industry Annual Review

([www.ga.gov.au/Annual Mineral Industry Review](http://www.ga.gov.au/Annual%20Mineral%20Industry%20Review))

Sections include: introduction, world summary; the mineral industry in the national economy; important recent developments; production; overseas trade, prices, mineral exploration, expenditure, structural data and taxation; government assistance and controls; mining census, state mining statistics and address lists. Contains figures for Important metals, minerals and fuels. Published annually, since 1948, by the Bureau of Mineral Resources. P.O. Box 379, Canberra, Australia.

Canadian Minerals Yearbook (www.nrcan.gc.ca/ms/cmy)

Sections include: production, trade, consumption, prices, principal statistics; employment, salaries and wages; mining, quarrying, prospecting and drilling, transportation; taxation; investment and ownership; company index; maps; review of over 50 metals and minerals. Published annually, since 1967, by the Publications Distribution Office, Mineral Resource Branch, Department of Energy, Mines and Resources, Ottawa. Canada K1A 0E4.

Mineral Facts and Problems (www.minerals.usgs.gov/pubs/mf)

Sections include. energy resources, ferrous and non-ferrous minerals, non-metallic minerals (chapter headings are similar to those in volume I of the Minerals Yearbook). Published by the Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 20402.

Miscellaneous Sources of Information

Listed below are some of the websites which can be browsed for mineral-related information:

(www.nymex.com)

- World's largest physical commodities futures exchange for energy and precious metals.

(www.indmin.com)

- Free research, news and analysis on the global mining industry.

(www.austmine.com.au)

- Australian Mining Industry Association supplying mining equipment.

(www.camese.org)

- Canadian Association of Mining Equipment and Services for Export.

(www.phmining.com)

- Manufacturer of heavy surface mining equipment.

(www.xjZDK.cn/Mining-Machines)

- Mining equipment and service provider.

(www.metal-pages.com)

- Provider of latest information on metals, ferro-alloys and rare earth markets.

(www.infomine.com) / (www.infomine.com/countries)

- A mine of information about the global mining industry / information on the world mining organized by country.

(www.mining equipment.net)

- A resource locator of mining equipment from around the globe, published quarterly.

(www.abmec.org.uk)

- Association of Contractors and Manufacturers of Mining Equipment, U.K.

(www.wme.com)

- World mining equipment suppliers` directory.

(www.worldcat.org)

- An extensive network of library content and services.

(www.mineweb.com)

- Web based international publication focusing on mining, financial and corporate news.

(www.mininglife.com)

- An information source for the mining industry of the world.

B. Overview of World Mineral Scene

For an overview of the world scene of the mineral industry, selection could be made from the following list of periodicals:

- Mining Magazine, 15 Wilson St., London, EC 2.
(www.mining-journal.com/mining_magazine)
- The Mining Engineer, The Institution of Mining Engineers, Metal Bulletin Ltd., 48 Wigmart St., London WI H0BJ.
(www.mineralnet.co.uk/mining_engineer)
- Industrial Minerals, Metal Bulletin Ltd., 48 Wigmart St., London WI H0BJ.
(www.mineralnet.co.uk/industrial_minerals)
- Colliery Engineering, 33 Tothill St., London SW 1.
(www.dmm-gallery.org.uk/colliery)
- Mining Engineering, Society of Mining Engineers of AIMME, 345 E. 47th St., New York, N.Y. 10017.
(www.smenet.org/mining_engineering)
- E/MJ, 1221 Ave. of the Americas, New York, N. Y. 10020.
(www.mining-media.com/EMJ)
- Mining Journal, address same as for E/MJ.
(www.mining-media.com/MJ)
- Coal Mining & Processing, 300 W. Adams St., Chicago 60606.
(www.hoovers.com/Coal - Mining & Processing)
- Pit & Quarry, 105 W. Adams St., Chicago 60603.
(www.pitandquarry.com)
- C1M Bulletin, The Canadian Institute of Mining and Metallurgy, 906-1117 Ste. Catherine St. W., Montreal 2, Que., Canada.
(www.cim.org./bulletin)
- Bulletin, Australasian Institute of Mining & Metallurgy, Clumes Ross House, 191 Royal Parade-Parkville 3052, Melbourne, Victoria, Australia.
(www.ausmin.co.au/main/bulletin)
- South African Institute of Mining & Metallurgy Journal, Johannesburg, S.A.
(www.saimm.co.za/journal)
- Natural Resources Forum, Natural Resources Division, United Nations, N. York.
(www.blackwellpublishing.com/journals/nrf)
- Resources Policy, IPC Science & Technology Press Ltd., IPC House, 32 High Street, Guildford, Surrey, GU1 3EW England.
(www.elsevier.com/locate/inca)
- Energy Policy, Butterworth Scientific Ltd., P.O. Box 63, Westbury House, Bury Street, Guildford, Surrey, England GU 5BH
(www.elsevier.co./locate/enpol)
- Third World Quarterly, Third World Foundation, New Zealand House, 80-Hay Market, London SW1Y 4TS.
(www.rsg.oxfordjournals.org)

