ANNUAL NEWSLETTER OF THE GAS PROCESSOR ASSOCIATION - GULF CO-OPERATION COUNCIL CHAPTER

GPA 2011 NEWS FOCUS

فرع دول مجلس التعاون الخليجي
GCC Chapter
www.gpa-gcc-chapter.org

Nineteenth Annual Technical 19 Conference

Wednesday May 4th, 2011 — Safir Marina Hotel - Kuwait

The 19th Annual Technical Conference of the Gas Processors Association – GCC Chapter was successfully held on 4th May 2011 at the Safir Marina Hotel in Kuwait with a theme of "Gas Processing: Innovation for Excellence".

During the opening session of the conference, a welcome remarks was delivered by the Vice Chairman of the GCC Chapter Mr. Fahad T. Al-Subaiey, Executive Director, Gas & Power – QPI. The keynote speech of the conference was provided by Mr. Mohammed A. Husain, Deputy Chairman & Deputy Managing Director-Planning & Gas - KOC.

Kuwait Oil Company (KOC) was the sponsor of the 19th Conference in Kuwait.

Eleven technical papers were presented by the Chapter's member companies which represent the major oil & gas companies all over the GCC. There were two papers from Saudi Aramco and the same from KOC and KNPC. Other papers were from QP, QPI, GPIC, BASF SE & Petrofac International. These presentations covered wide range of topics relevant to the gas processing industry in which it discussed the latest developments and best practice in this important industrial sector in the region.

Mr. Fahad T. Al-Subaiey
Executive Director, Gas & Power - QPI

Mr. Mohammed A. Husain
Deputy Chairman & Deputy Managing Director-Planning & Gas - KOC

6th SPECIALIZED TECHNICAL SEMINAR

Wednesday 30th November, 2011 - Hotel Missoni Kuwait

Energy Optimization in the Gas Processing Industry

Mr. Saad Turaiki
GCC Chapter Chairman

Energy Optimization in the Gas Processing Industry was the subject of the 6th Specialized Technical Seminar which was organized by the GPA-GCC Chapter.

More than 110 participants from all over the GCC have attended the seminar which was held on Wednesday 30th November 2011 at the Hotel Missoni Kuwait in Kuwait.

Kuwait Oil Company (KOC) represented by the Gas Management Group was the sponsor of the specialized seminar.

Eight technical presentations were delivered covering a wide range of topics on the subject seminar highlighting the latest developments and experiences in this important industrial sector in the region.

The session has commenced with opening remarks by the Chapter Chairman Mr. Saad Turaiki, Vice President - Southern Area Oil Operations, Saudi Aramco and then followed by the technical papers:

Energy Optimization in the Gas Processing Industry: Energy Savings Lessons Learned
By: Dr. Musleh B. Al-Otaibi, Mr. A.H.M. Abdul-Hassan, *KOC, Kuwait*

Continued on 11

Visits to Kuwait Oil Company

A plant tour to Buran Field "Gas Booster Station 140" at KOC on 5th May 2011.

Visit to KOC Oasis on 5th May 2011

New Member Companies

Emarat

شركة الغاز العمانية ش.م.ع.م.
OMAN GAS COMPANY S.A.O.C.

Third & Fourth Gas Sweetening Workshops in 2011

Gas sweetening workshop was conducted successfully twice during 2011, the 3rd workshop in May 2-3 and the 4th workshop in November 28-29, 2011 in Kuwait as part of the GPA-GCC Chapter technical program.

The instructor of the workshop was Mr. Kefah A. Al-Faddagh, Saudi Aramco, the Chairman of the Technical Committee.

Total of 50 participants attended these two sessions, and it will be conducted again for the fifth time in Dubai in May 7-8, 2012 at The Address Dubai Mall Hotel. The prime objective of this workshop was to provide the participant with a good understanding of Gas Sweetening in general and common practice. This workshop presented a complete and up-to-date overview of the Gas Sweetening processes with emphasis on gas plant process operations.

