

### **III – PROPOSED ARRANGEMENT, GAS OFFERED, METERING & FIELD DATA**

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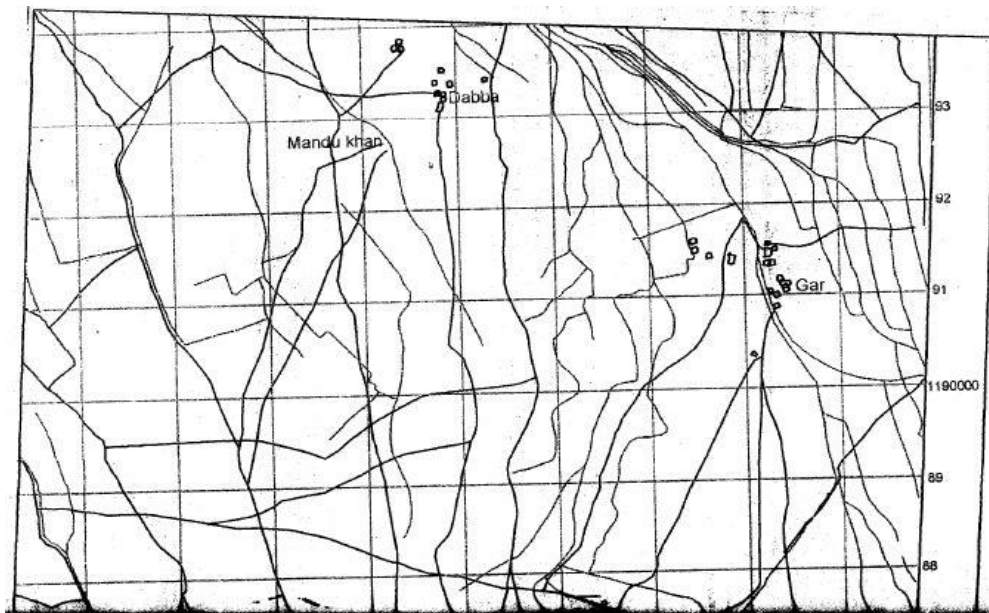
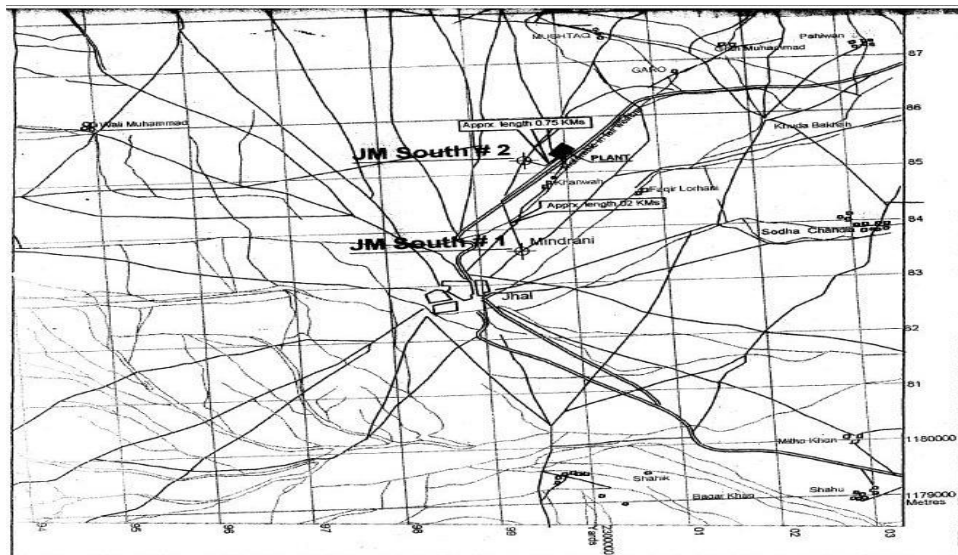
## 1. JHAL MAGSI FIELD

### 1.1 Facility Location

The Jhal Magsi Field, located in Jhal Magsi District Baluchistan Province, Facility will be located as per the following coordinates:

