EXPRESSION OF INTEREST (EOI) FOR PROVISION OF TRANSACTION ADVISORY SERVICES

FOR FEASIBILITY STUDY AND SELECTION OF CONCESSIONAIRE /INVESTOR(S) FOR IRON / COPPER MINING AND STEEL MILL IN CHINIOT, PUNJAB, PAKISTAN

Punjab Mineral Company (PMC) is a wholly owned corporate entity of the Government of Punjab, registered with SECP, with the mandate for economic exploitation of its mineral resources. PMC has already engaged Metallurgical Corporation of China (MCC) as contractor for the project of resource estimation of Iron Ore and associated metallic minerals on international standard (NI43-101) under the supervision of G.E.O.S. Ingenieuresellschaft mbH (Germany). Project progress review has confirmed discovery of high quality iron ore deposits along with presence of copper, cobalt and other metals on a vast area in Chiniot-Raja and vicinity.

EOI is invited for selection of Transaction Advisor (T.A) with the mandate to undertake business case feasibility study (including legal, financial, environmental due diligence) based on the resource estimation report by MCC, leading to selection of concessionaire / investor(s) for iron/ copper mining and establishment of Steel Mill in Punjab. Detailed scope of work along with pre-qualification and evaluation criteria has been compiled in Prequalification Documents (POD) which may be downloaded from the website: http://ppra.punjab.gov.pk or obtained from the office (mentioned below).

Transaction Advisory firms having international experience and capability to undertake the assignment (as per scope of work) are requested to submit applications, complete in all respects, on or before 10th August, 2015 by 2:00 pm at the address given below. (IPL-8319)

Chief Financial Officer/ Company Secretary
Punjab Mineral Company
10-B Model Town, Lahore, Punjab, Pakistan.
Ph: +92-042-99231771, +92-042-35915846 Fax: +92-042-99231772
E-mail: secretarymmgopb@gmail.com, email@PMC.punjab.gov.pk
PRE-QUALIFICATION DOCUMENT (PQD)

INSTRUCTION TO PROSPECTIVE BIDDERS

FOR PROVISION OF TRANSACTION ADVISORY SERVICES FOR THE PROJECT TITLED

“FEASIBILITY STUDY AND SELECTION OF CONCESSIONAIRE / INVESTOR(S) FOR IRON / COPPER MINING AND STEEL MILL IN CHINIOT, PUNJAB, PAKISTAN”

CHIEF FINANCIAL OFFICER/COMPANY SECRETARY
PUNJAB MINERAL COMPANY (PRIVATE) LIMITED

10-B MODEL TOWN, LAHORE, PUNJAB, PAKISTAN
Ph: # +92 42 9923 1771, +92 42 3591 5846 Fax: +92 42 9923 1772
Email: secretarymmgopb@gmail.com; email@pmc.punjab.gov.pk
This Prequalification Document ("PQD") has been prepared by Punjab Mineral Company (Private) Limited ("PMC" or the "Client") and it constitutes no commitment on the part of PMC to enter into any arrangements with any person / entity. PMC reserves the right to withdraw from or cancel the process or any part thereof or to vary any of its terms at any time without giving any reason whatsoever. No financial or other obligation whatsoever shall accrue to PMC in such an event. The information contained in this PQD or subsequently provided to Applicants, whether verbally or in documentary or any other form by or on behalf of PMC or any of its employees or advisors, is provided to them on the terms and conditions set out in this PQD and such other terms and conditions subject to which such information is provided.

This PQD does not constitute an agreement; its sole purpose is to provide interested parties with information that may be useful to them in submitting their Expressions of Interest ("EOIs") pursuant to issuance of this PQD. Any document and information submitted in response to this PQD becomes the property of PMC and PMC does not accept any responsibility for maintaining the confidentiality of the material including any trade secrets or proprietary data submitted to PMC.

PMC shall not be responsible for non-receipt of correspondence sent by post / courier / email / fax. No decision should be based solely on the basis of the information provided in this PQD. PMC has no liability for any statements, opinions or information provided in this PQD.

In submitting an EOI in response to this PQD, each Applicant certifies that it understands, accepts and agrees to the disclaimers set forth above. Nothing contained in any other provision of this PQD nor any statements made orally or in writing by any person or party shall have the effect of negating or suspending any of the disclaimers set forth in this disclaimer.
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DEFINITIONS AND INTERPRETATIONS

In this PQD, unless the context otherwise requires, the following terms shall have the meanings set forth below:

"Applicant" means a Firm or a Consortium participating in the Prequalification Process for provision of Transaction Advisory Services for the Project. The term Applicant has been interchangeably used with the term "Firm / Consortium" in this PQD.

"Consortium" means a group of entities submitting a joint EOI for participating in the Prequalification Process for the provision of Transaction Advisory Services for the Project.

"Client" or "PMC" means Punjab Mineral Company (Pvt.) Limited.

"EOI" means an Expression of Interest submitted by an Applicant, in accordance with the guidelines provided in the PQD, for participating in the Prequalification Process for the provision of Transaction Advisory Services for the Project.

"EOI Submission Date" is defined in paragraph 1.3 of Section - D of this PQD.

"Firm" means an entity participating in the Prequalification Process for the provision of Transaction Advisory Services for the Project.

"Project" means the “Feasibility study and selection of concessionaire / investor(s) for iron / copper mining and steel mill in Chiniot, Punjab, Pakistan”.

"Transaction Advisory Services" means advisory services to be offered in accordance with Section B: Terms of Reference of this PQD including any revisions in such Terms of Reference as are included in the Agreement to be signed between the Transaction Advisor and the Client.

In this PQD, unless the context otherwise requires:

(a) any reference to a statutory provision shall include such provision as is from time to time modified or re-enacted or consolidated so far as such modification or re-enactment or consolidation applies or is capable of applying to any transactions entered into hereunder;

(b) the words importing singular shall include plural and vice versa, and words denoting natural persons shall include partnerships, firms, companies, corporations, joint ventures, trusts, associations, organizations or other entities (whether or not having a separate legal entity);

(c) the headings are for convenience of reference only and shall not be used in, and shall not affect, the construction or interpretation of this PQD;

(d) the words "include" and "including" are to be construed without limitation;

(e) any reference to any period of time shall mean a reference to that according to Pakistan Standard Time;
(f) any reference to day shall mean a reference to a calendar day;

(g) any reference to month shall mean a reference to a calendar month;

(h) any reference to GoPb shall mean Government of the Punjab;

(i) the Annexure to this PQD or any Addenda issued later on to clarify matters, if any, form an integral part of this PQD and will be in full force and effect as though they were expressly set out in the body of this PQD;

(j) unless otherwise stated, any reference to any period commencing "from" a specified day or date and "till" or "until" a specified day or date shall include both such days or dates;

(k) any reference to "Prequalification Process" shall mean the entire process commencing from the invitation of EOIs until prequalification of Applicants;

(l) any reference to "Bidding Process" shall mean the entire process for selection of Transaction Advisor commencing from issuance of Request for Proposals (RFP) to prequalified Applicants until signing of Agreement for Transaction Advisory Services for the Project;

(m) any reference to "Transaction Advisor" shall mean the selected Applicant with whom Agreement for Transaction Advisory Services for the Project will be signed.

(n) Net Worth means the value of total assets less total liabilities of the entity concerned at the end of a financial year

(o) Gross Annual Revenues/Turnover/Sales means the value of gross revenues/turnover/sales of the firm/consortium concerned for a given financial year as mentioned in its financial statement for that year.
SUBMISSION LETTER

(This letter shall be submitted by the Applicant or lead member, in case of a Consortium, on its letter head)

Date: Month, Day, Year

The Chief Executive Officer,
Punjab Mineral Company (Pvt.) Limited
10-B Model Town, Lahore, Punjab, Pakistan.

Dear Sir,

SUBJECT: PREQUALIFICATION OF APPLICANT FOR THE PROVISION OF TRANSACTION ADVISORY SERVICES FOR THE PROJECT “FEASIBILITY STUDY AND SELECTION OF CONCESSIONAIRE / INVESTOR(S) FOR IRON / COPPER MINING AND STEEL MILL IN CHINIOT, PUNJAB, PAKISTAN”

The undersigned, being duly authorized to represent and act on behalf of (Applicant), applying to be prequalified for provision of Transaction Advisory Services for the Project cited above, is pleased to enclose one (1) original (together with two copies) of our EOI in accordance with the terms set forth in the PQD and declare the following:

a. We have examined and have no reservations to the PQD issued;

b. We agree to comply with all the tender rules, laws and regulations governing the tender as issued by Client from time to time;

c. We accept the exclusive application of the federal laws of Pakistan and provincial laws of Punjab with respect to procedures laid down in the PQD;

d. We accept the right of the Client to (i) request additional information reasonably required to assess the EOI, (ii) amend the procedures and rules or make clarifications thereof, and (iii) extend or amend the schedule of the Prequalification Process and the Bidding Process;

e. We understand that you may cancel the Prequalification Process at any time and that you are not bound either to accept any Application that you may receive or to invite the prequalified Applicants for the subject Project;

f. Prequalified Applicants will be subjected to verification of all information submitted for prequalification at any time during the Prequalification Process;

g. [Name of Applicant or lead member, in case of a Consortium] hereby represents and warrants that as of the date of this letter:

   All the information submitted is accurate in all respects;
(Applicant members individually and as Consortium) has(ve) not been subject to any voluntary or involuntary bankruptcy or insolvency or similar proceeding during the last five (5) years; and

(Applicant members individually and as Consortium), has(ve) paid all taxes due, except those which are being contested in good faith by appropriate proceedings and for which adequate reserves have been established.

Capitalized terms used which have not been defined herein shall bear the meaning ascribed to them in the PQD.

PMC and its authorized representatives may contact the following person(s) for further information, if needed:

Name:
Phone #
Cell #
Email:

The undersigned declares that the information provided and the statements made in this EOI are complete, true and correct in every detail.

Signature of Authorized Signatory: ____________________________
Name and Title of Signatory: ________________________________
Name of Firm/Consortium: ________________________________
Address: ________________________________
SECTION - A: INFORMATION TO APPLICANTS
1. PROJECT DEVELOPMENT PROCESS AT A GLANCE

The sequence of activities to be performed during the Prequalification Process and Bidding Process is provided below for comprehension of the way forward leading to award of contract for Transaction Advisory Services for the Project:

**Prequalification Process**

(i). Invitation of EOIs including issuance of Prequalification Document (PQD);
(ii). Pre-Submission meeting with Prospective Applicants
(iii). Submission of EOIs;
(iv). Opening and Evaluation of EOIs;
(v). Prequalification of Applicants;

**Bidding Process**

(i). Issuance of Request for Proposal (RFP) to the Prequalified Applicants.
(ii). Pre-bid Meeting;
(iii). Submission of Proposals including Bid Bond;
(iv). Opening and Evaluation of Technical Proposals;
(v). Opening of Financial Proposals (of the Firms/Consortia with technically responsive proposals);
(vi). Notice of Award to successful bidder through Issuance of Letter of Acceptance;
(vii). Signing of Agreement for Transaction Advisory Services for the Project;
(viii). Placement of Performance Security and Release of Bid Bond;
(ix). Commencement of Work; and
(x). Project Completion.

2. PROPOSED SCHEDULE

PMC shall endeavor to adhere to the following schedule during the Prequalification Process:

<table>
<thead>
<tr>
<th>Event Description</th>
<th>Date</th>
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<tbody>
<tr>
<td><strong>Prequalification Process</strong></td>
<td></td>
</tr>
<tr>
<td>Issuance of Prequalification Document (PQD)</td>
<td>June 22, 2015</td>
</tr>
<tr>
<td>Pre-submission meeting with Prospective Applicants (Venue: Clients office at 11 AM-PST)</td>
<td>July 20, 2015</td>
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<tr>
<td>Submission of EOIs</td>
<td>August 10, 2015</td>
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<td>Event</td>
<td>Date</td>
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<tr>
<td>Evaluation of EOI</td>
<td>August 20, 2015</td>
</tr>
<tr>
<td>Prequalification of Applicants</td>
<td>August 21, 2015</td>
</tr>
<tr>
<td><strong>Bidding Process</strong></td>
<td></td>
</tr>
<tr>
<td>Issuance of Request for Proposal (RFP) to the Prequalified Applicants</td>
<td>August 22, 2015</td>
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<tr>
<td>Pre-bid Meeting</td>
<td>September 8, 2015</td>
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<tr>
<td>Submission of Proposals including Bid Bond</td>
<td>September 28, 2015</td>
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<td>Opening of Technical Proposals</td>
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<td>Evaluation of Technical Proposals</td>
<td>October 12, 2015</td>
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<tr>
<td>Opening of Financial Proposals</td>
<td>October 14, 2015</td>
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<tr>
<td>Notice of Award through Issuance of Letter of Acceptance</td>
<td>October 16, 2015</td>
</tr>
<tr>
<td>Signing of Agreement for Transaction Advisory Services for the Project</td>
<td>October 28, 2015</td>
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3. INTRODUCTION AND BACKGROUND OF THE PROJECT

PURPOSE

The purpose of this Prequalification Document (PQD) is to invite Expressions of Interest (EOIs) from the prospective Applicants for their prequalification. The pre-qualified applicants will be invited to participate in the Bidding Process for award of contract for Transaction Advisory Services for the Project. Information regarding the Project is set forth below:

BRIEF INTRODUCTION

3.1 Pakistan Overview

Pakistan has important strategic endowments and development potential. The country is located at the crossroads of South Asia, Central Asia, China and the Middle East and is thus at the fulcrum of a regional market with a vast population of 189.9 million\(^1\) and GDP of US$ 269 billion (PKR 27,384 Billion\(^1\)), large and diverse resources, and untapped potential for trade. The increasing proportion of Pakistan’s working-age population provides the country with a potential demographic dividend.