The process flow sheets of several Sweetening Processes used to illustrate how the various operations differ. The advantages, limitations, and range of applicability of these processes were discussed so that selection and integration into the overall plant was fully understood and appreciated.

At the end of the workshop, each participant received a certificate from GPA-GCC Chapter. It is worth mentioning that both workshops were very well received by the participants.

Instructor
Mr. Kefah A. Al-Faddagh, Saudi Aramco
Technical Committee Chairman

Morning Session
Chairman:
Mr. Menahi Al-Enzi
Manager
Gas Development Group, KOC

Gas Compression and Flaring

The core business of Kuwait Oil Company (KOC) is to produce Crude Oil from various fields, process and treat the crude oil to specifications, and adjust the production rates in order to meet OPEC's quota.

Treated Crude Oil from the Gathering Centers (GCs) is transferred via pipelines to the Export Crude Oil Tanks Farms located some distance away. The gas is routed to the nearby Booster Stations for treating and further compression for onward transmission to LPG plant in Shuaiba.

Dr. Musleh B. Al-Otaibi, KOC, Kuwait

Most of the fourteen GCs in South and East Kuwait (S&EK) Assets have been in operation for a long time, some of them longer than 40 years. The original design did not consider energy efficiency or the environment and thus resulted in an exceptionally high gas flaring that exceeded 2.0% in many GCs.

The GCs' were renovated and upgraded under "Facility Modernization" Project and were commissioned in year 2010. The new facilities included process equipment capacity enhancement and energy efficiency equipment such as a new Condensate Recovery Unit (CRU) which resulted in maximizing vapour recovery from the crude oil tanks and consequently, substantial reduction in Gas flaring to well below 1.0% and sometimes reached as low as 0.2%. This was achieved by installing Tank Vapour (TV) Compressor and a High Pressure Compressor driven by a common Variable Speed Motor Driver and keeping the old CRU on standby.

The Facility Modernization Project has resulted in higher equipment availability, more efficient operations and maximizing valuable gas recovery (added value to KOC) and positive contribution to the environment (less Greenhouse gases emission). This paper provided detailed description including lessons learned during Project's execution and facilities commissioning phases.

Corrosion and Erosion in Acid Gas Removal Units

The paper started by briefly defining the phenomena of corrosion and erosion in acid gas removal units, with emphasis on the common "problem locations".

The importance of selecting the appropriate metallurgy in grassroots units was discussed, depending upon the specific treatment application, e.g. synthesis gas /LNG applications /selective H_2S removal.

When things do not work as intended, corroded surfaces must be repaired during turnarounds. The pros and cons of one commonly-used corrosion remediation technique were discussed. The forensic investigation of one corrosion event was also included in the paper. This illustrated the useful role of electron microscopy in determining the root cause of a corrosion / erosion event.

The remainder of the paper consisted of several "case histories" featuring erosion and corrosion incidents. This comprised a series of pictures illustrating problems in various plant locations taken in a variety of AGR plants. The probable reasons for the corrosion / erosion were discussed, and potential remedies suggested.

In summary, it is possible, with careful regard to the particular acid gas removal application, to design a grassroots acid gas removal plant to operate with few general corrosion and erosion-corrosion issues.

The paper concluded with the most important points as follows:

- Select the most appropriate amine for the application.
- Specify the appropriate metallurgy for the problem areas in the plant, considering the recommendations given in API 945.
- Ensure that the detailed mechanical design allows the amine solution to continuously wet any exposed carbon steel surfaces.
- Monitor the amine solution for HSS and any signs that corrosion may be occurring.
- Implement a rigorous inspection program.