C. Overview of General World Scene

For information on current socio-economic and political issues and topics, the following list could provide adequate choice:

- U.S. News and World Report
- Fortune.
- Newsweek/Time
- Financial Times
- The Wall Street Journal
- Local and Regional Periodicals
- Local Chamber of Commerce Publications

D. Government Departments

1. From the U.S. Government Departments:
(www.niosh.cdc.usa)

Lot of mineral related publications are also available on this website in addition to the following:

- Mineral Trade Notes
- Monthly List of Publications
- International Coal Trade
- Reports of Investigations Series
- Information Circular Series

2. From Canadian Department of Mines, Energy and Resources:

(www.nrcan.gc.ca)

In addition to Canadian Minerals Yearbook, the department also gives out a large number of reports and studies dealing with various aspects of the mineral industry.

3. From Australian Bureau of Mineral Resources, Geology and Geophysics:

(www.doir.wa.ga.au) & (www-abc.gov.au/ayastats/abs)

A number of other interesting papers and reports are also published, besides their Australian Mineral Industry Review.

4. From South African Department of Mines:

(www.dme.gov.za/minerals)

The reports of the Government Mining Engineers Office, Geological Survey, Minerals Bureau and particularly, the semi-state National Institute for Metallurgy, contain a wealth of statistical, economical and technological information. Publications of the South African Chamber of Mines are well worth studying.

5. From Others:

In addition to these four major mineral producing countries, there are similar departments in Britain, France, W. Germany, Italy and Japan, and mineral-producing developing countries such as Brazil, India, Indonesia, etc. whose publications should also be read with interest. For Russia, the best source of information is their 'Five-Year Plans' which could be scanned for relevant information.

Mineral development planners and decision makers must also keep a close watch on any new legislation enacted by mineral-producing or consuming nation which may point to some impending changes on the mineral policies. Tariff agreements affect the international trade and should therefore, be thoroughly scrutinized. Various provisions of annual budgets of a nation should also be checked for possible effects on the mineral industry. Finally, the patent applications (unless these are intended to forestall the development of similar technology by other competitors) are a useful guide to technological trends and developments.

E. Private Agencies, Universities and Research Institutes

Some international organizations also publish reports of interest for mineral planners and analysts. These include the U.N. (e.g. the U.N. Statistical Yearbook), the U.N. conference on Trade and Development (UNCTAD), UNESCO, FAO (in the case of fertilizer commodities), UNITAR, the OECD, the World Bank and its regional affiliates, the Association of Geoscientists for International Development (AGID) and many others.

A number of private organizations such as Roskill Information Services, Charles River Associates, Battelle, Stanford Research Institute, Resources for the Future Inc., publish useful commodity studies which could be of great value. Last but no less important are the publications and reports given out by mineral producers associations such as Organization of Petroleum Exporting Countries (OPEC), International Tin Council (ITC), Inter-governmental Council of Copper Exporting Countries (CIPEC), International Bauxite Association (IBA), Association of Iron Ore Exporting Countries (AIEC) and Lead, Tungsten and Mercury Groups which operate as

cartels in the international mineral scene. [4]

Additionally, universities and their departments of Mineral Engineering and Earth Sciences, and technical institutes around the globe are well equipped to serve as important sources of information. Professional bodies and organizations and R&D establishments can be useful in providing information on latest technical innovations and processes. Libraries in general but especially those attached with the universities are store-houses of information which can be tapped whenever needed. Added to this are the inter-library loan services which have access to all the four corners of the earth thus providing unlimited opportunities and avenues for information collection.