3.1.1 Pakistan Economy Overview\(^1\)

Pakistan is improving quantitatively and qualitatively as the current growth rate of 4.24 % is the highest since 2008-09. Fiscal year 2014-15 registered some remarkable achievements. Inflation hit the lowest level at 2.1 % on YoY in April since 2003-04. The policy rate decelerated at 7 percent which was lowest in last 42 years, capital market created history, grading by international rating agencies improved, historical agreement with Chinese Government on China Pakistan Economic Corridor (CPEC) for an investment portfolio of USD 45 billion, successful reviews with IMF, issuance of Ijara Sukuk Bond after a period of 9 year, decline in unemployment rate from 6.2 to 6.0 percent etc. are few economic highlights of Pakistan.

3.1.2 Growth and Investment\(^1\)

Supported by a favorable slump in international oil prices, and stellar implementation of the IMF reform program; growth recovery remains underway, with projected GDP growth now at 4.3-4.6 percent. Preliminary data for the first semester of FY 2015 show growth picking up, driven mainly by agriculture and services. Growth of large-scale manufacturing (LSM) was positive arising from strong performance of pharmaceuticals (6%), electronics (8%), automobiles (17%), iron and steel (36%). The LSM will also benefit from the backward and forward linkages of huge infrastructure projects under CPEC and increasing demand for housing triggering sharp demand for iron, cement and related construction industries.

China and Pakistan have made agreements to establish China Pakistan Economic Corridor between the two countries. The game changer agreements have been signed between Pakistan and China worth US$45 billion. The corridor will serve as a driver for connectivity, trade in the world is expected to increase and Pakistan will take benefits through multiple dimensions. Pak-China Economic Corridor will lead to greater investment

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\(^1\) Pakistan Economic Survey 2014-15
and rapid industrialization in Pakistan. This is a great initiative which will open new avenues for prosperity and co-operation in the whole region and certainly it will uplift socio-economic condition of Pakistan on fast track with multiple dimensions.

Present government has launched comprehensive plan to create investment friendly environment and to attract foreign investors in the country. As is evident, the capital market has reached new height and sending positive signals for restoring the investor’s confidence.

Pakistan's policy trends have been consistent, with liberalization, deregulation, privatization, and facilitation being its foremost cornerstones. Board of Investment (BOI) under the Prime Minister's office and Punjab Board of Investment & Trade (PBIT) in Province have stable investment policies to provide more investment friendly environment to investors.

Foreign private investment has reached to $1666.2 million during July-April 2015 as compared to $1050.3 million showing 58.6% increase as compared to last year.

3.1.3 Mining and Quarrying Sector:

Pakistan is bestowed with all kinds of resources including minerals. It has abundance of economically exploitable resources of metallic and non-metallic minerals including Iron, Copper, and Cobalt etc. Other key minerals include coal, rock salt, limestone and onyx marble, china clay, dolomite, fire clay, gypsum, silica sand and granite, as well as precious and semi-precious stones. This sub-sector contains 14.4 % share of the industrial sector and contributes 2.9% in GDP of the country. Mining and quarrying has recorded a growth of 3.8% against the last year growth of 1.6%.

3.1.4 Steel Sector:

Steel Sector is expanding as the current production is around 4.5 million tons/annum while the annual demand is around 6.5 million tons. This gap is covered by the import of Steel. Demand for steel products is expected to rise in near future as the CPEC projects are achieving financial close and construction activity will soon commence which will increase the consumption of steel.

3.2 Mineral Potential in Punjab

Punjab is the largest province of Pakistan with 53% contribution in national GDP whereas Punjab’s Gross Regional Product is approximately USD 132.95 billion (PKR 13,532 billion). Government of the Punjab, under the visionary and dynamic leadership of Chief Minister Punjab is fully committed to develop its metallic mineral resources with a special focus on Iron Ore and Copper. The province is bestowed with large resources of metallic and non-metallic minerals. The Iron Ore resources have been known since long in the districts of Mianwali, Chiniot and Dera Ghazi Khan however, no systematic studies on these deposits were ever done in the past, due to which these could not be developed.

Recently the Government of Punjab conducted metallurgical studies through IMC-Montan Consulting GmbH, Germany on Kalabagh Iron Ore in district Mianwali, while the resource estimation studies on Iron Ores of Chiniot-
Rajoa and vicinity in district Chiniot are underway through Metallurgical Corporation of China (MCC) under the supervision of a JV of G.E.O.S Ingenieurgesellschaft mbH of Germany and two Pakistani Firms. The results of metallurgical studies on Kalabagh Iron Ore and that of the initial exploratory work being carried out in Chiniot-Rajoa and vicinity, are quite encouraging in terms of quality as well as quantity and have therefore paved a way for the development of these resources and their utilization in the steel mill to be established at Chiniot or any other suitable place in Punjab.

The Government of Punjab is fully committed for the development and exploitation of these resources to establish a base for Steel Industry.

All the raw materials like limestone, dolomite, silica sand and fire clay required for processing of Iron Ore are available within the distance ranging from 10 kilometers to 150 kilometers from these deposits.
3.3 The Client: Punjab Mineral Company (Pvt.) Limited (PMC)

The Client (PMC) is a wholly owned company of the Government of Punjab, established under Companies Ordinance 1984, duly registered with Securities & Exchange Commission of Pakistan. PMC has a highly experienced Board of Directors and, inter alia, has the mandate for promotion, exploration and resource estimation of the mineral resources of Punjab. PMC has got metallurgical studies on Kalabagh Iron Ore through IMC-Montan Consulting GmbH, Germany, whereas it has engaged Metallurgical Corporation of China (MCC) as contractor for exploration & resource estimation of Iron Ore and associated metallic minerals in Chiniot-Rajoa and vicinity on international standard (NI43-101) under the supervision of G.E.O.S. Ingenieurgesellschaft mbH (Germany). The exploration progress review has confirmed discovery of high quality iron ore deposits along with presence of copper, molybdenum, nickel, cobalt, graphite, and other precious metals on a vast area in Chiniot-Rajoa and vicinity.

The high quality iron ore and copper ascertained by world highly accredited labs signify a new age of exploration for metallic minerals in Punjab. The establishment of steel mill based upon these resources will prove to be a game changer for the province and the country at large vis-à-vis its GDP growth and energy constraints. Therefore, PMC is keen to select a concessionaire/ investor(s) to develop and operate Iron Ore Mines in Kalabagh and Chiniot-Rajoa & vicinity areas, and establish a steel mill in Punjab.

3.4 Location/Logistic Information of Iron Ore Resources Areas

3.4.1 Chiniot-Rajoa and Vicinity

(i). The location of resources of iron ore and associated metallic & non-metallic minerals in Chiniot-Rajoa (and adjoining areas) is 158 km in the north-west from Lahore and 38 km in north of Faisalabad.

(ii). The corresponding exploration areas are; Chiniot & Rajoa; 28 KM², Wad Sayyidan; 24KM², Ghutti Sayyidan; 66 KM² and Chak Jhumra; 84KM² in districts Chiniot & Faisalabad, Punjab.

(iii). Adequate infrastructure facilities/connectivity is available including roads, rail, motorway, electricity, gas and water.

(iv). Skilled / semi-skilled manpower and labour is abundantly available in the adjoining areas.

(v). Tertiary health care facilities, international airport, five star hotel, golf course, gymnasiums and sports clubs are available within a distance of 20 kilometers from the Project site at Chiniot.

(vi). Industrial and personal insurance services and corporate / investment banking facilities are readily available.

(vii). Multinational Japanese and French firms / EPC Contractor(s) have been operating near the area on Water Utility and other projects.
3.4.2 Kalabagh

(i). Iron ore deposits are located in the Surghar Range in Trans Indus (Across River Indus) from Kalabagh to Makarwal over a stretch length of 75 KM in District Mianwali.

(ii). This mountain range forms a quadrangle with Kuch located 7 km north, Chichali 14 km west-north-west and Makarwal 38 km west-south-west of Kalabagh.

(iii). The Surghar Range extends from Kalabagh to Mallakhel in East-West trend, and then bends towards Makarwal in North –South.

(iv). The area is located at the Punjab and Khyber Pakhtunkhwa (KPK) Provincial boundary.

(v). The deposits at places extend from Punjab to KPK.

(vi). The area is approachable from Kalabagh to Makarwal via Chapri-Mallakhel through a single road along the foot hills (motor able in fair weather).

(vii). Adequate infrastructure facilities/connectivity is available including roads, rail, electricity and water.

(viii). Skilled / semi-skilled manpower and labour is abundantly available in the adjoining areas.

(ix). Tertiary health care facilities within the area of 100 kilometers are available in District Headquarter Hospital, Mianwali.

(x). Industrial and personal insurance services and corporate / investment banking facilities are readily available.

Figure 3: Regional Map of the Area of Interest
3.5  JUSTIFICATION FOR THE PROJECT

The following justify the project to be undertaken: -

1. The metallurgical studies conducted for Kalabagh Iron Ore, and the exploration results of Chiniot-Rajoa & vicinity are quite encouraging.

2. Market demand of steel products is available in Punjab as well as in Pakistan.
3. Market demand is expected to increase in view of the agreements worth US$45 billion signed between China and Pakistan to establish China Pakistan Economic Corridor between the two countries.

4. Infrastructure facilities for both the sites of iron ore resources are available.

### 3.6 PROJECT OBJECTIVE

The main objective of the project is to appoint a Transaction Advisor (TA) who will assist the Client in attracting Concessionaire/Investor(s) to:

1. Develop and Operate the mines for the exploitation of Kalabagh Iron Ore and Chiniot-Rajoa Iron Ore & other minerals; and
2. Establish steel mill at Chiniot or any other suitable place in Punjab by using indigenous iron ore from Kalabagh and Chiniot-Rajoa & vicinity.

The mines and the steel mill will be developed and established in accordance with international best practices in respect of management of social, economic, and environmental impacts of the developments.

### 3.7 IRON ORE RESOURCES AT A GLANCE

#### 3.7.1 KALABAGH IRON ORE

1. Iron ore resource is a sedimentary deposit present in Chichali Formation of Cretaceous age located in Surghar Range. The Chichali Formation contains following three iron-rich beds (from top to bottom):
   - Kuch Bed, up to 3 meters thick
   - Chichali Bed, up to 4 meters thick, and
   - Makarwal Bed, up to 7 meters thick.

2. Exploratory work which was carried out in the past, included,
   - Exploratory drifts and cross-cuts
   - Drilling of boreholes
   - Exploratory mining by the development of 900 feet long tunnel

3. In recent metallurgical study conducted by IMC-Montan Consulting GmbH (Germany), an economically viable process for sponge iron and steel with direct reduction followed by smelting using Kalabagh iron ore and indigenous Pakistani coal has been developed.

4. Makarwal & adjoining coal fields, where coal mining is being conducted since long, are located within the Surghar Range.

5. Other raw material like limestone, dolomite, silica sand and fireclay is available within Surghar Range.

6. Unprecedented support of the government towards the development of this resource is available.

7. The area is well connected with rest of the country.

**NOTE:** The detailed information about Iron Ore resources at Kalabagh and their metallurgical processing has been summarized at Annexure 7 & 8.
3.7.2 IRON ORE AT CHINIOT-RAJOA & VICINITY

1. Iron ore along with other associated metallic & non-metallic mineral resources are hosted by sub-surface volcanogenic rocks, which are part of the Pre-Cambrian Indian Shield rocks.

2. The exploratory work includes:
   - Topographic survey
   - Geophysical surveys
   - Core drilling
   - Sampling & lab tests
   - 3-D ore body modeling
   - Resource estimation

3. The exploratory work at Chiniot area has almost been completed.

4. The chemical & mineralogical tests of core samples are quite encouraging.

5. Iron ore resources areas are well connected with rest of country.

6. Other raw material like limestone, dolomite, silica sand and fireclay is available in Salt Range at distance ranging between 150 to 200 kilometers.

7. Unprecedented support of the government towards the development of these resources is available.

NOTE: The detailed information about ongoing Resource estimation project at Chiniot-Rajoa has been summarized at Annexure 5 & 6.

3.8 Selection and Engagement of Applicant for Transaction Advisory Services for the Project

In the backdrop of above, the Client desires to engage the Applicant, possessing sufficient capabilities and relevant experience, through competitive Bidding Process to act as Transaction Advisor for the Project. The successful Applicant (Transaction Advisor) shall be responsible for the Project Preparation in consultation/coordination and based on reports/work of the existing consultants and Transaction Execution of the Project. The Scope of Work of the Transaction Advisor is defined in Section B: Terms of Reference, of this PQD. Applicants, as part of submission of this PQD, are encouraged to propose any revisions / amendments in the Scope of Work of the Transaction Advisor to make this function of Transaction Advisory Services more effective and fruitful for the Project.

In this connection, PMC intends to hold a pre-submission meeting with the prospective applicants to analyze any changes in scope of work that they would like to propose. The meeting would be convened at the Client office (10-B Model Town Lahore, Pakistan) at 11 AM on 20\textsuperscript{th} July, 2015
SECTION - B: TERMS OF REFERENCE
1. REQUIRED SCOPE OF WORK

1. Mobilization Period:

Transaction Advisor will set up the team, mobilize funds, and convene the Project kick-off meetings.