A	2690913.950 m E	447243.909 m N	62.803 m Height
B	2691218.988 m E	447243.821 m N	62.406 m Height
C	2690913.955 m E	446726.013 m N	62.483 m Height
D	2691218.974 m E	446726.003 m N	62.043 m Height

#### Location Map:



## **1.2 Proposed Arrangement**

### **Raw Gas**

In case, option of Raw Gas is finalized after bidding process, OGDCL will install gas gathering, gas separation, oil storage, and gas metering system. Raw Gas of Jhal Magsi contains Gas, Condensate and produced water, separation of all three phases shall be carried out prior to the metering.

OGDCL will provide Separator gas through metering skid to the delivery point for custody transfer to buyer (i.e OGDCL Field Gate)

OGDCL will supply raw gas as per volume, conditions & specifications mentioned on Section III of this tender document

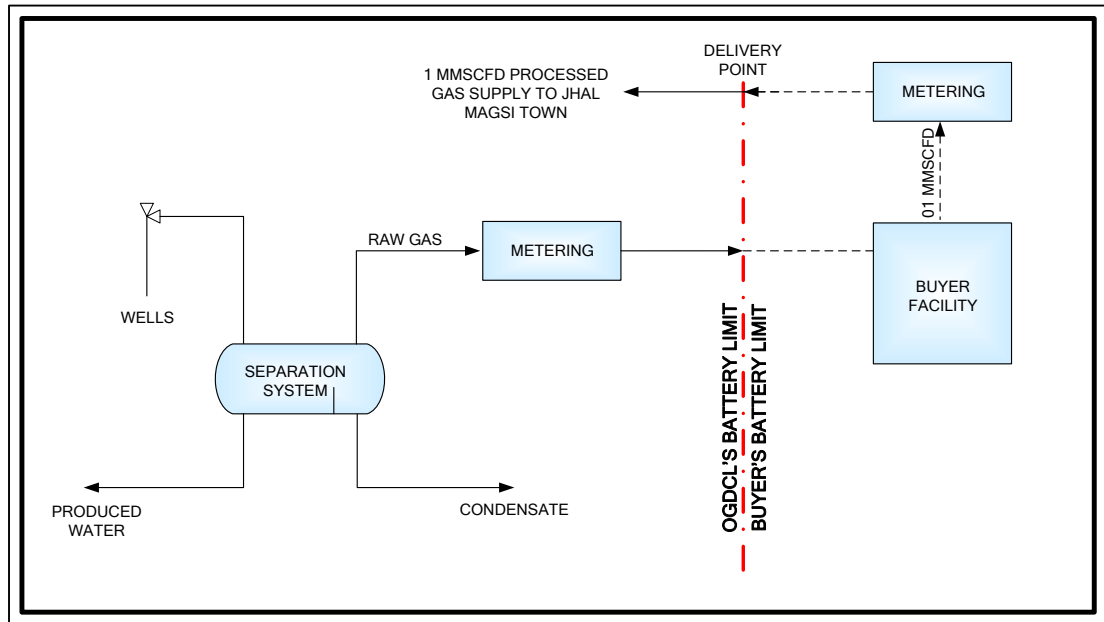
Buyer will install - necessary facilities for utilization of raw gas (as proposed by Buyer in the technical bid document to be submitted to OGDCL under this tender).

Buyer will be responsible to deliver 1 MMscfd (approx.) Processed Gas of Pipeline quality (by installing necessary processing facilities) through metering (to be installed by Buyer) at buyer field gate back to OGDCL for supply to Jhal Magsi Town. OGDCL will not make any payment for this 1 MMscfd Gas.

Buyer will have the right to sell or utilize 100% of the Gas by it under its own arrangement. All the arrangements of gas selling or utilization after the delivery point will be responsibility of Buyer

Buyer will be responsible to take or pay for 85% of gas as per annual contract quantity on annum basis.

Refer Figure below, for the proposed arrangement for OGDCL and Buyer.