F. Reference Works and Handbooks

The planners and the decision makers at the national-level and the executives in the mineral industry should have at their disposal a number of good, basic reference works which cover broad aspects of the mineral industry. Needless to say that professionals like specialist geologist, mining engineer, metallurgist, marketing man etc. must also have, depending on their area of interest, access to these sources of information and the information that they contain. Following short list of reference works is suggested:

- E/MJ International Directory of Mining and Mineral Processing Operations
- SME Mining Engineering Handbook by H. L. Hartman
- World Mineral Supplies-Assessment and Perspective by Govett and Govett
- McGraw-Hill Encyclopedia of Science and Technology
- Kirk-Othmer Encyclopedia of Chemical Technology
- Dictionary of Mining, Minerals and Related Terms
(Published on CD-ROM by the US Bureau of Mines, available online by EduMine.
(xmlwords.infomine.com/mlwords.htm-2k)
- Some basic handbooks on geology, exploration, ore-dressing, metallurgy, mining engineering, finance, economics, law, marketing and mineral economics.
- A list of well known national and international publishers and suppliers.

SOURCES OF INFORMATION IN PAKISTAN

The most appropriate sources of information in Pakistan are the governmental agencies / departments and organizations that collect, compile, analyze and disseminate relevant information and data to be used as input for future developmental planning and resource allocations in various sectors of the national economy. Mineral Cell of the Planning Commission of the Government of Pakistan (www.pc.gov.pk) can be a useful source of information. Further, professional bodies of geo-scientists and engineers, and sometimes, commercial houses can also be tapped for relevant information. Technical universities with their pool of expertise and well established laboratorial infrastructure and libraries are not only equipped to provide assistance in mineral project identification its assessment and evaluation, but serve as sources of information as well. For an overview of the local and regional socio political and economic scene, selected periodicals and dailies can fulfill the need.

A. Ministry of Petroleum and Natural Resources

(www.mpnr.gov.pk)

This ministry at the federal level defines the contours of national mineral policy and provides the guidelines for regulatory and fiscal regimes needed to pursue the indigenous mineral resource development in Pakistan. The last National Mineral Policy was announced in 1995 and with minor adjustments over time, is still the main policy document governing mineral development efforts in the country.

As per 1973 Constitution, oil, gas and nuclear minerals and those occurring in Federally Administered Tribal Areas (FATA), Northern Areas, Azad Jammu and Kashmir and off shore zones, along with geological surveys, preliminary evaluation, processing and enrichment of minerals are federal functions. Provincial Governments, on the other hand,, are responsible for

regulation, development and exploitation of all other minerals. The subject of labor and safety in the mines appears concurrently.

B. Experts Advisory Cell Study Group Report

(www.mip.gov.pk)

In 2003, a study group was organized by the Experts Advisor Cell of the Ministry of Industries & Production, Government of Pakistan, with the prime aim of highlighting the opportunities for investors, both local as well as foreign, in the mineral industry of the country. [5]The study report, completed in April 2004, is a very well prepared document with an information base covering all the facets of the industry. It details topics such as geological setting, mineral data base along with import reliance of minerals and metal scraps, R & D infrastructure in geo-science organizations, policy matters and fiscal measures, metallogenic regions, high mineral potential areas, exploration and evaluation frame work, identification and formulation of profiles of high mineral potential deposits for their utilization in various sectors of the economy and suggested plan of action for the future.

C. Geological Survey of Pakistan (GSP)

(www.gsp.gov.pk)

GSP with its regional offices at Islamabad, Lahore, Karachi and Muzaffarabad and head quarters at Quetta, is entrusted with the task of undertaking geological studies, preparation of geological maps, investigation of mineralized zones/areas, identification of winnable deposits, inventory of mineral resources/reserves and publication of periodical mineral statistics and area reports. The organization is duly staffed with qualified personnel and is equipped with up to date laboratory facilities covering different areas including analytical chemistry, sedimentary geology, geophysics, drilling, petrography, photogeology and photogrammetry and geo science research activities.