2. Phase I – Due Diligence:

As already mentioned in this Prequalification Document, some work is currently in progress and some has been undertaken in the past with respect to the Project. Transaction Advisor, along with its consultants, will review this work, and identify areas where further due diligence is required. The detailed tasks for this phase include:

1. Technical Due Diligence: Transaction Advisor and its consultants will base their detailed technical due diligence on (i) metallurgical studies conducted by IMC-Montan Consulting GmbH, Germany along with other past studies/work on Kalabagh Iron Ore in district Mianwali and (ii) the resource estimation report by MCC and past studies/works conducted in Chiniot-Rajoa & vicinity in district Chiniot and its vicinity. The technical due-diligence will determine the technical specifications and parameters, facility sizing and location, mining/production technology, preliminary facility design, and applicable qualitative and health, safety and environmental standards.

2. Legal, Institutional & Regulatory Framework: Transaction Advisor will advise on any legal, regulatory and other issues affecting Project implementation. The regulatory, legal, and institutional framework necessary to support the Project will be evaluated with the assistance of specialized legal consultants.

3. Preliminary Environment and Social Assessment: Transaction Advisor will carry out preliminary environmental and social impact assessment to ensure that the mining and steel mill facilities are constructed or rehabilitated in accordance with the Environmental and Social Standards, which are internationally recognized and accepted.

4. Financial Projections: Transaction Advisor will develop a financial model to determine the likely cost of the Project development and operation to the private sector concessionaire/investor and the Client. Financial analysis will include a review of various options, with recommendations based on the optimal value for money solutions for the Client.

5. Pre-marketing: Transaction Advisor will reach out to a range of potential investors, operators and financiers to assess interest in the Project. These discussions will assist in addressing the sharing of risks and responsibilities between the private and public sector and structuring of options suitable for the Project. An assessment would also be made of any major investor
issues/concerns that would have to be addressed for a successful transaction.

6. Feasibility Study: Following the above analysis, Transaction Advisor will prepare a feasibility study that includes but is not limited to:

   - Strategic Option Analysis (Including Transaction Structuring Options, Choice of Technology, Choice of Location)
   - Project Design & Cost (Including Preliminary Design, Cost Estimates)
   - Environmental & Social Assessment (Including Environmental Assessment, Social Impact Assessment, Land Acquisition and Resettlement Plans, Stakeholder Consultations)
   - Economic Analysis (Including Least-Cost Analysis, Economic Internal Rate of Return, Value for Money)

7. Project Management Plan covering the transaction execution, implementation and operation phases

3. Consultation Period

1. The Feasibility Study Report will be discussed with the Client and approval on this will be required before proceeding with the transaction implementation. The Transaction Advisor will prepare and assist the client (Punjab Mineral Company) in preparation of the case for consideration / approval of various government decision makers, that includes:
   a. The results of the feasibility study and assess whether the project is technically deliverable, affordable to users, economically viable for Punjab, financially viable for investors, and environmentally and socially sustainable;
   b. Decide whether or not to further proceed with the project;
   c. If the decision is positive, compare the project with others within its sector and/or geographic area of responsibility, using criteria such as supply and demand gaps, social and economic benefits, financial attractiveness, risks and uncertainties involved, and readiness for implementation;
   d. If the project is confirmed to have a high priority, prepare a project proposal;
e. Submit the project proposal, together with the feasibility report and other supporting documents, to various government decision makers for consideration.

Transaction Advisor will work closely with the Client to ensure that: (i) there is close coordination throughout the process; (ii) the Client has adequate information to make timely decisions; and (iii) any issues or concerns that arise are addressed promptly.

4. **Phase II - Transaction Implementation**

Following the Client’s review period and notification to the Transaction Advisor in writing to proceed with the structure proposed in the Transaction Structuring Report, Transaction Advisor will proceed to the implementation phase, which will include, preparing the prequalification documents, tender documentation and bidding criteria, conducting a transparent bidding process, selecting winning bidder(s), and assisting in closing the transaction. Detailed tasks include:

1. **Information Teaser and Marketing:**
   
   An Information Memorandum, describing the investment opportunities and proposed transaction(s), will be prepared and distributed to potential investors/operators. Marketing activities can include investor/bidder conferences, road shows and/or investor meetings.

2. **Prequalification:**
   
   As per the applicable laws in Punjab, Pakistan, a prequalification stage of the process will be implemented and interested parties will be selected based on technical and financial criteria. Qualified prospective bidders will be allowed to participate in the bidding stage.

3. **Investor due-diligence:**
   
   To ensure a successful and transparent transaction, pre-qualified bidders will have access to (i) information on the project(s) (ii) sufficient time to complete their due-diligence and (iii) equal access to all data and information.

4. **Tender Documentation:**
   
   Transaction Advisor, along with its Hired Consultants, will formulate the proposed bidding procedures, criteria and timetable; oversee the preparation of draft tender documentation including the bidding documents and other documents appropriate for the chosen transaction structure.

   These tender documents may set out, inter alia:
   a. Contractual obligations of the respective parties;
   b. Risks to be assumed by each party;
c. Performance standards to be achieved by the private developer/operator/concessionaire/investor;
d. Procedures for monitoring compliance with contractual obligations;
e. Dispute resolution mechanisms;
f. Exit and termination procedures;
g. Force majeure procedures; and
h. Payment regimes.

The tender documents will be distributed in draft form to pre-qualified bidders and will undergo a formal process of enquiries and consultation before they are finalized.

5. Bidding

The Transaction Advisor will ensure a fair and transparent bidding process. This will likely attract credible investors. Transaction Advisor’s main tasks include:

- Organizing a transparent, international bidding process;
- Supervising the legal consultants in reviewing the legal credentials of the bidding companies or consortia and other documentation (such as bid and performance bonds) as required;
- Assisting in the implementation of the public bidding process and the selection of the winning bidder(s) in accordance with the bidding rules and selection criteria. Assisting the client in successfully enabling to achieve the financial close with the selected bidder.
Work Program and Indicative Timetable

Outlined below is an *indicative timetable*, assuming a work period of 8 months, leading to Financial Close up to 14 months. The *actual timetable* will depend upon the complexity of the Project, any extra time required to seek legislative approvals (if any are required), and the approval process by the Client of key aspects of the transaction.

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Target Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Mobilization of Transaction Advisor’s Team</td>
<td>Month 1</td>
</tr>
<tr>
<td>Hiring and Mobilization of Specialized Consultants</td>
<td>Month 1</td>
</tr>
<tr>
<td><strong>Phase 1: Transaction Preparation</strong></td>
<td></td>
</tr>
<tr>
<td>Kick-Off</td>
<td>Month 1</td>
</tr>
<tr>
<td>Completion of Data Gathering and Due Diligence</td>
<td>Month 2</td>
</tr>
<tr>
<td>Market Sounding and feedback</td>
<td>Month 3</td>
</tr>
<tr>
<td>Identification/Assessment of Strategic Options</td>
<td>Month 4</td>
</tr>
<tr>
<td>Finalization of Transaction Structure Report</td>
<td>Month 4</td>
</tr>
<tr>
<td><strong>Consultation Period</strong></td>
<td>1 Month</td>
</tr>
<tr>
<td><strong>Phase 2: Transaction Implementation</strong></td>
<td></td>
</tr>
<tr>
<td>Pre-qualification of Interested Bidders</td>
<td>Month 5-6</td>
</tr>
<tr>
<td>Preparation of Draft Tender/Bidding Documents</td>
<td>Month 5-6</td>
</tr>
<tr>
<td>Opening of Data Room and Investor Due Diligence</td>
<td>Month 6-7</td>
</tr>
<tr>
<td>Investor Conferences</td>
<td>Month 7</td>
</tr>
<tr>
<td>Finalization of Tender Documents</td>
<td>Month 7</td>
</tr>
<tr>
<td>Bidding Submissions</td>
<td>Month 8</td>
</tr>
<tr>
<td>Evaluation of Tender and Closing</td>
<td>Month 8</td>
</tr>
<tr>
<td>Financial Close</td>
<td>Month 14</td>
</tr>
</tbody>
</table>
SECTION - C: INSTRUCTIONS TO APPLICANTS
1. INSTRUCTION TO APPLICANTS

1.1. Language of EOI

The EOI and any related information will be written in English language for the ease of comprehension and comparability. Additionally, any original or pre-printed information (e.g. brochures) furnished by the Applicant may be written in native language, provided that it is accompanied by a certified translation of its pertinent passages in English.

1.2. Costs

The Applicant shall bear all costs and expenses associated with the preparation and submission of its EOI, including, without limitation, all costs and expenses related to Applicant's preparation of responses to questions or requests for clarification issued by the Client.

1.3. Evaluation Requirements

If the Applicant is a Consortium, it shall clearly indicate, in its EOI, which Consortium member(s) are to be evaluated for each such criteria. In case, it does not specify the same, the Lead Member of the Applicant will be considered for evaluation.

1.4. Applicant Lead Members

An Applicant may be a single entity or may take the form of a Consortium comprising of companies, firms, corporate bodies or other legal entities.

Each Consortium Applicant shall appoint and authorize one (1) lead member ("Lead Member"), through submission of duly executed Power of Attorney in the form set forth in Annexure 2 of Section - F of this PQD, to represent and irrevocably bind all members of the Applicant in all matters connected with the Prequalification Process, including but not limited to the submission of the EOI on behalf of the Applicant.

1.5. Consortium Participation Restrictions

No Applicant may prequalify if it owns more than five per cent (5%) of the shares (directly or indirectly, in terms of voting rights and/or rights to dividends) of another Applicant.

No Applicant may prequalify if it has any representative on the Board of Directors of another Applicant.

No Firm or Applicant member may prequalify if any of the Client's advisors or external consultants holds any shares or has any representatives in the Board of Directors of the Applicant.

Notwithstanding the foregoing, an Applicant may prequalify if it can present evidence reasonably satisfactory to the Client that arrangements have been established such that any such cross shareholdings do not materially affect the independent decisions of the Applicant in which such cross shareholding exists.

1.6. Ineligibility of an Applicant

If an Applicant has been barred by any Central, State or local government or government instrumentality in Pakistan or in any other jurisdiction to
which the Applicant belongs or in which the Applicant conducts its business, from participating in any project, and the bar subsists as on the EOI Submission Deadline, such entity shall not be eligible to submit an EOI, either individually or as a member of an Applicant Consortium.

1.7. Prequalification Criteria

Each Applicant's general and particular experience, personnel and financial position, as demonstrated by the Applicant's responses in the prescribed forms will be evaluated as per prequalification criteria given in this PQD. The Client reserves the right to waive minor deviations, if these do not materially affect the capability of an Applicant to perform the contract.

Sub-Consultant(s) experience and resources shall not be taken into account for determining the Applicant’s compliance with the prequalification criteria.

1.8. Partnering between Prequalified Applicants

Any prequalified Applicant shall be precluded from partnering (directly or indirectly) with another prequalified Applicant without the express written approval of the Client, who shall be free to accept or refuse at its discretion, and in all cases taking into account the likely effects of the proposed partnering on the competitiveness of the Bidding Process. If the Applicant is a Consortium, the above procedure shall apply to all members of the Applicant.

1.9. Partnering between Prequalified Applicant and Non-Prequalified Applicant

Non-prequalified Applicant shall not be entitled to partner with a prequalified Applicant.

1.10. Engagement of a Consultant for Procuring Transaction Advisory Services

The Client has engaged a consultant to conduct prequalification and bidding process including processing and evaluation of prequalification applications and bid proposals, conduct meetings and issuance of minutes/addenda on behalf of the Client for procuring Transaction Advisory Services for the Project.
SECTION - D: SUBMISSION AND EVALUATION OF EOIs
1. **SUBMISSION OF EOI**

1.1. **Format and Signing of the EOI**

The EOI shall be submitted in triplicate (one original and two copies) and placed in a sealed envelope clearly marked “EOI – Transaction Advisory Services for the Project “Feasibility study and selection of concessionaire / investor(s) for iron / copper mining and steel mill in Chiniot, Punjab, Pakistan”.

The EOI shall be signed by a duly authorized representative of the Applicant. The EOIs shall include a Power of Attorney (Annexure - 1 of Section - F of this PQD) authorizing such representative to sign and submit the EOIs to PMC on behalf of the Applicant. Authorized representative of Applicants shall make initials on each page of EOI.

The Applicant may modify, substitute or withdraw its EOI after submission, provided that written notice of the modification, substitution or withdrawal is received by PMC prior to the EOI Submission Date. No EOI shall be modified, substituted or withdrawn by the Applicant on or after the EOI Submission Date. The modification, substitution or withdrawal notice shall be prepared, sealed, marked, and delivered with the envelopes being additionally marked “MODIFICATION”, “SUBSTITUTION” or “WITHDRAWAL”, as appropriate. Any alteration/ modification in the EOI or additional information supplied subsequent to the EOI Submission Date shall be disregarded.

1.2. **Sealing and Marking of EOI**

The Applicant shall seal the original EOI and each copy in separate envelopes and shall mark the envelopes as “Original” and “Copies” (all duly marked as required herein). The envelopes shall be sealed in an outer envelope. The inner and outer envelopes shall be addressed to the Client (PMC) at the following address:

The Chief Executive Officer,  
Punjab Mineral Company (Pvt.) Limited  
10-B Model Town, Lahore, Punjab, Pakistan.  
Ph: # +92 42 9923 1771, +92 42 3591 5846 Fax: +92 42 9923 1772

The inner and outer envelopes shall each bear the words: “EOI - TRANSACTION ADVISORY SERVICES FOR THE PROJECT: “FEASIBILITY STUDY AND SELECTION OF CONCESSIONAIRE / INVESTOR(S) FOR IRON / COPPER MINING AND STEEL MILL IN CHINIOT, PUNJAB, PAKISTAN”"

The outer envelope shall indicate the name and address of the Applicant to enable the relevant EOI to be returned unopened in the event that it is declared "late".

If the outer envelope is not sealed and marked as required, the Client will assume no responsibility for any misplacement or premature opening of the EOI.
1.3. Deadline for Submission of EOIs

EOIs shall be submitted to the Client at the address specified above no later than 14:00 hrs PAKISTAN TIME, August 10, 2015 (the "EOI Submission Date").

