

## Technical Queries of Annex 1

### Bidding Reference N° NPD/MoMP/1403/G-641/ ICB

Based on the latest revision of the Annex 1 – also referenced as Terms of Reference (ToR) – received from the Ministry of Mines and Petroleum (MoMP) of the Islamic Emirate of Afghanistan (IEA) regarding the “Procurement and Site Installation of Acid Gas Removal & Gas Dehydration Units for the Mid-Stream Natural Gas Sector”, we present the following queries in order to prepare an accurate proposal for this bidding process:

No	Questions	Answers
1	In Annex 1, item 4.2.1 – Sour Feed Gas Compositions and Conditions, it is indicated a content of CO <sub>2</sub> (8.9 mol%) and H <sub>2</sub> S (0.87 mol%) in acid gas composition which is more than 4 times the current content of CO <sub>2</sub> and H <sub>2</sub> S in YatimTaq acid gas. <b>Are you confident about this amount of CO<sub>2</sub> and H<sub>2</sub>S to design the new facilities? Have you confirmed this values with accurate measurements?</b>	Yes, we confirms these Values. Only the amount of H <sub>2</sub> S (3.5 mol %) has changed.
2	In Annex 1, item 4.2.1 – Sour Feed Gas Compositions and Conditions, it is not indicated the inlet temperature. The inlet temperature of sour gas strongly influences the performance of absorption and consequently the size of the amine unit. Higher temperatures reduce the efficiency of the absorption of acid compounds in the amine solution, requiring a higher flow of amines circulating for the same amount of acid to be removed. <b>Which is the summer and winter temperature to be considered in in the inlet acid gas?</b>	Acidic Inlet Gas Temperatures in Summer (36°C-40°C) and in Winter (1°C-5°C).
3	In Annex 1, item 4.2.1 – Sour Feed Gas Compositions and Conditions, it is indicated that future gas inlet pressure will be 500 psig. The inlet pressure of inlet gas strongly influences the performance of absorption and consequently the size of the amine unit. Lower pressures reduce the efficiency of the absorption of acid compounds in the amine solution, requiring a higher flow of amines circulating for the same amount of acid to be removed and a bigger contactor tower and pre & post gas filters. <b>Are you confident about this future inlet pressure of 500 psig to be considered in the design of the new facilities?</b>	Considering the technical specifications provided, yes, we are confident.
4	In Annex 1, item 4.2.2 – Treated Gas Specification, it is indicated that Vendor shall specify the removal of sulfur compounds as mercaptans, COS, etc. To specify the percentage of removal of these components it is	The Gas Specifications of Mercaptans, COS are not available to us before the treatment of its figures.

	necessary to have a more detailed composition of the inlet gas, which should include these types of sulfur compounds. <b>Do you understand that this detail will not be fulfilled by any Vendor?</b>	
5	In Annex 1, item 4.4 – Amine Specific Requirements, it is indicated that an amine solution of MDEA was determined by Client. However, MDEA solution with some % of DEA will remove easier acid compounds like CO <sub>2</sub> , reducing the total amine circulation rate required. <b>Client will accept a proposal with an amine solution of MDEA with DEA?</b>	Because MDEA chemical solution is used in the current sulphur removal device. In the previously presented specifications, the name of the chemical solution MDEA is mentioned. So our desired selection of MDEA solution can be confirmed.
6	<ul style="list-style-type: none"> <li>• In Annex 1, item 4.4 – Amine Specific Requirements, it is indicated the required filtration for lean amine stream.</li> <li>a - <b>Is it required one pre sock filter and one post sock filter for 100% capacity each or just one filter 100% capacity with a stand-by unit?</b></li> <li>b - <b>Charcoal filter shall be cartridge type or could be charcoal bed?</b></li> <li>c- <b>Charcoal filter shall be designed to filter just 10% of lean amine stream or Vendor could indicate recommended capacity to keep the amine system free of degradation products?</b></li> </ul>	<ul style="list-style-type: none"> <li>a- Yes, it is necessary to have a pre-sock filter and a post-sock filter for each with a capacity of 100%.</li> <li>b- According to the specifications already provided, the Charcoal filter should be cartridge type.</li> <li>c- In the current Sulphur removal device, charcoal filter is activated in rich Amin section and we don't have charcoal filter in lean Amin section. It is better to take any good measures to prevent the destruction of Amin Solution.</li> </ul>
7	In Annex 1, item 5.4 – TEG Specific Requirements, it is indicated that Vendor shall specify the levels of BTX co-absorbed into rich glycol and then released into atmosphere. To specify the levels of BTX compounds absorbed in rich glycol, it is necessary to have a more detailed composition of the inlet gas which should include these types of aromatic compounds. <b>Do you understand that this detail will not be fulfilled by any Vendor?</b>	The amount of BTX, is not available its figures for us.
8	<ul style="list-style-type: none"> <li>In Annex 1, item 5.4 – TEG Specific Requirements, it is indicated the required filtration for rich glycol stream.</li> <li>a - <b>Is it required one pre sock filter and one post sock filter for 100% capacity each or just one filter 100% capacity with a stand-by unit? It is also used to install a sock filter in the rich glycol stream and other one in the lean glycol stream.</b></li> <li>b - <b>Charcoal filter shall be cartridge type or could be charcoal bed?</b></li> <li>c - <b>Charcoal filter shall be designed to filter just 10% of rich glycol stream or Vendor could indicate</b></li> </ul>	<ul style="list-style-type: none"> <li>a- In the glycol reduction section, according to the technical documents provided, a sock filter in lean glycol section , and a sock filter in rich glycol section with 100% efficiency is considered and can be our acceptable.</li> <li>b- According to the technical specifications provide, charcoal filter should be</li> </ul>