**Figure 1: Raw Gas Schematic Diagram**

### **Processed Gas**

In case, option of Processed Gas is finalized after bidding process, OGDCL will install Gas Processing Plant to treat the raw gas in order to meet the processed gas quality specifications as given in Section-III. Gas processing plant shall consist of the following facilities as minimum:

- Separation Units.
- Gas treatment unit (Amine Unit, Dehydration Unit)
- Metering system
- Offsite and utility systems including power Generation

OGDCL will provide processed gas through metering skid to the delivery point for custody transfer to buyer (i.e OGDCL Field Gate)

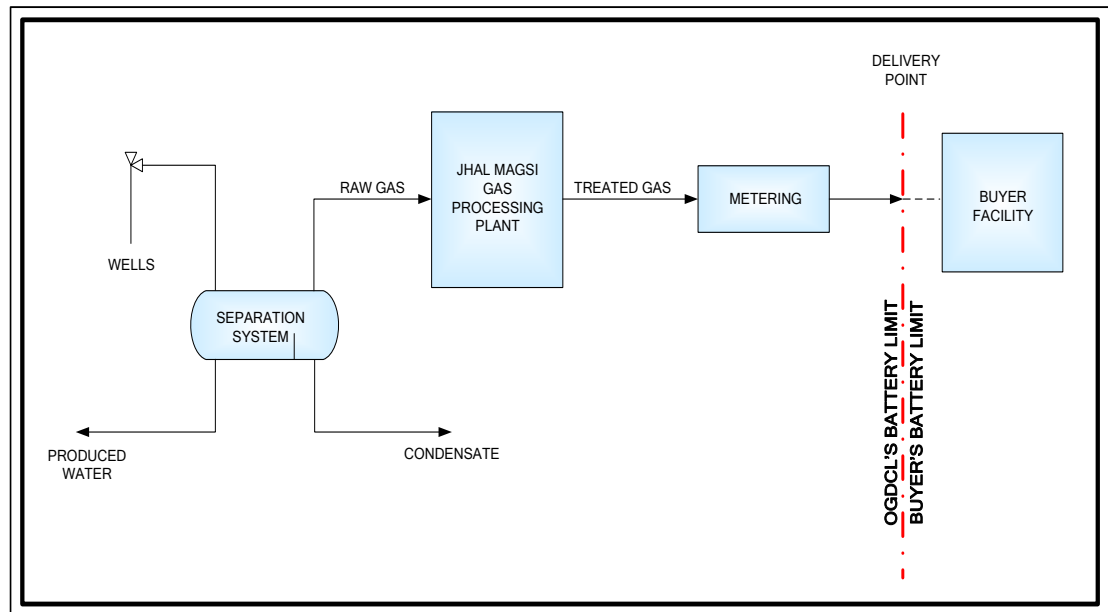
OGDCL will supply processed gas as per volume, conditions & specifications mentioned on Section III of this tender document

Buyer will install necessary facilities like gas compression, gas liquefaction, gas utilization, gas transportation etc (as proposed by Buyer in the technical bid document to be submitted to OGDCL under this tender).

Buyer will have the right to sell or utilize 100% of the Gas by it under its own arrangement. All the arrangements of gas selling & utilization after the delivery point will be responsibility of Buyer.

Buyer will be responsible to take or pay for 85% of gas as per annual contract quantity on annum basis.

Refer below figure, for the proposed arrangement for OGDCL and Buyer.



**Figure 2: Processed Gas Schematic Diagram**

## 2. OFFERED GAS

### 2.1. Raw Gas Data

#### 2.1.1. Reserves

Reserves of Jhal Magsi Gas are 35 BCF.