Any EOI submitted after the EOI Submission Date shall be rejected and shall be returned unopened to the Applicant.

PMC may, at its discretion, extend the EOI Submission Date by amending the PQD, and in such case, all rights and obligations of PMC and the Applicants subject to the previous deadline shall thereafter be subject to the deadline as extended.

1.4. Addendum

At any time prior to the EOI Submission Date of EOIs, the Client may amend the PQD by issuing addenda. Any addendum issued shall be part of the PQD and shall be communicated through e-mail or other suitable means as decided by PMC to all who have requested to obtain the PQD in pursuance to the Advertisement inviting EOIs.

2. EVALUATION OF EOI

2.1. Preliminary Examination of EOIs

The Client will carry out a preliminary examination of each EOI to determine whether it is complete, whether the documents have been properly signed, and whether it is generally in order.

Where the Client deems it convenient or necessary, it may request supplementary information or documentation from an Applicant for determining its eligibility for prequalification. Whenever such request is made, the Applicant shall provide the same to the Client by such date as may be specified by the Client.

Any EOI found to be non-responsive may be rejected by the Client and not included for further consideration.

2.2. Evaluation of EOIs

The Client will carry out a detailed evaluation of the EOIs that have not been rejected after the preliminary examination. Subsequently, the Client will examine the information provided by the Applicant in the EOI for its prequalification to be done in accordance with Prequalification Criteria specified in the following pages.

Applicant whose EOI is determined by the Client to be substantively responsive thereby meeting the prequalification criteria specified shall be invited to participate in the next stages of the Bidding Process.

Applicant whose EOI is determined by the Client to be substantively non-responsive thereby not meeting the Prequalification Criteria specified shall be disqualified from participating in the Bidding Process.
Verification of the information provided by the Applicant in the EOI submitted for prequalification may be made in such manner as the Client may decide.

2.3. Test of Responsiveness

Prior to detailed evaluation of EOIs, PMC shall determine whether each EOI is responsive to the requirements of this PQD. An EOI shall be considered responsive only if:

(i). It is duly signed and each page is initialed on behalf of the Applicant by the duly authorized representative;

(ii). It is prepared and received as per the formats and Annexure given in Section – E and Section F of this PQD;

(iii). It is received by the EOI Submission Date including any extension thereof, if any;

(iv). It is sealed and bound together in hard cover and marked as stipulated in the above clauses;

(v). It is accompanied by the latest three years Audited Financial Statements in accordance with Form – 3 of Section - E of this PQD;

(vi). It is accompanied by the Power(s) of Attorney in accordance with Annexure – 1 and Annexure - 2 of Section - F of this PQD;

(vii). It is accompanied by the Affidavit in accordance with Annexure – 3 of Section - F of this PQD; and

(viii). It does not contain any condition i.e. it is unconditional.

PMC reserves the right to reject any EOI which is non-responsive and no request for alteration, modification, substitution or withdrawal shall be entertained in respect thereof.

2.4. Invitation for Request for Proposal (RFP)

At the end of evaluation activity, the Client will issue RFP to the prequalified Applicants for participating in the next stages of the Bidding Process. Moreover, if the prequalified Applicant is a Consortium, it shall not change the structure of the Consortium for participating in the Bidding Process without the prior written consent of the Client.

3. PREQUALIFICATION CRITERIA

The maximum marks are 100 with the following weightage distribution.

(i). Weightage for technical criteria is 80%

(ii). Weightage for financial criteria is 20%
Minimum 50% marks for each section/segment of technical and financial criteria are required for prequalification. Cumulative/Aggregate (technical + financial) prequalifying marks after assigning above mentioned weightages will be 65%.

Final Score for prequalification shall be calculated as follows:

<table>
<thead>
<tr>
<th>Prequalification Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marks obtained in Technical Criteria x (0.80) – A</td>
</tr>
<tr>
<td>Marks obtained in Financial Criteria x (0.20) – B</td>
</tr>
<tr>
<td><strong>Total Score (A+B)</strong></td>
</tr>
<tr>
<td><em>This score should be exceeding 65 for an Applicant to prequalify.</em></td>
</tr>
</tbody>
</table>
3.1. Technical Criteria

The following technical criteria shall be used to prequalify the Applicants:

A. Applicant's Profile and Strengths
B. Relevant Experience
C. Profile of Proposed Team

Prequalification of Applicants will be done on the basis of score obtained out of 100 according to the following table:

<table>
<thead>
<tr>
<th>Evaluation Areas</th>
<th>Maximum Score</th>
<th>Obtained Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Applicant's Profile and Strengths</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>B. Relevant Experience</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>C. Profile of Proposed Team</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

Minimum qualifying score in each sub section will be 50% for the Applicant to prequalify in technical criteria.
### A. Applicant's Profile and Strengths

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Range</th>
<th>Max. Score</th>
<th>Obtained Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Experience in Transaction Advisory Services for:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Feasibility study and procurement advisory services for Surface /</td>
<td>One mark will be awarded for one year of experience with a capping of 10 marks. Preference will be given to experience in Metallic subsurface mining projects</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Subsurface Metallic / Non-Metallic Mineral Mining Projects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Feasibility study and procurement advisory services for Establishment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>of Steel Mill Projects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note: Each Applicant shall clearly demonstrate its experience along with</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>suitable evidence thereof to facilitate evaluation under this section.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local presence</td>
<td>05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>International presence</td>
<td>05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local and international presence</td>
<td>05 additional marks will be awarded in case an Applicant has local and international experiences</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>
### B. Relevant Experience

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Total Marks = 35</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Feasibility study and procurement advisory services for Surface/ Subsurface Metallic / Non-Metallic Mineral Projects completed and / or in progress. For each project the Firm/Consortium will specify each of the following activities undertaken. Accordingly, following marking scheme will be observed for marking each project mentioned:</strong></td>
<td><strong>Range</strong></td>
</tr>
<tr>
<td><strong>Activity</strong></td>
<td><strong>Marks</strong></td>
</tr>
<tr>
<td>(a) Feasibility study for Metallic/ Non-Metallic Mineral Mine Development &amp; Operations encompassing technical, legal, financial and environmental aspects</td>
<td>03</td>
</tr>
<tr>
<td>(b) Experience in procurement advisory (Bidding and Selection of Concessionaire/Investor)</td>
<td>02</td>
</tr>
<tr>
<td><strong>Feasibility study and procurement advisory services for establishment of Steel Mill Projects completed and / or in progress. For each project the Firm/Consortium will specify each of the following activities undertaken. Accordingly, following marking scheme will be observed for marking each project mentioned:</strong></td>
<td><strong>Range</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Marks</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td>(a) Feasibility Study for Establishment of Steel Mill encompassing technical, legal, financial and environmental aspects</td>
<td>03</td>
</tr>
<tr>
<td>(b) Experience in procurement advisory (Bidding and Selection of investor(s))</td>
<td>02</td>
</tr>
</tbody>
</table>

**Note 1:** Each Applicant shall fill Form -1 to express its experience.

**Note 2:** Each Applicant shall clearly demonstrate its experience of undertaking the project in the form of a completion / ongoing work certificate from the client to which services were rendered or being rendered in case of ongoing projects.
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Range</th>
<th>Max. Score</th>
<th>Obtained Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Team Member holding minimum Masters or equivalent degree in</td>
<td>Each of the projects mentioned will carry three marks</td>
<td>06</td>
<td></td>
</tr>
<tr>
<td>Geological discipline and having at least ten years of relevant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>experience and expertise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Team Member holding minimum Masters or equivalent degree in</td>
<td>Each of the projects mentioned will carry three marks</td>
<td>06</td>
<td></td>
</tr>
<tr>
<td>Mining Engineering and having at least ten years of relevant experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and expertise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Team Member holding minimum Masters or equivalent degree in</td>
<td>Each of the projects mentioned will carry three marks</td>
<td>06</td>
<td></td>
</tr>
<tr>
<td>Metallurgical Engineering and having at least ten years of relevant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>experience and expertise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Team Member holding minimum Masters or equivalent degree in</td>
<td>Each of the projects mentioned will carry two marks</td>
<td>04</td>
<td></td>
</tr>
<tr>
<td>Environmental discipline and having at least ten years of relevant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>experience and expertise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Team Member holding minimum Masters or equivalent degree in</td>
<td>Each of the projects mentioned will carry two marks</td>
<td>04</td>
<td></td>
</tr>
<tr>
<td>Finance and having at least ten years of relevant experience and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>expertise</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Project Team Member holding minimum L.L.B. or equivalent degree in</td>
<td>Each of the projects mentioned will carry two marks</td>
<td>04</td>
<td></td>
</tr>
<tr>
<td>Law and having at least ten years of relevant experience and expertise</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** *Each Team member shall fill Form -2 to demonstrate its experience.*
3.2. Financial Criteria

The following financial criteria shall be used to prequalify the Applicants:

Prequalification of Applicants will be done on the basis of score obtained out of 100 according to the following table:

<table>
<thead>
<tr>
<th>Evaluation Areas</th>
<th>Maximum Score</th>
<th>Obtained Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applicant's Financial Strength:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Average Net Worth</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>B. Average Gross Annual Revenue/Sales/Turnover</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Minimum qualifying score in each sub section will be 50% for the Applicant to prequalify in financial criteria.

i. **Net Worth** means the value of total assets less total liabilities of the entity concerned at the end of a financial year.

*The Applicant Firms/Consortia shall provide information regarding the above, based on the audited annual financial statements for the last three (3) full financial years up to 30th June, 2014, for which such statements are available, including the consolidated balance sheet, income statement, statement of cash flows and the accompanying notes. Further elaboration regarding financial capability has been given below.*

ii. **Gross Annual Revenues/Turnover/Sales** means the value of gross revenues/turnover/sales of the firm/consortium concerned for a given financial year as mentioned in its financial statement for that year.

**NOTE:**

(1) For Conversion of Net Worth and Annual Revenues of the Firm/Consortium into PKR (Pakistan Rupees), the Exchange Rate of **USD 1 = PKR 102** would be applied.
(2) The AVERAGE of last three years for net worth and gross annual revenues, as determined from the audited annual financial statements of the firms/consortia (for the last three years) up to 30th June, 2014 would form the BASIS for marking/ranking during evaluation process.
<table>
<thead>
<tr>
<th>Applicant's Financial Strength</th>
<th>Total Marks = 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria</td>
<td>Range</td>
</tr>
<tr>
<td>A. Average Net Worth</td>
<td>Total Marks = 50</td>
</tr>
<tr>
<td>Average Net Worth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Up to PKR 0.01</td>
</tr>
<tr>
<td></td>
<td>Billion</td>
</tr>
<tr>
<td></td>
<td>Exceeding PKR 0.01</td>
</tr>
<tr>
<td></td>
<td>Billion</td>
</tr>
<tr>
<td>B. Average Gross Annual</td>
<td>Total Marks = 50</td>
</tr>
<tr>
<td>Revenue/Sales/Turnover</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PKR 0.10</td>
</tr>
<tr>
<td></td>
<td>Billion – 0.15</td>
</tr>
<tr>
<td></td>
<td>Billion</td>
</tr>
<tr>
<td></td>
<td>Exceeding PKR 0.15</td>
</tr>
<tr>
<td></td>
<td>Billion</td>
</tr>
</tbody>
</table>

**Note:** Each Applicant shall fill Form - 3 to express its Financial Strength.
SECTION - E: FORMATS
FORM – 1: RELEVANT EXPERIENCE

Applicants shall provide the details of projects completed or in progress using the below Form:

SECTION I - Details of Feasibility study and procurement advisory services for Surface / Subsurface Metallic / Non-Metallic Mineral Projects

<table>
<thead>
<tr>
<th>1.</th>
<th>Name of Project:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Country of Execution:</td>
</tr>
<tr>
<td></td>
<td>Activities undertaken:</td>
</tr>
<tr>
<td></td>
<td>(a) Feasibility study for Metallic/ Non-Metallic Mineral Mine Development &amp; Operations encompassing technical, legal, financial and environmental aspects</td>
</tr>
<tr>
<td></td>
<td>(b) Procurement Advisory covering Bidding and Selection of Concessionaire/Investor</td>
</tr>
</tbody>
</table>

| 2. | Name and Contact Details of Procuring Agency: |

| 3. | Nature and scope of work executed: |

| 4. | Value of Services Provided in PKR for each component: |
|    | (a) Feasibility study for Metallic/ Non-Metallic Mineral Mine Development & Operations encompassing technical, legal, financial and environmental aspects |
|    | (b) Procurement Advisory covering Bidding and Selection of Concessionaire |

| 5. | Date of Award: |

| 6. | Date of Completion: |
SECTION II - Details of Feasibility study and procurement advisory services for Establishment of Steel Mill Projects

<table>
<thead>
<tr>
<th>1.</th>
<th>Name of Project:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Country of Execution:</td>
</tr>
<tr>
<td></td>
<td>Activities undertaken:</td>
</tr>
<tr>
<td></td>
<td>(a) Feasibility study for Steel Mill Establishment and Operations encompassing technical, legal, financial and environmental aspects</td>
</tr>
<tr>
<td></td>
<td>(b) Procurement Advisory covering Bidding and Selection of investor(s)</td>
</tr>
</tbody>
</table>

| 2. | Name and Contact Details of Procuring Agency: |

| 3. | Nature and scope of work executed: |

| 4. | Value of Services Provided in PKR for each component: |
|    | (a) Feasibility study for Steel Mill Establishment and Operations encompassing technical, legal, financial and environmental aspects |
|    | (b) Procurement Advisory covering Bidding and Selection of investor(s) |

| 5. | Date of Award: |

| 6. | Date of Completion: |
# FORM – 2: RELEVANT PROJECT PERSONNEL

<table>
<thead>
<tr>
<th>Title of Position:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Personnel Information</th>
<th>Name</th>
<th>Date of birth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Professional qualifications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Present Employment</th>
<th>Name of employer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Address of employer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Telephone</th>
<th>Contact (Manager / Personnel Officer)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fax</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Job title / Position</th>
<th>Years with present employer</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please summarize professional experience in reverse chronological order. Indicate particular technical and managerial experience relevant to the proposed Project.