	<b>recommended capacity to keep the glycol system free of degradation products?</b>	<p>cartridge type and is our acceptable.</p> <p>c- In the Technical documents section 5.4 specified about the capacity of charcoal filter absorption (Error in material absorption (10%) is considered and can be confirmed.</p>
9	<p>It is usually recommended to include an Outlet Coalescer Filter or Scrubber for outlet sweet and dry gas in both units, to reduce amine and glycol loses. <b>Please confirm that specification for amine and glycol maximum carryover into treated gas will be enough with 0.05 USgal/mmscf and that is not mandatory to include outlet filters or scrubbers.</b></p>	<ul style="list-style-type: none"> <li>- To prevent from MDEA solution waste, it is necessary to set outlet filters or outlet scrowbers.</li> <li>- In section 5.4 of the technical documents, a filter coalyser is considered before absorber. But it is not considered after Absorber.</li> </ul> <p>For the prevent of glycol waste that is mentioned in technical document 0.05 US gl/mmmcf, it is necessary to a coalyser filter after absorber.</p>
10	<p>Taking into account the size of the equipment in each treatment unit to be installed, it is recommended that both plants be designed at the maximum operational pressure. This involves, right from the start, integrating a compression unit based on the reservoir declination curve. This strategy is aimed at designing units with the smallest possible volumetric size, thereby promoting their modularization and installation cost. Otherwise, it is necessary to confirm:</p> <p><b>- The design of the facilities should be carried out operating at the maximum pressure (800 psig), and then report the possible treatment flow rate when operating at the minimum pressure (500 psig) - meeting the specifications of the outlet gas-, or the design should be developed at the minimum operating pressure (500 psig), penalizing the design, equipment size, and final cost?</b></p>	<p>According to technical documents, the maximum working pressure of the device (800psig) and the minimum working pressure of the device (500psig) are considered and confirmed.</p>
11	<p>Analyzing the results obtained after performing a preliminary design of the required facilities, it is recommended to pursue a strategy of installing multiple smaller units in parallel (a preliminary sizing of the plants resulted in an amine circulation rate of 8 to 10 times the one of YatimTaq). This approach involves designing for a capacity that allows modularized fabrication within manufacturing and transportation limits. Consequently, units would be</p>	<p>Please take a look at the document provided at this stage, and is confirmed.</p>

	installed in parallel and staggered over time as reserves and gas quality from the reservoir are confirmed, providing greater operational flexibility during sudden shutdowns and planned plant maintenance shutdowns. However, the required auxiliary services could already be designed considering the total capacity of the units, simplifying the installation of new treatment trains.	
12	Due to the technical and logistical complexity of the project, along with its stages including design, fabrication of modules and equipment, transportation to the Sheberghan area for final installation, preparation of civil works and on-site interconnection piping, assembly and installation of equipment and auxiliary systems on-site, precommissioning, performance testing, operator training and start-up, it does not seem feasible for the contract to be limited to 8 months. Please confirm whether this timeframe is mandatory, or clarify if the Vendor can propose a reasonable execution time, encompassing potential unforeseen delays in equipment and material deliveries, transportation of each component, mobilization of labor to the site, relocation of technicians and engineers, etc."	If needed, the time can be extended up to 12 months more.
13	As a consequence of this analysis, we strongly recommend to start the project developing a FEED (Front End Engineering Design), confirming the Basis of Design with accurate and detailed measurements of acid gas composition and contaminants, comparing advantages and disadvantages of designing at maximum or minimum operating pressure (800 psig vs. 500 psig), analyzing the best amine solution to optimize the design, and evaluating the best modularization and expansion strategy to follow, in order to have the best design at the lower cost.	About the design and selection of the device, it is better to take a look at the document provided (Proposal) and is confirmed.

Sincerely