#### 2.1.2. Raw Gas Profiles & Delivery Pressures

OGDCL can provide Raw gas as per following scenario:

Case-01			Case-02			Case-03		
Year	Gas Rate (MMSCFD)	WHFP (PSIG)	Year	Gas Rate (MMSCFD)	WHFP (PSIG)	Year	Gas Rate (MMSCFD)	WHFP (PSIG)
1	15.0	1505	1	10.0	1950	1	7.0	2880
2	15.0	1375	2	10.0	1782	2	7.0	2631
3	15.0	1240	3	10.0	1607	3	7.0	2373
4	13.7	1146	4	10.0	1485	4	7.0	2193
5	10.6	1011	5	10.0	1310	5	7.0	1935
6	8.2	890	6	10.0	1153	6	7.0	1703
7	6.4	795	7	10.0	1031	7	7.0	1522
8	5.0	674	8	8.2	873	8	7.0	1290
9	4.0	573	9	6.4	742	9	7.0	1096
10	3.0	431	10	4.9	559	10	7.0	826
11	2.5	337	11	3.8	437	11	7.0	645
12	2.5	246	12	3.0	385	12	6.4	550
			13	2.5	341	13	5	413
			14	2.0	239	14	4	371
						15	3	334
						16	3	305
						17	2.5	243

### **2.1.3. Raw Gas - Quality:**

Well Head Gas will be supplied without any treatment as per well head conditions; the approximate composition is as under.

Component	Mole %
C <sub>1</sub>	89.22
C <sub>2</sub>	0.86
C <sub>3</sub>	0.23
iC <sub>4</sub>	0.04
nC <sub>4</sub>	0.06
iC <sub>5</sub>	0.01
nC <sub>5</sub>	0.00
C <sub>6</sub> +	0.12
CO <sub>2</sub>	2.23
N <sub>2</sub>	7.26
CV (Btu/scf)	935
H <sub>2</sub> S (ppm)	1000
Water	Saturated

Gas Temperature : 120 F (approx.)

NOTE: OGDCL will not provide any guarantee in change of volume & characteristics of gas due to reservoir behavior change.



## 2.2. Processed Gas (Pipeline Quality) Data

### 2.2.1. Reserves:

Reserves of Jhal Magsi Gas are 35 BCF.

### 2.2.2. Processed Gas Profiles:

OGDCL can provide sales gas as per following scenario:

- Buyers may offer purchasing minimum 1 MMscfd gas and maximum 13 MMscfd gas. (starting from year 1)
- Buyers offering maximum quantity will be preferred.
- OGDCL Plant turn down capacity is 33% of Plant Normal capacity i.e. 15 MMSCFD.
- The decline in process gas volume may be estimated from the profile below

Year	Processed Gas (MMSCFD)
1	13.0
2	13.0
3	13.0
4	11.7
5	8.6
6	6.2
7	4.4
8	3.0
9	2.0
10	1.0
11	0.5
12	0.5

### 2.2.3. Processed Gas - Quality:

The approximate composition is as under

Component	Mole %
C <sub>1</sub>	89.22
C <sub>2</sub>	0.86
C <sub>3</sub>	0.23
iC <sub>4</sub>	0.04
nC <sub>4</sub>	0.06
iC <sub>5</sub>	0.01
nC <sub>5</sub>	0.00
C <sub>6+</sub>	0.12
CO <sub>2</sub>	<3
N <sub>2</sub>	7.26
CV (Btu/scf)	925-950
H <sub>2</sub> S (ppm)	< 4 ppm
Water	< 7 lb/MMscf

Processed Gas Pressure: not less than 1000 psig

Processed Gas Temperature: < 120 F

NOTE: OGDCL will not provide any guarantee in change of volume & characteristics of gas due to reservoir behavior change.

## **METERING**

### **2.3. Raw/Processed Gas Metering System**

Flow Orifice based metering skids shall be considered for Raw and Processed Gas metering. Orifice metering systems shall be according to AGA Report no. 8 and AGA Report no. 3 for orifice metering of natural gas & latest ISA standard as applicable. The metering system shall have provision for remotely monitoring at OGDCL facilities.

Senior orifice assembly shall be provided at both metering runs. The minimum diameter ratio shall not be less than 0.3 and the maximum allowable shall not exceed 0.6.

AGA-Report #3 shall be used to determine the minimum length of the meter tube. Upstream parts from the orifice plate shall have the lengths as specified 'zero additional uncertainty' using a beta ratio of 0.70 and assuming two or more 90° bends in different planes.