<table>
<thead>
<tr>
<th>Serial #</th>
<th>Project Name</th>
<th>From</th>
<th>To</th>
<th>Particulars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>Company Name:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Position Held:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Work Done on the project:</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>Company Name:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Position Held:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Work Done on the project:</td>
</tr>
</tbody>
</table>

**Note:** The Applicant shall not change the proposed team for the project while submitting its Technical Proposal except with prior written approval of the Client.
FORM – 3: FINANCIAL STATUS

a. Summarize the required financial data in the form below, based on audited financial statements for the latest three (3) financial years.

b. For Conversion of Net Worth, Gross Annual Revenue/Turnover/Sale of the Applicant into PKR (Pakistan Rupees), the Exchange Rate of USD 1 = PKR 102 will be used.

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Latest Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Net Worth</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2. Gross Annual Revenue</td>
<td></td>
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</tr>
</tbody>
</table>

Note: The Applicant shall fill this table based on the audited financial statements, which statements shall be submitted by the Applicants with their EOI's duly translated in English language from a certified translator.
### FORM – 4: LITIGATION HISTORY

Applicants, including each of the members of an Applicant Consortium, shall provide information on any history of litigation or arbitration resulting from contracts executed in the last five years or currently under execution. A separate sheet should be used for each Consortium member. A consistent history (50% or more) of award against the Applicant or any member of a Consortium may result in rejection of the application.

#### A. Decided Litigation:

<table>
<thead>
<tr>
<th>Year</th>
<th>Award For or Against Applicant</th>
<th>Name of client, cause of litigation, and matter in dispute</th>
<th>Disputed amount (Current value Pak Rs. or equivalent)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

#### B. Pending Litigation:

<table>
<thead>
<tr>
<th>Year</th>
<th>Matter in Dispute</th>
<th>Value of Pending Claim in US$ Equivalent</th>
<th>Value of Pending Claim as a Percentage of Net Worth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
SECTION - F: ANNEXURE
ANNEXURE – 1
POWER OF ATTORNEY FROM APPLICANT IN FAVOUR OF ITS AUTHORIZED SIGNATORY

Date:

Power of Attorney

Know all men by these presents, We___________________ name and address of the registered office) do hereby constitute, appoint and authorize Mr./ Ms. __________________________ name and residential address) who is presently employed with us and holding the position of ___________________ as our attorney, to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to our EOI for Prequalification of Applicant for the Provision of Transaction Advisory Services for The Project “Feasibility study and selection of concessionaire / investor(s) for iron / copper mining and steel mill in Chiniot, Punjab, Pakistan”, including signing and submission of all documents and providing information / responses to the Punjab Mineral Company (Pvt.) Limited (PMC), representing us in all matters before PMC, and generally dealing with PMC in all matters in connection with our EOI for the said Transaction Advisory Services Project. We hereby agree to ratify all acts, deeds and things lawfully done by our said attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid attorney shall and shall always be deemed to have been done by us.

Signature of Authorized Attorney

_____________________________

Name and Title of Attorney:

_____________________________

Name of Firm:

_____________________________

Address:

_____________________________

Note: To be executed by all the members in case of a Consortium. The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure.
ANNEXURE – 2

POWER OF ATTORNEY BY APPLICANT MEMBERS IN FAVOUR OF LEAD APPLICANT MEMBER

Power of Attorney

Whereas, the Punjab Mineral Company (Pvt.) Limited (PMC) has invited EOIs from interested parties for the Prequalification of Applicant for the Provision of Transaction Advisory Services for The Project “Feasibility study and selection of concessionaire / investor(s) for iron / copper mining and steel mill in Chiniot, Punjab, Pakistan”.

Whereas, the undersigned members of the Applicant are interested in prequalification for the abovementioned Transaction Advisory Services Project in accordance with the terms and conditions of the Prequalification Document (PQD).

Whereas, it is necessary under the PQD for the members of the Applicant to designate one of them as the Lead Member with all necessary power and authority to do for and on behalf of the Applicant and its members, all acts, deeds and things as may be necessary in connection with the Applicant’s EOI for the Project.

NOW THIS POWER OF ATTORNEY WITNESSETH THAT; We, M/s. ________________ M/s ________________ and M/s ________________ (the respective names and addresses of the registered office) do hereby designate M/s ________________ being one of the members of the Applicant, as the Lead Member of the Applicant, to do on behalf of the Applicant and all its members, all or any of the acts, deeds or things necessary or incidental to the Applicant’s EOI for the Project, including submission of EOI, responding to queries, submission of information / documents and generally to represent the Applicant in all its dealings with PMC, any other Government Agency or any person, in connection with the Transaction Advisory Services Project until culmination of the process of prequalification. We hereby agree to ratify all acts, deeds and things lawfully done by the Lead Member pursuant to this Power of Attorney and that all acts deeds and things done by our aforesaid attorney shall and shall always be deemed to have been done by us/Applicant.

Dated this the _______Day of ________201___

(Executants)
Signature of Authorized Attorney   _____________________________
Name and Title of Attorney:  _____________________________
Name of Firm:      _____________________________
Address:       _____________________________

(To be executed by all the members of the Applicant)

Note: The mode of execution of the Power of Attorney should be in accordance with the procedure, if any, lay down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure.
ANNEXURE – 3

AFFIDAVIT

Date:

The Chief Executive Officer
Punjab Mineral Company (PMC)
10-B Model Town, Lahore, Punjab, Pakistan.

We, [insert name of Applicant] hereby represent and warrant that, as of the date of this letter [Name of Applicant / Lead Member of Applicant], and each member of Applicant (if applicable):

a. is not in bankruptcy or liquidation proceedings;

b. has not been convicted of, fraud, corruption, collusion or money laundering; and

c. is not aware of any conflict of interest or potential conflict of interest arising from prior or existing contracts or relationships which could materially affect its capability to comply with the obligations in respect of the subject Project for which prequalification is being done.

We further represent and warrant that all information and documentation submitted as part of our Expression of Interest is true and accurate.

We have also attached a clearance certificate duly attested by the chamber of commerce / registration authority evidencing registration.

Yours sincerely,

Signature of Authorized Signatory _____________________________
Name and Title of Signatory: _____________________________
Name of Firm: _____________________________
Address: _____________________________
# ANNEXURE – 4

**LIST OF EXISTING STUDIES AND DATA**

**CHINIOT AND RAJOA, PUNJAB, PAKISTAN**

<table>
<thead>
<tr>
<th>SR. NO.</th>
<th>SUBJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>04.</td>
<td>Brief of Prospective Project on Chiniot &amp; Rajoa Iron Ore Deposits Of District Chiniot, Punjab, Pakistan (December 2000).</td>
</tr>
</tbody>
</table>

---

1 Now Chiniot District.
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>SUBJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>“Hydrogeologic Investigations of the Area Between Jhang Branch Canal And Chenab River Near Chiniot” by L.A Khan, Hydrogeology Directorate WAPDA, Lahore (August 1982)</td>
</tr>
<tr>
<td>02</td>
<td>“A Study on Geo-Resistivity Survey And Exploratory Drilling At Well Field Between Chenab River And Jhang Canal” by Nihon Suido Consultants Co. Ltd., Tokyo, Japan. (September 1982)</td>
</tr>
<tr>
<td>03</td>
<td>“Ground Water Sources of Faisalabad / Faisalabad Environmental Infrastructure Master Plan Study” by Inter-consult AS Consulting Services Kjorboveien 25, N-1300 Sandvika Norway (1992)</td>
</tr>
<tr>
<td>04</td>
<td><strong>Exploration and Resource Estimation of Iron Ore and associated metallic minerals at Chiniot-Rajoa, Punjab, Pakistan by Metallurgical Corporation of China on NI43-101 international standard under supervision of German Consultants G.E.O.S. Ingenieurgesellschaft mbH (Ongoing Project-to be completed by February 2016. Inception and mid-term report may be provided to prequalified firms for Transaction Advisory Services on request)</strong></td>
</tr>
</tbody>
</table>

**KALABAGH, PUNJAB, PAKISTAN**

**KALABAGH-MAKARWAL IRON ORE DEPOSITS, DISTRICT MIANWALI**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>SUBJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td><strong>KRUPP report (1955-56)</strong></td>
</tr>
<tr>
<td>02</td>
<td><strong>UN-PAK Mineral survey project, executed by United Nations Special Fund in</strong></td>
</tr>
</tbody>
</table>
**collaboration with WPIDC & GSP (1962-63)**

| 03 | Geology of iron ore deposits of Pakistan by F.L. Klinger, J.A. Reinemund & M.G. White, Geologist, US Geological Survey, USAID, Quetta, PAKISTAN (1963) |
| 04 | Fried Krupp Rohstoffe (1967) |

**PREVIOUS KALABAGH ORE DEVELOPMENT AND PROCESS WORK**

<table>
<thead>
<tr>
<th>SR. NO.</th>
<th>SUBJECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>01.</td>
<td>Krupp-Renn, Germany (1963)</td>
</tr>
<tr>
<td>02.</td>
<td>Institut De Recherches de la SIDEURGIE Francaise, (IRSID, France – 1963-64)</td>
</tr>
<tr>
<td>03.</td>
<td>Salzgitter Trials, Germany (1965)</td>
</tr>
<tr>
<td>05.</td>
<td>Arthur D. Little Reduction &amp; Beneficiation – USA (1965)</td>
</tr>
<tr>
<td>06.</td>
<td>Minesotta Resource Research Centre (MRRC) SA (1973-74)</td>
</tr>
<tr>
<td>08.</td>
<td>Study on Makerwal ore Royal Institute of Technical Stockholm (1985)</td>
</tr>
<tr>
<td>09.</td>
<td>Prospects of Utilization of Chichali iron ore by PCSIR, Lahore (1987)</td>
</tr>
<tr>
<td>11.</td>
<td>Feasibility Study for Development &amp; Exploitation of Chichali iron ore &amp; commissioning of steel mill at Kalabagh, study by MCC (2007-08)</td>
</tr>
</tbody>
</table>
ANNEXURE – 5

1. **SCOPE OF WORK OF THE CONTRACTOR (MCC) FOR ONGOING RESOURCE ESTIMATION PROJECT**

The Scope of Work of the Resource Estimation Project includes but is not limited to the extent summarized below:

1.1 **Data, Reports and Literature Review**

   (i). Careful study of the Existing Studies and Data and available previous reports / data, provided by the Client, for review and evaluation including but not limited to the available geological, geophysical, drilling, chemical / mineralogical analyses regarding Iron Ore and associated metallic minerals in Chiniot and Rajoa areas, carried out in the past by various national / international organizations. Firm / Consortium may collect and study any other reports, images / data, at its own, if so required.

   (ii). Compile an Inception Report on the outcome of the reviewed studies / data for submission to the Client.

   (iii). Firm / Consortium will plan, guide, supervise and conduct the execution of the entire work as per the detailed Scope of Work, to achieve the objectives of the Project while assuring quality standards.

1.2 **Geophysical Surveys**

   (i). Conduct geophysical surveys to delineate the anomalous zones, map the basement topography of subsurface rocks / ore bodies and formulate comprehensive drilling plan. Geophysical surveys should include but not be limited to the following:

   a. Electrical Resistivity (Dipole-Dipole) & Induced Polarization surveys,

   b. Magnetic Survey

   c. Gravity Survey

   d. Seismic Survey (reflection and refraction)

   (ii). The Firm / Consortium would be encouraged to adopt latest cost effective survey types / techniques and software without compromising the efficacy of the stated objective. The surveys mentioned above are indicative. The work plan and methodology to be submitted by the Bidder would define the genuinely required surveys (including types, quantum, scale etc, as deemed suitable) without compromising the value for money criteria.

1.3 **Drilling and Sample Analysis**

   (iii). Drill the detected Iron Ore and metallic detected anomalous zones vertically as well as inclined (where deemed necessary) upto the lower contact of the ore bodies or as advised by the Client.

   (iv). In case of failure to complete the identified borehole upto the lower contact of the ore bodies or as advised by the Client as the case may be, the Firm/Consortium will drill a new borehole at its own cost. In
such case, the Firm/Consortium will not be entitled for any payment in respect of work done on the incomplete borehole.

(v). Collect and preserve the core in core boxes, prepare lithological logs, split the core for sampling and analyses.

(vi). Undertake geophysical logging (density logs) using digital logger and down-hole surveys of drilled boreholes.

(vii). Hand over the requisite quantity of core samples to the Client for utilization (at its discretion).

(viii). Safe transportation of core samples (other than handed over to the Client) to the lab(s) of International Standard (to be identified upfront) for analyses and reports.

(ix). The sequence of actions/activities in drilling and sample analyses is not restricted as stated above and the Bidder is fully encouraged to introduce latest approaches/techniques in order to achieve cost efficiency without any compromise on the output/outcome of the drilling and sample analyses, thus leading to achievement of Project objectives.

1.4 Data Processing, 3-D Modeling and Estimation of Resources

(i). Use and process geophysical surveys, drilling, logging and assay data, delineate and develop an accurate computer aided contour map, bed rock topography, 3-D ore body modeling and development of ISOPACHs through appropriate software.