D. Pakistan Council of Scientific and Industrial research (PCSIR)

(www.pcsir.gov.pk)

This organization comprises Mineral and Metallurgy Centre (Peshawar), Glass and Ceramic Centre (Lahore), Fuel Research Centre (Karachi) and Mineral technology Division (Peshawar). PCSIR is staffed with highly qualified and well versed people to undertake research on various aspects of rocks and minerals and develop product and suggest mineral based industries. Interaction with geo-science and technical universities is a regular feature.

E. Public Sector Mining Organizations

There are a number of mining entities engaged in the development and marketing of minerals and mineral products in the public sector at federal as well as provincial levels. Their yearly productions records, the type of mineral (s) being mined, exploration targets, future plans etc are available for public perusal. These are:

- Pakistan Mineral development Corporation (PMDC), Islamabad.
- Federally Administered Tribal Areas Development Corporation (FATADC), Peshawar.
- Punjab Mineral Development Corporation (PUNJMIN), Lahore.
- Sind Coal Authority, Karachi.
- Sarhad Development Authority (SDA), Peshawar.
- Balochistan Development Authority (BDA), Quetta.
- Azad Kashmir Mineral Development Corporation, Muzaffarabad.

F. Directorates of Mineral development

These directorates function at the provincial level and are authorized to grant prospecting and mining leases, keep records of mines productions, collect royalties, regulate and monitor the workings of mines within the national mineral policy framework.

G. Inspectorates of Mines

Both at the federal as well as provincial levels these inspectorates are responsible for labor and safety related issues such as manpower employed, productions, accidents and their causes, use of explosives and other devices, suggested safety measures, short courses on safety and rescue etc. Annual reports printed by respective inspectorates detail an exhaustive overview of mine workings along with their statistical information for the previous year.

H. Geo Science and Technical Universities

Higher Education Commission (HEC) on its website (www.hec.gov.pk) lists a number of geo science and technical universities offering graduate and post graduate degrees. Their R & D establishments, subject specialist and experts and prolific technical literature facilities can be of substantial assistance and help for statistical information and data seekers. Some of these universities along with their areas of relevant specializations are listed below:-

University of Engineering & Technology, Lahore. (www.uet.edu.pk)

(*Mining & Geological Engineering*).

NWFP University of Engineering & Technology, Peshawar. (www.nwfpuet.edu.pk)

(*Mining Engineering & Geo Sciences*)

Mehran University of Engineering & Technology, Jamshoro. (www.muett.edu.pk)

(*Mining Engineering & Geo Sciences*)

National University of Science & technology, Rawalpindi. (www.nust.edu.pk)

(*Geo Technical Engineering*)

Balochistan University of I.T., Engineering and Management Sciences, Quetta.

(www.buitms.edu.pk), (*Mining & Geological Engineering*)

Institute of Geology, Punjab University, Lahore. (www.pu.edu.pk)

(*Geo Sciences*)

University of Peshawar, Peshawar. (www.upesh.edu.pk)

(*Geo Sciences*)

University of Karachi, Karachi. (www.uk.edu.pk)

(*Geo Sciences*)

University of AJK, Muzaffarabad. (www.ajku.edu.pk)

(*Geo Sciences*)

Sindh University, Jamshoro. (www.su.edu.pk)

(*Geo Sciences*)

Quaid-e- Azam University, Islamabad. (www.qau.edu.pk)

(*Earth Sciences*)

CONCLUSIONS

Selection of proper sources of information is, however, a hard task, and the job is made all the more difficult because of the proliferation and, in many cases, duplication of information from different sources with variations in standards, measures and terminology. The information collectors should define their objectives clearly and exercise utmost care in the selection of the information source. As the time goes by the experience gained over the years will perhaps be the best guide; the mineral analyst will know his ability to collate and analyze this information and think in retrospect about the quality of his advice and decisions.

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