H<sub>2</sub>S analyzer coupled with gas chromatograph analyzer, density transmitter and all other related equipment (field instruments etc) shall be provided and installed as part of metering system. All instruments and analyzers shall be hazardous area classified and suitable to be installed in hazardous area.

A microprocessor based control room mounted gas flow computer will be provided for each run of the gas metering system. Each meter run shall have one redundant flow computer. The gas flow computer will be programmed for flanged tap mode only. The gas flow computers in all the metering runs shall operate completely independently of each other. The flow computers shall be installed in Gas Metering Panel which shall reside in the Control Room.

The gas flow computer shall display the totalized gross volume, standard volume and mass, orifice differential pressure, temperature, pressure, density, gross volume, standard volume and mass flow rate of its meter run.

In coordination with gas stream analysis from gas chromatograph gas BTU per unit shall be also displayed.

An on-line gas chromatograph shall be provided and installed at the custody transfer point to measure the concentration of N<sub>2</sub>, CO<sub>2</sub>, C<sub>1</sub> – C<sub>8</sub>. The gas chromatograph shall be able to be programmed for the heating value (BTU) & WOBBE Index and specific gravity of the flowing gas stream. The gas chromatograph gas sample shall be taken from a common gas sampling point. The gas chromatograph shall also measure dew point.

One reference gas cylinder and two carrier gas cylinders for Raw/Processed Gas calibration will be provided and installed as part of the gas chromatograph system. Manifolding will be provided and installed for the carrier gas cylinders to allow for removal of one cylinder without disrupting the flow of carrier gas to the detector.

A on line moisture analyzer shall also be provided and installed at the gas metering station to determine the moisture content.

H<sub>2</sub>S Analyzer shall also be provided to determine the H<sub>2</sub>S content in the flowing streams (Raw/Processed Gas).

The gas metering system shall be designed to achieve an overall accuracy of readout within  $\pm 0.5\%$  or better as calculated in accordance with AGA-Report #3.

Accuracy for Gas Chromatograph shall be  $\pm 0.05\%$ .

An industrial type Desktop PC shall be provided and installed in the Control room to work as operator workstation.

All Gas Measurement Systems shall also be equipped with mechanical chart recorders for back up to the electronic system. Charts will not normally require integration unless complete electronic system failure occurs, thereby eliminating the possibility of electronic re-computation.

All Instrument wetted parts and equipment material to be used in Raw Gas metering Skid shall conform to NACE MR-0175 / ISO 15156 (latest edition).

### 3. Data for OGDCL Jhal Magsi facility SITE & ENVIRONMENTAL

#### 3.1. Temperature

Average maximum dry bulb temperature	127	°F
Design maximum dry bulb temperature	131	°F
Average minimum dry bulb temperature	47.5	°F
Design minimum dry bulb temperature	30	°F
Design wet bulb temperature	86	°F

#### 3.2. Humidity

Relative Humidity range	18 – 89 %
Average Relative Humidity for monsoon months	59 – 87 %

#### 3.3. Pressure

Minimum barometric pressure	14.3	psia
Maximum barometric pressure	14.7	psia

#### 3.4. Rainfall

Heaviest rainfall in one day	251.5	mm
Design rainfall	260	mm

#### 3.5. Wind Data

(Note: Data for maximum wind velocity in storm condition is not available. In house data of a nearby gas field having similar site & environmental conditions has been considered.)

Average wind velocity	0.115-6.8	mph
Design wind velocity for structural design	120	mph

##### **Prevailing wind direction:**

Summer	South-West
Winter	Northerly

#### 3.6. Seismic Design

Seismic design factor	0.03-0.15	g
Earthquake zone	Zone 2	(uniform building code)
Earthquake magnitude	5.0-5.9	

#### 3.7. Site Conditions

Site elevation	180 ft (AMSL)
Site location:	Approx. 400 km from Quetta, Balochistan, Pakistan.

**3.8. Soil Conditions**

Soil temperature at 3.28 ft depth (Min/Max)	65/110 °F
Soil type	Clay soil (Silt)
Soil conductivity	0.25 Btu/hr-ft-°F