(ii). Estimate tonnage and grades of ore bodies by application of leading International Standards / methods, e.g., latest geo-statistical techniques.

1.5 Submission of Report

(i). Submit draft and final Resource Estimation Report/Ore Resources Report of Iron Ore and associated metallic minerals on leading International Standards. The report must include recommendations and way forward for the Client (PMC) for adopting further course of action as encapsulated in the Project objective.

2. TERMS AND CONDITIONS TO EXECUTE THE DRILLING WORK

2.1 Core Recovery

The Firm / Consortium shall recover at least 90% core in the Iron Ore bodies and metallic sulphide zone(s). Any occurrence of less recovery, for reasons beyond the control of the Firm / Consortium, must immediately be notified to the Client, giving possible reasons and suggesting remedial measures for Client’s consideration. In no case shall the diameter of the recovered core be less than standard NQ Size at the deepest / lowest point of all drilled holes.
2.2 Preservation of core

The Firm / Consortium will preserve the entire core in good quality core boxes, tag sampled portions, marking the borehole number and depth etc. on the core boxes, indicating the depth in meters at the end of each core run along with colored digital photographs of the same. All cores will be the property of the Client and all unused core and remaining portions of the laboratory tested samples will be delivered to the Client at its desired destination by the Firm / Consortium.

2.3 Sample Preparation and Analysis

The Firm / Consortium will adopt internationally acceptable sampling and sample preparation methods, which best suit such Iron Ore and metallic minerals, keeping in view the requirements for mineralogical, petrography, metallurgical and physical / analytical tests. Adequate number of samples would be taken, keeping in view the lithological changes and inter-distance of samples in each borehole. The Firm / Consortium will also furnish an appropriate quantity of the representative samples to the Client as reference samples. The samples will be duly numbered, transported / handed over by the Firm / Consortium to renowned national / international accredited laboratory(ies) acceptable to the Client. The methods of analyses must be appropriate for the samples and standard assay quality control measures will be taken as approved by the Client in liaison with Resident Consultant.

2.4 Control Samples

As part of assay quality control procedure, the Client may introduce resort to counter checking of samples, of known assay value, for analyses in the laboratory along with the batches of samples being sent by the Firm / Consortium.

2.5 Abandoning of boreholes

No borehole will be abandoned unless certified in writing by the Client through the Client's Representative at the Client's Site Office.

2.6 Lithological Logs

The Firm / Consortium will prepare and provide the lithological logs in hard as well as electronic form, in the formats as per acceptable International Standards, in good order to the Client on completion of each borehole. X, Y, Z coordinates of each borehole for calculation of mineable intersections for Iron Ore bodies / metallic minerals and any other relevant observations encountered during drilling will be given on the lithological logs. Depth to water table in each borehole will be recorded and marked on the lithological logs.

2.7 Geophysical logs

The Firm / Consortium will prepare and provide the geophysical logs in hard as well as electronic form, in the formats as per acceptable International Standards, to the Client on completion of each borehole.
2.8 **Cross Section / Correlation Chart and Interpretation**

The Firm / Consortium will prepare cross sections and correlation charts of Iron Ore and metallic bodies encountered in the boreholes along with interpretation with the help of lithological / geophysical logs data. Computer-aided 3-D geological models based on generated data together with resource estimates must be presented in accordance with international definitions / standards.

2.9 **Down Hole Survey**

Down hole survey of each completed borehole will be conducted by Firm / Consortium with appropriate equipment, software and other relevant parameters. The Firm / Consortium will arrange and provide all the requisite facilities, office aids etc. to its staff at its own cost and expenditures.

3. **REQUISITE QUALIFICATION AND EXPERIENCE OF THE FIRM / CONSORTIUM**

The Firm / Consortium shall deploy the same staff along with equipment and machinery etc. as specified in their expressions of interest at the time of pre qualification. In case of an issue, a replacement may be allowed by the Client subject to the condition that the qualification/experience/specification would not the less than the requirement specified in PQD.

4. **DELIVERABLES TO BE SUBMITTED BY THE CONTRACTOR(S)**

The main Project Deliverables to be submitted by the Contractor(s) will be as under:

4.1. **Inception Report:**

A report incorporating the outcome of the Contractor(s)’s review of Existing Studies and Data, setting out in detail the geological concept for further Exploration Operations, plan of execution, quality assurance / control program to be implemented through all stages of Project till its completion.

This report should also indicate the additional quantum of geological / geophysical investigations, other surveys etc., infill, scout and detailed drilling, requisite core samples analyses types and related geological work required to develop 3D models of the Iron Ore and associated metallic mineral resource(s) and estimation reports compliant with acceptable International Standards.

The entire work plan should clearly be elucidated on a standard Gant Chart.

4.2. **Certificates of Mobilization**

Mobilization of human resource, equipment, machinery and accessories will be carried out in the following two stages:

(i). Mobilization of pre-qualified Team Leader and geophysical surveys staff along with all necessary geophysical surveys equipments and establishment of Site Office and intimation to the Client;

Submission of Completion Certificate (which may also be referred to as Certificate of Mobilization of Stage I) by the Resident Consultant certifying mobilization in respect of stage (i) including logistic
supports and establishment of office with all facilities required to start
the Project works as required in the Scope of Work (SOW).

(ii). Mobilization of pre-qualified exploration and drilling staff along with
drilling rigs and accessories etc.

Submission of Completion Certificate of Mobilization by the Resident
Consultant (which may also be referred to as Certificate of
Mobilization of Stage II) certifying mobilization in respect of stage (ii)
as required in the Scope of Work.

4.3. Periodic Progress Reports

The Contractor(s) will furnish, throughout the course of the Project
execution, fortnightly and monthly progress reports of activities, on a pre-
agreed format, in accordance with the work plan.

4.4. Completion of Geophysical Surveys

On the completion of geophysical surveys, the Contractor(s) will furnish a
comprehensive report, in hard and soft form, comprising the surveys data,
their analysis and interpretation, maps and recommended drilling plan as
per acceptable International Standards.

4.5. Borehole Completion Report

On the completion of each borehole, the Contractor(s) will furnish a
comprehensive report, in hard and soft forms, comprising the lithological
logs, geophysical logs, down hole survey and collection of samples and
their dispatch to laboratories for analyses as per acceptable International
Standards.

4.6. Sample Analysis Report

This report will contain details of the analytical results of the sample.

4.7. 3-D ore body models and ISOPACHs

The Contractor(s) will demonstrate 3-D ore body models and ISOPACHs by
using data generated through geophysical surveys, drilling, lithological
logging, sample analysis, geo physical logging and down hole surveys etc.

4.8. Ore Resources Report

A report, compliant with International Standards spelling out the results of
Iron Ore and metallic mineral resources estimation in the following manner:

(i) Draft Report of Iron Ore and associated metallic mineral Resource
Estimation (also referred to as Ore Resources Report) to be submitted
for Client’s review, comments and acceptance as per its satisfaction.

(ii) Final Ore Resources Report to be submitted for Client’s review,
comments and acceptance as per its satisfaction, in the light of Scope of
Work as already elaborated (including Isopachs and tonnage and quality
etc).

(iii) The final Ore Resources Report estimated at International Standards
should lead to development of bankable documentation going forward.
The Contractor(s) will provide ten (10) hard and soft sets of each of all the Project Deliverables along with all the electronic data of the 3-D resource models and illustrations / drawings in hard form on a viewable scale and in a presentable manner. Additionally, the Contractor(s) may also need to present such Project Deliverables in review meeting(s) in Lahore, Pakistan, as required by the Client. All Project Deliverables must be certified by the qualified person / competent person of the Contractor(s) under the International Standards. A Project Deliverable will only be considered delivered when a Completion Certificate in respect of the same has been issued by the Resident Consultant.

5. TIMELINES FOR COMPLETION OF DELIVERABLES

Contractor(s) are required to complete all the above specified work / services and deliver the relevant Project Deliverables of the Project within a period of eighteen (18) months from the Commencement Date (as defined in the Project Agreement).
ANNEXURE – 6

1. **PROJECT STRUCTURE OF ONGOING RESOURCE ESTIMATION PROJECT IN CHINIOIT-RAJOA**

1.1 Chiniot-Rajoa and vicinity


In order to exercise quality control and supervision on the project, Punjab Mineral Company (PMC, the Client), also signed an agreement for the Resident Supervision of the project with a Resident Consultants (RC) Consortium comprising of:

2. GEO-RESEARCH and
3. GEOCONSULT ASSOCIATES SOIL & FOUNDATION ENGINEERS.

G.E.O.S. Ingenieurgesellschaft mbH is facilitated by partners in Joint Venture for local resource and extensive local knowledge of geology and related works in Pakistan. The Resident Consultant task is to supervise all activities within the scope of work and their execution on international standards. A generalized governance structure of the project is given in the figure below.

![Organization structure of Chiniot-Rajoa iron and associated metallic minerals resource estimation Project.](image-url)
1.2 The Teams

The team of MCC comprises of high degree skilled engineers and specialists, including PhDs in their relevant subjects, having several years of experience in the field of geophysics and geology. Similar is true for the Resident Consultants team members having many years of international experience in exploration mineral deposits of similar nature. In addition, the exploration program is running under the guidelines of a “Qualified Person” under international standard NI43-101.

1.3 Early Findings

Latest results from laboratory analysis have confirmed presence of Hematite and Magnetite as iron ores with Total Iron (TFe) content of up to 65% and a deeper lying sulphidic zone that hosts a vast spread copper mineralization. The quantity of the two metallic minerals of interest is yet to be determined after the resource report is finalized.

Based on the early finding the Prime Minister of Pakistan Honorable Mr. Muhammad Nawaz Sharif along with his cabinet members, higher representatives of the media and respectable academic heads visited Chiniot for briefing on this discovery.

Figure 7: Prime Minister of Pakistan, Chief Minister of Punjab, Minister Mines and Minerals and the Chief Scientist of Pakistan along with other dignitaries are examining core in Rajoa.

1.4 Additional anomalies found in Chiniot and its vicinity

Three additional anomalies adjoining Chiniot are identified as immediate interest for further investigations of metallic resource potential in Punjab.
2. SHARING THE PROGRESS OF THE ONGOING RESOURCE ESTIMATION BY MCC AT CHINIOT-RAJOA AND VICINITY

The Scope of Work encompasses detailed geodetic survey, a complete range of surface and subsurface geophysical studies and an extensive core drilling program in order to retrieve the subsurface rock samples for chemical analyses to delineate the quantum and quality of the underlying minerals resource.

2.1 Data, Reports and Literature Review

Careful revision of the existing studies and available previous reports / data review and evaluation including but not limited to the available geological, geophysical, drilling, chemical / mineralogical analyses regarding Iron Ore and associated metallic minerals in Chiniot and Rajoa areas carried out in the past by various national / international organizations.

MCC has collected and studied other available reports, images / data, at its own, & compiled an Inception Report on the outcome of the reviewed studies / data for submission to the Client. MCC will plan, guide, supervise and conduct the execution of the entire work as per the detailed Scope of Work, to achieve the objectives of the Project while assuring quality based on international standard (NI43-101).

Different types of reports that are produced are Inception Report, Geodetic Survey Report, Geophysical Survey Report, Boreholes Reports, Chemical Analysis Reports, Weekly, and Monthly Progress Reports etc. etc.

2.2 Geodetic Survey

Wuhan Surveying-Geotechnical Research Institute Co., LTD has conducted detailed Geodetic Survey using modern instruments and state-of-the-art surveying accurate techniques in order to provide basis data for area under exploration at Chiniot & Rajoa.
This is to facilitate as basic image for geophysical prospecting, hydrography, engineering geology and environmental investigation, deployment of prospecting grid, demonstration of forward inversion, elevation for each measuring point for interpretation. Measurement of drilling point coordinates and facilitation for future mine planning.

For this purpose a fourth order GPS survey was conducted for which a first class horizontal control network was established using four Leica made dual frequency GPS units in static mode. A total of 27 control points were established. The vertical control network established with reference to the Survey of Pakistan class-A bench mark located at Lalian, District Sargodha by leveling using Leica NA2 automatic compensated level with a reversible rod.

![Figure 9: GPS Control Point Network](image)

For detailed topographic survey, fixed wing UAV (Unmanned air vehicle) aerial surveying system was used. The aerial photographing of the project area about 35 Square Kilometer was done by UAV.

![Figure 10: UAV Aerial Mapping](image)

The data captured by UAV was processed using digital aerial photogrammetry software capable to solve aerial triangulation and image matching using modern digital photogrammetric techniques. The DEM (Digital Elevation Model), DSM (Digital Surface Model) and DOM (Digital
Ortho Model) were produced. The topographic maps at the scale of 1:2000 were produced from DEM.

The work scope included:

- Reconnaissance of Project area and finalization of required survey area.
- Establishment of reference control point in project area.
- Fixing / Erection of Control Point Monuments in project area.
- Establishment of Primary and Secondary Horizontal and Vertical control in the project area using high accuracy Dual frequency GPS.
- Marking and picking up of Ground Photo Control Points for UAV Data processing.
- Acquisition of Aerial Photogrammetry using Unmanned Aerial Vehicle (UAV).
- Digitization of all possible natural and manmade features using high resolution UAV Images.
- Production of topographic maps on 1:2000 scale with 0.5m contour interval.

![Figure 11: GPS Control Marker and Detailed Topographic Map of Chiniot.](image)

2.3 Geophysical Surveys

Wuhan Surveying-Geotechnical Research Institute Co., LTD has conducted detailed geophysical surveys that were mainly aimed to search for iron ore and associated polymetallic ores and focus targets for later geological work and provide basis for drilling works.

This helped to delineate the anomalous zones, map the basement topography of subsurface rocks and to formulate a comprehensive drilling plan based on information from geophysical surveys. The Geophysical Surveys were completed in mid of December 2014 and were of the magnitude in area of interest as below:
2.3.1 Gravity Survey

The gravity survey in scale of 1/10000 was carried out according to the result of magnetic scanning, and discussion together with PMC and RC, with total area of 28km², gridded of 100m×40m. 2920 stations were acquired.

![Figure 12: Layout of Gravity Scanning works](image)

2.3.2 Magnetic Survey

The ground magnetic survey in scale of 1/10000 was deployed in Chiniot and Rajoa area, with total area of 28 KM², gridded of 100m×20m. 15000 plus stations were acquired.
2.3.3 Electrical Resistivity (Dipole-Dipole), Induced Polarization surveys

Nine IP sounding profiles were carried out in 28 KM$^2$ area; the point spacing of IP sounding was kept at 250m. also Resistivity surveys to a maximum depth of 1000m were carried out in exploration area.

2.3.4 Seismic Survey (Refraction)

Eight profiles for refraction seismic survey were carried out to using seismometer GEODE-DZ, made in U.S.A to delineate the velocity of the medium and to map the top surface of the bedrock covered by alluvium.
Figure 15: Seismogram of Seismic Profile

Figure 16: Magnetic survey, Gravity, IP and Refraction Seismic Survey

A detailed report along with interpretation of data to correlate the geophysical anomalies with the geology was submitted by Contractor as way forward for further working and strategic planning of borehole locations.
2.4 Drilling Works

The initial plan is to drill approximately 50 bore holes in Chiniot and Rajoa and 15 more in the adjoining anomalies that will comprise of 55000 liner meters of core drilling.

MCC has deployed ten core drilling rigs and is drilling boreholes to retrieve core samples from the detected Iron Ore and geophysical anomalous zones up to the lower contact of the ore bodies or as governed by the geological conditions and exploration objectives. The machinery involved is drilling rigs, e.g. XY-44t, XY-5 and Atlas Copco CS-14.

The drilling depth ranges from 400m to 1100m and is expected to reach 1500m.
Each borehole is planned after careful consideration and deliberation of geological and geophysical conditions and the available sample analyses results from internationally acclaimed laboratories in order to justify the project objectives. This provides basis for establishing borehole location for which a dynamic nature map is produced to interpret the geology of existing boreholes and way forward for further drillings.
2.5 Core Recovery & Preservation

The collected core is preserved in core boxes made of high quality metal alloy for longer time preservation. A database of core boxes is developed for easy tracking and accounting of core boxes and respective place of storage.

![Core Preservation](image)

Figure 20: High Grade Hematite core in core boxes

2.6 Sample Preparation and Analysis

The Contractor (MCC) uses internationally acceptable sampling and sample preparation methods, which best suit such Iron Ore and metallic minerals, keeping in view the requirements for mineralogical, petrography, metallurgical and physical / analytical tests. Adequate number of samples is taken, keeping in view the lithological changes and inter-distance of samples in each borehole. The Contractor (MCC) furnishes an appropriate quantity of the representative samples to the Client as reference samples.

The lithological log is generated by the experienced geologists and the intended sampled portions are tagged with identifiers, marking the RQD, borehole number and depth etc. After the sampling intervals are demarked the core is split in one half's of the diameter and is packed in plastic bags again covered with cotton bags to add strength and to reduce risk of cross contamination with other nearly placed samples.
These sample bags are duly coded according to pre organized secure and self-descriptive sample number and is sent for chemical and optical analyses to laboratories of international stature for example SGS and AcmeLabs in Canada.
2.7 Control Samples

As part of assay quality control procedure and counter checking of samples, of known assay value, are counter confirmed from internationally accredited laboratory in Canada i.e. AcmeLabs.

2.8 Lithological Logs

The Contractor (MCC) prepares and provides the lithological logs in hard as well as electronic form, in the formats as per acceptable International Standards, in good order to the Client on completion of each borehole. X, Y, Z coordinates of each borehole for calculation of mineable intersections for Iron Ore bodies / metallic minerals and any other relevant observations encountered during drilling are given on the lithological logs. Depth to water table in each borehole is recorded and marked on the lithological logs.
2.9 Geophysical logs

In addition to lithology log of the boreholes, a broad range of geophysical logs such as Resistivity, Self-potential, Natural Gamma, Density & Susceptibility are conducted to delineate the geophysical properties of the rocks and to assist in the sample selection. This also provides a way to correlate the geophysical information with the physical characteristics of the rocks and to make it a reference for predicting mineralization in the new boreholes.
2.10 Inclination Survey

Downhole survey for example inclination survey of each completed borehole is conducted by Contractor (MCC) with appropriate equipment, software and other relevant parameters. The vertical angle and azimuth is measured every 50m to establish verticality and deviation of borehole from its intended trajectory therefore depicting correct subsurface location of the core retrieved.

2.11 Cross Section / Correlation Chart and Interpretation

The Contractor (MCC) is preparing cross sections and correlation charts of Iron Ore and metallic bodies encountered in the boreholes along with interpretation with the help of lithological / geophysical logs data. Computer-aided 3-D geological models based on generated data together with resource estimates is presented in accordance with international definitions / standards.

2.12 Data Processing, 3-D Modeling and Estimation of Resources

The Contractor (MCC) to use and process geophysical surveys, drilling, logging and assay data, delineate and develop an accurate computer aided contour map, bed rock topography, 3-D ore body modeling and development of ISOPACHs through industry well established software i.e. SURPAC.

All works are governed under international standard NI43-101. All the sample results from the laboratory are updated in the 3d resource modeling software database and a representative model is built progressively to track the underlying asset quality and quantity. This data is also integrated with the surface topography, features and subsurface top of the bed rock to bring value addition subsurface information through 3d modeling.

Figure 27: 3d modeling of ore body in SURPAC
2.13 Submission of Report

The Contractor (MCC), to submit draft and final Resource Estimation Report/Ore Resources Report of Iron Ore and associated metallic minerals on International Standard i.e. NI43-101. The report to include recommendations and way forward for the Client (PMC) for adopting further course of action as encapsulated in the Project objective.

2.14 Timelines for Completion of Project

Contractor (MCC) is required to complete all the above specified work / services and deliver the relevant Project Deliverables of the Project within a period of eighteen (months from the Commencement Date.

2.15 Deliverable Certification- INTERNATIONAL STANDARDS

All Project Deliverables are to be certified by the qualified person of the Contractor (MCC) under the International Standard NI43-101. A Project Deliverable is considered delivered when a Completion Certificate in respect of the same has been issued by the Resident Consultant.

MCC has contracted a Qualified Person who is guiding the project work on NI43-101 Canadian Standards.

Figure 28: Qualified Person Dr. Wang Weiliang instructing PMC and MCC on International Standards NI-43-101

2.16 Early Findings

Latest results from laboratory analysis have confirmed presence of Hematite and Magnetite as iron ores with Total Iron (TFe) content of up to 65% and a deeper lying sulphidic zone that hosts a vast spread copper mineralization. The quantity of the two metallic minerals of interest is yet to be determined after the resource report is finalized.
ANNEXURE – 7

1. **KALABAGH IRON ORE**

1.1 Geological Background

The Surghar Range is striking east-west in the northern part for 40 km and turns towards south for another 35 km. It has been referred to as an anticline. So north and west of the more than 1000 m high mountains the beds dip continuously to north, respectively west.

In the inner part of the quadrangle at the base of the mountain range the inner fold limb is partly overturned in Chichali area or made of faulted blocks in Makerwal area.

The lithology of the Surghar Range is made of sediments from the Permian up to the Pliocene, with younger cover.

The Late Jurassic-Early Cretaceous Chichali Formation is between 50 and 80 meters thick and is overlain by the Lumshival Sandstone formation, which forms prominent ridges on the inner flank of the mountain range. The Chichali formation contains three iron-rich beds (from top to bottom):

- Kuch Bed, up to 3 meters thick
- Chichali Bed, up to 4 meters thick, and
- Makarwal Bed, up to 7 meters thick.

The beds are named by their localities, where they predominate. For ease of use Kuch Bed and Chichali Bed together will be referred to as “Upper Bed”, while Makerwal Bed as “Lower Bed”.

Above the Lumshiwal sandstone, is the Hangu Formation. In the Makarwal area it contains coal, which is being mined underground. An access drift to one of these mines (Mallakhel) helped to get access to relatively unweathered material from the Lower Bed.
Figure 29: Stratigraphic Table of the Makarwal Area in the Surghar Range
1.2 Previous Exploration Work

Chichali is the best explored area within the Surghar Range. Exploratory drifts and cross-cuts were driven on both sides of the Chichali gorge. In addition to that, four drill holes were drilled by United Nations Mineral Survey Project in 1962-63 (WDH-1, WDH-2, WDH-4, WDH-5) with a total length of more than 9000 feet.

Exploratory mining in Kuch was done in 1956 by Pakistan Industrial Development Corporation with a 960 feet long tunnel. There are small-sized
open pit mines in the Kuch area to supply additives to the nearby cement works until today.

In Makarwal area a number of access drifts to several small-scale underground coal mines cross the iron bed on numerous sites. One of them (Mallakhel) was used for sampling. Starting from the access drift at Charles Mine, two exploratory drifts to the Makarwal Iron Bed have been driven in the 1950’s. During the site visit it was reported that both of them are collapsed or in very bad conditions, respectively.

The average chemical composition of the Kalabagh Iron Ores is given below:

<table>
<thead>
<tr>
<th>Location</th>
<th>Fe</th>
<th>SiO₂</th>
<th>Al₂O₃</th>
<th>CaO</th>
<th>MgO</th>
<th>Mn</th>
<th>S</th>
<th>P</th>
<th>Na₂O</th>
<th>K₂O</th>
<th>LOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chichali</td>
<td>32.5</td>
<td>21.2</td>
<td>6.20</td>
<td>2.62</td>
<td>2.65</td>
<td>0.08</td>
<td>0.27</td>
<td>0.48</td>
<td>0.14</td>
<td>2.34</td>
<td>16.2</td>
</tr>
<tr>
<td>Makerwal</td>
<td>33.2</td>
<td>26.4</td>
<td>7.50</td>
<td>2.80</td>
<td>2.20</td>
<td>0.10</td>
<td>0.70</td>
<td>0.20</td>
<td>0.10</td>
<td>2.19</td>
<td>9.5</td>
</tr>
<tr>
<td>Kuch</td>
<td>33.1</td>
<td>23.2</td>
<td>13.15</td>
<td>2.45</td>
<td>0.72</td>
<td>n.a.</td>
<td>0.45</td>
<td>0.23</td>
<td>n.a.</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

1.3 Testing the Kalabagh Iron Ores

The following research centres and companies have investigated the Kalabagh ores:
- Hüttenwerke Salzgitter, Germany in the 1960’s
- Krupp Rohstoffe, Germany in the 1960’s
- IRSID, France, in 1962
- Mechanobrchermet, UdSSR
- PCSIR, Ore Processing and Metallurgy Division, Lahore, Pakistan, in 1977/78/79
- PCSIR, Pakistan Council of Scientific & Industrial Research, 1982 - 1989
- Pakistan Science Foundation, Islamabad, 2005
- Eastern Technique Ltd, Islamabad, Pakistan, 2005
- China Metallurgical Group Corporation, Feasibility Study 2008

1.4 Mineralogy of the Kalabagh Ores

The mineralogical investigations of PCSIR have indicated a liberation size of the iron bearing phases of 0.120 – 0.150 mm, but tests have been performed mostly after grinding to < 0.075 mm.

They have divided the ores in two types:

(i). Kuch Type, about 32.5 % Fe, consisting in:
- Chamosite
- Siderite
- Quartz minor amount
(ii). Chichali Type, 33.1 % Fe, consisting in:
- Siderite
- Limonite
- Goethite
- Glauconite
- Quartz minor amount

In thin sections greenish brown, greenish yellow and dirty green coloured iron silicates are present as large irregular shaped grains.

Glauconite low in iron is partly very fine disseminated with siderite somewhat higher in iron.

China Metallurgical Group Corporation has investigated the Kalabagh ores regarding the distribution of the iron in the different mineral phases and the following was reported:
- Iron in limonite about 57 %
- Iron in siderite about 37 %
- Iron in silicates about 6%

In contrary to other sedimentary ores, at Kalabagh no ooides were formed. Due to the disseminated nature of the limonite and siderite with the silicates, no adequate upgrading can be reached via gravity and magnetic separation.

Nearly the same was stated by all of the companies and research centres who have investigated the Karabagh ores.
Pilot Scale Testwork for
Kalabagh Iron Ore, Pakistan

Punjab Mineral Company, Lahore, Pakistan

To: Punjab Mineral Company, Lahore, Pakistan
Date: 18th February 2015
Report No.: Pilot Scale Testwork V01
Prepared By: Florian Beier
Distribution: Dr. Arshad Mahmood (PMC), Michael Loos (DMTC)

Global Services to the Mining and Energy Industry

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INTRODUCTION

SCOPE OF WORK

As agreed during the meeting on 11th and 12th November 2014 in Lahore, Pakistan with PMC Pilot Scale Testwork on DRI and SAF and Converter should be executed.

LOCATION

The Laboratory Testwork has been executed with the University of Leoben, Austria. The Pilot Scale Testwork was executed in the facilities of the former test facilities of the Voest Alpine in close cooperation with the University of Leoben and under supervision of DMT Consulting GmbH in the weeks starting 15th and 22nd December 2014 in Leoben, Austria. The converter test work was executed at the same location in Leoben, Austria on the 14th and 15th of January 2015. Three converter tests have been executed, whereof Test 1 and 2 were only for testing purposes.
Results on Pilot Plant Tests
Direct Reduction Tests
Page 1 of 6; Cover-Page

executed on behalf of:

DMT Consulting GmbH
(formerly known as "IMC-Montan Consulting GmbH")
Am Technologiepark 1, 45307 Essen, Germany

for the Client:
Government of the Punjab, Mines and Minerals Department
Lahore, Pakistan

on the project:
Development of a Process for Molten Iron / Sponge Iron using indigenous Kalabagh Iron Ore and Non-Coking Coal Punjab, Pakistan

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<th>Page Number</th>
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Revision Date prepared checked approved revised Pages / Type of Revision
0 13.12.2014 Dr. H. Osthof  
First Issue

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C:\Users\dros\Desktop\Kalabagh 30065-01\6_Pilot Test_12-2014\20626313-P-1
The direct reduction tests for the Kalabagh ore were executed in short rotary furnace (see sketch above). The short rotary furnace was operated in a horizontal position at a speed of 1.2 rounds / min.

On the front (the off gas side) side the furnace is equipped with a oxyfuel burner (natural gas and oxygen) to preheat the furnace and supply the relevant heat to heat the material up to operational temperature. The oxy was operated under slightly reducing condition (lambda < 1).

The furnace was operated in batch operation, thus the plug was set in the wall between chamber 1 and 2. Chamber 1 can take approximately 1 t of charge.

At the end of the test period the off-gas chamber and oxy-fuel burner are removed and the furnace is tilted to be discharged.
Ore Preparation

Due to the difference in Siderite content and physical strength of the four different Kalabagh ores, two different feed mixes were prepared for the direct reduction tests. This is not contrary to a plant operation as we as well considered different treatment ways prior to the direct reduction.

5A and 6B have a considerable high Siderite content which can cause sudden destruction of the material when the deacidification takes place and a reductant is already present.

**Material 1**

The ore types 5B and 6A (50:50), the more Goethite material, was crushed, than milled to 0 to 6 mm, mixed with coal mix and finally briquetted with molasses (8%).

In this case 810 kg of ore mix was mixed with 230 kg of coal mix.

**Material 2**

Thus the ore mix 5A and 6B (50:50), the high in Siderite material was crushed and screened at 25 mm. The minus 25 mm fraction was milled in an impact mill and briquetted with molasses (8%). A charge of 960 kg ore mix was prepared.

Coal Preparation / The Coal Mix

As the previously used coal DK7 demonstrated a low Cfix value and a too high reactivity the coal DK7 was mixed with an Australian Coal higher in Cfix and lower in reactivity. A to elevated reactivity of a coal in the direct reduction would result in a too fast use of the coal.

Cfix Australian Coal = 60%, Cfix Kalabagh DK7 = 30%, Mixture 50 to 50 parts

Cfix of mix = 45%

Direct Reduction Tests

DRI tests 1

The material 1 (the ore-coal briquettes) (960 kg) was charged into the hot rotary kiln furnace. Total charging period was 23 min.

In between 135 kg of coal were recharged, as the oxygen level in the gas phase was increasing and the CO level decreasing.

Then the material was left for direct reduction 7 h 30 min in rotation in the kiln. The temperature in bed aimed for was 950°C. Then after the main operation time an additional 50 kg of coal was charged on to avoid re-oxidation and the furnace was left overnight to cool down. The next morning the material at a temperature below 500°C was discharged.
DRI test 2
The material were again charged over a period of 23 min into the hot furnace. , the briquetted and the coarse. In total 810 kg of ore and in parallel 230 kg of coal mix was charged. After 6 h 30 min additional 50
Gas Analysis and Temperature Profiles for the Pilot Tests

Test 1 = Day 1 = charge mix 1 = material 1 , Test 2 = Day 2 = charge mix 2 = material 2

These diagrams demonstrate the different profiles for the main gas components and the temperature during the test runs. The axis Y1 shows the value for the gas analysis, the right Y2 axis the values for the temperature.

The temperature of the preheated furnace drops when the material is charged and then is slowly climbing up again.

At the beginning of the test the CO₂ value are increased due to the destruction of the siderite. This is more obvious in test 1 were the reductant is added after the material is up to temperature and deacified.

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### Results on DRI Material

<table>
<thead>
<tr>
<th>Line</th>
<th>Rev.</th>
<th>Test 1 Fine</th>
<th>Test 1 Coarse</th>
<th>Test 2 Fine</th>
<th>Test 2 Coarse</th>
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<tr>
<td>1</td>
<td></td>
<td>50 %</td>
<td>50 %</td>
<td>60 %</td>
<td>40 %</td>
</tr>
<tr>
<td>2</td>
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### Discussion of results

The production of fines is independent to the preparation of the feed material. As one can see the fine fraction has a higher tendency to re-oxidation, as especially with material 1 the metallic iron content is considerably lower.

The more sideritic material, 5A+6B, the test 2 proved again a higher possible degree of reduction to metallic iron as already demonstrated in the laboratory and semi-pilot tests.
Results on Pilot Plant Tests
Smelting Test
Page 1 of 6; Cover-Page

Project No. DMT: 20626313
Project Name: Kalabagh
Document No.: 20626313-P-1024

Project No. R&H: 30065-02
Test Name: E-Furnace Smelting
Rev. of Document: 0

executed on behalf of:

DMT Consulting GmbH
(formerly known as "IMC-Montan Consulting GmbH")
Am Technologiepark 1, 45307 Essen, Germany

for the Client:
Government of the Punjab, Mines and Minerals Department
Lahore, Pakistan

on the project:
Development of a Process for Molten Iron / Sponge Iron using indigenous Kalabagh Iron Ore and Non-Coking Coal Punjab, Pakistan

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<td>2</td>
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Person in Charge of Test Work:
Dr. Harald Osthof (for DMT and R&H)
Dr. Jürgen Antrekowitsch (Montanuniversität Leoben, Austria)
Dr. Johannes Schenk (Montanuniversität Leoben, Depart. of Ferrous Metallurgy)

Revision Date  prepared checked approved revised Pages / Type of Revision
0 13.02.2015  Dr. H. Osthof

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For the smelting tests an electric furnace operated in submerged arc furnace mode was used. The bath volume of the furnace is 1 m³. The furnace is operated with alternating current (AC) and owns 3 graphite electrodes. The maximum power input is 250 kW.

The furnace is lined with a chrome silicate refractory, allowing a more acidic slag operation.

A cover over the furnace takes care of the extraction of fumes (off-gas). This cover is equipped with holes for the electrodes and a charge port for the feed material.

To discharge the furnace it can be tilted with hydraulic props.
To come close to a realistic plant operation, the DRI material (the pre-reduced Kalabagh ore) would be as well charged into an operating submerged arc furnace with a liquid bath, the pilot furnace was prepared as follows.

A start up bath out of shaft furnace slag ( < 1% Fe, 12% Al₂O₃, 30% CaO, 11% MgO, 38% SiO₂ ) and 15kg iron scrap was molten. The iron scrap forms a liquid metal bath below the liquid slag and acts as a collector for the iron droplets formed during the smelting of the DRI material.

Into this existing bath the different DRI materials were continuously charged. These are the fines mixed with lime (CaO) for correction of the slag basicity and a reductant coke and briquetted, namely the feed mixtures M1 and M2. The coarse material out of the DRI tests was directly charged without any further preparation.

The power input while smelting DRI material was kept in the range of 60 to 80 kW. Slag samples were taken in the smelting period to observe the iron content in the slag as well the slag basicity. Thus additional lime was charged while smelting to aim a slag basicity of 0.8 .

The slag basicity of 0.8 still guarantees a liquid slag and a minimum of iron in the slag. A higher slag basicity would result of even more lime to be added, thus more slag and a far higher electricity consumption. The negative factors of a low slag basicity, namely that more phosphor and sulphur reports to the metal will be corrected in the following step, the steel blowing or converting.

A steel blowing and converting step is always necessary since the carbon in the metal is always to high when smelting a so called pig iron out of an ore or DRI product.

During smelting it was observed that the slag attacks considerably the lining of the furnace. This results in Chromiumoxide values in the slag and Chromium as well in the pig iron. Even that the lining was selected according to the slag basicity and expected temperatures, this has to be regarded as side effects of a pilot test. The pilot furnace is never as ideal as a large scale operational furnace. This starts with refractory
### Results on Pilot Plant Tests

#### Smelting Tests

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<td>E-Furnace Smelting</td>
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</table>

View on top of bath (partly molten charge)

![View on top of bath](image)

Tilting the furnace

![Tilting the furnace](image)

Discharging the furnace

![Discharging the furnace](image)

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## Results on Pilot Plant Tests
### Smelting Tests

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### Slag Analysis

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### Pig Iron Analysis

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executed on behalf of:

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for the Client:
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on the project:
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Person in Charge of Test Work:

Dr. Harald Osthof (for DMT and R&H)
Dr. Jürgen Antrekowitsch (Montanuniversität Leoben, Austria)
Dr. Johannes Schenk (Montanuniversität Leoben, Depart. of Ferrous Metallurgy)

Revision

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Results on Proove of Concept Tests  
Steel Blowing

Description of Equipment used for the testwork

No.1 = Induction furnace ( Test V1 and V2 ) and No.2 = TBRC ( Top blow Rotary Converter ) ( Test V3 )

For the steel blowing tests two different types of equipment were used, as there are an induction furnace and a TBRC converter.

Both furnace were lined with a alkaline refractory. Permasit GS contains 95% MgO, 2.1% CaO, 1%SiO₂, 0.2% Fe₂O₃, 0.1% Al₂O₃ and is certified for use up to a temperature of 1750°C.

The first two test were executed in an induction furnace. The aim was to melt the pig iron and blow oxygen into the bath to remove the constituents carbon, sulphur and phosphor. Additionally to remove the Chromium which reported to the metal phase by fault.

The melting unit placed at the university itself was produced by “ITG-Induktionsanlagen GmbH” to melt iron in the casting industry. The furnace can melt up to 100 kg of iron. Nevertheless the full melting capacity was not used due to the facts of splashing and the formation of a foaming slag.

The key data of the furnace are:

- Voltage: 600 V
- Frequency: 3.9 kHz
- Max. Power: 80 kW

A lance was mounted on the furnace to blow oxygen into the bath.

![The tilded induction furnace](image-url)
The second test equipment used for test V3 the TBRC converter consists of a vessel which rotates around its axis in operation and can be tilted. Thus an operation from vertical to almost horizontal is possible. On the converter mouth an oxy-fuel burner is mounted to heat up, melt or even blow pure oxygen into the charge.

TBRC Converter in "horizontal" position with lid flapped to the side

Vacuum sample taker (top) and temperature measurement lance (bottom), both with single use attachment for sampling and temperature measurement
The metal (the pig-iron) out of the smelting pilot test was cut into portions and molten in the adequate furnaces. Lime and CaSi was added to the liquid bath and oxygen blown via a steel lance into the bath. The impurities S, P and Cr out of the pig iron report as oxides to the slag. The impurity C reports to the off-gas as CO and CO₂.

Problem in the tests V1 and V2 was the formed crumbly solid slag which accumulated on the small and stagnant bath surface in the induction furnace.

Therefore for the third test V3 the TBRC was selected. The pig-iron was molten with the oxy-fuel burner under reducing conditions. When the material was fully molten lime and CaSi was added to the molten bath and oxygen injected with the burner.

Due to the rotating vessel, a larger bath area, an oxy-fuel burner able to put heat into the slag phase the TBRC proved to be the more adequate piece of equipment for the steel blowing test.
Oxygen blowing in the induction furnace

Crumbly slag on induction furnace bath surface

Discharge steel out of TBRC converter

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### Results on Proove of Concept Tests

#### Steel Blowing

**Project No. DMT:** 20626313  
**Project Name:** Kalabagh  
**Document No.:** 20626313-P-1025  
**Rev.:** 1  
**Project No. R&H:** 30065-02  
**Test Name:** V1 / V2 / V3

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<td>92.97 %</td>
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<td>C</td>
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* = analysed by dissolution in HNO₃ and ICP

The results demonstrate clearly how necessary the interaction between metal bath and slag is to remove the impurities P (phosphor), S (sulphur), Cr (Chromium) and as well Mn (Manganese). It has to be kept in mind that the Chromium entered the pig iron due to a failure of the lining during smelting.

In the tests in the induction furnace were a crumbly more solid slag is produced the values of P, S, Cr and Mn are still high were as the C (carbon) value is already considerably reduced, due to a bad interaction of slag and metal bath.

The TBRC converter with its special design and an oxy-fuel burner is able to keep a liquid slag phase and thus all impurity levels are considerably lower compared to the induction furnace tests (V1, V2).

The exchange of slag and a second blow period even improved the values further.

An LD converter, a present standard process for steel production is capable to reach S(sulphur)-content of less than 0.001%, N(Nitrogen) <0.005% and P(phosphor) of 0.01% and within increased operating costs even lower. Whereas in 1970 values for P and S of 0.02% were regarded to be the limit. The relevant condition for this is a sufficient high bath temperature, exchange of slag and injection of CaSi as an alloy.

Comparing the TBRC with an industrial LD converter it has to be stated that the TBRC is not as good as a LD converter in injecting oxygen into the bath. Taken into account how the values improved in regard to all impurities it must be stated that an industrial scale LD converter will lower the P(phosphor) and

### Limits for different types of steel

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<th>min</th>
<th>max</th>
<th>Limits for non alloy steel</th>
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<td>0.15</td>
<td>0.5</td>
<td>Cu, Cr, Ni</td>
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<td>S</td>
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<td>Mo</td>
</tr>
<tr>
<td>P</td>
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CONCLUSIONS

With best regards

DMT Consulting GmbH, Am Technologiepark 1, 45307 Essen, Germany

Florian Beier, Senior Project Manager, DMT Consulting GmbH