Mr. Justin Hearn, BASF SE, Germany

Process Improvement Using Lean Six Sigma Approach at Khurais Dew Point Control Gas Plant

Mr. Kamarul A. Amminudin, Saudi Aramco, Saudi Arabia

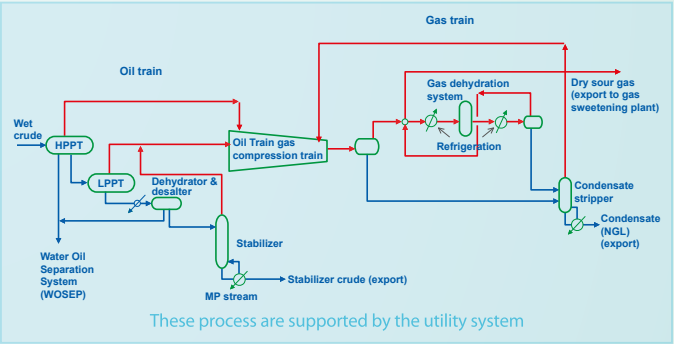
This paper shared the Saudi Aramco Khurais Central Processing Facility (KhCPF) experience in its efforts to continuously improve the performance of its gas plant. In this initiative, KhCPF adopted the use of the Lean Six Sigma methodology, which has been traditionally used as a process improvement tool throughout the non-engineering related activities, such as administration, service industries and manufacturing.

In this specific process improvement project, the Lean Six Sigma tools were used to address the lower propane content in the Khurais NGL products. The methodology strictly follows the framework of the Define, Measure, Analyze, Improve and Control (DMAIC) phases. It involved the definition of the problem through statistical analysis of the current performance and quantification of the propane losses. It also involved a brainstorming session to identify potential root cause of the problem. Based on this approach, a data gathering exercise was carried out, which then was followed by the subsequent data analysis to verify the root cause of the problem. The team identified the poor chilling performance in the gas plant as the major root cause of the problem. Focus is shifted towards improving the chiller performance from minimizing the process stream pressure drop across the chillers to maximize the propane refrigeration performance. The team then implemented these findings into a series of performance tests, which successfully confirmed that propane recovery can be maximized to meet the target. The team is currently monitoring the performance of the gas train to sustain this performance.

In conclusion, the project team successfully achieved the following:

- Lean Six Sigma methodology proves to be applicable in a typical engineering assessment for process improvement of an operating plant.
- Significant improvement in both C3 composition in NGL products and overall NGL yield.
- All achievements were made without incurring any cost to the organization, but above all, these achievements create huge added value to the organization.

A simplified process flow diagram showing major processes within KhCPF.



Refrigeration System Optimization in Future Gas Processing Complex in Kuwait

As society goal, Carbon emission has to be minimized in any Process Unit. Low temperature processes required refrigeration systems which rejects huge amount of energy. The same should be minimized by optimizing the refrigeration system which includes the process also. This paper discussed the various options considered by KNPC gas processing complex of utilizing the process gas cooling, selection of different types of heat exchangers, selection of pure component refrigeration, selection of cascade and mixed refrigeration, the use of selective components in the refrigeration mixture, Turbo expander, etc.

Refrigeration system requirement is a function of process feed gas quality, therefore the system is optimized with flexibility. The integrated design and optimization of the overall cryogenic energy systems is also addressed to reflect the systems interaction between driver selections and design of refrigeration systems. With these technologies, the overall energy is reduced by about 10~20% compared to initial design.

KNPC is constructing LPG Train 4 Plant along with associated facilities to process associated gas and condensate from KOC gathering centers South-East Kuwait (SEK) and North Kuwait (NK) oil fields. In addition to the above, existing refinery gases from Shuaiba (SHU) AGRP and MAA AGRP will be supplied to LPG Train 4 Plant. Moreover, future non-associated gas from Jurrasic/ Dorra gas field are also considered in LPG Train 4 design case.

The capacity of LPG Train 4 is designed to process 805 MMSCFD gas and 106.3 MBPD external condensate in addition to the condensate produced in NGL recovery section of the process. Product recoveries are at least 75% of C2, 97% of C3 and 99% of C4 are expected. It consists of following process sections or units.

Mr. K. S. Sabapathi, MAA, KNPC, Kuwait

1. Feed Pre-treatment Unit (Unit 231) & Feed gas dehydration
2. NGL Recovery Unit (Unit 232).
3. The NGL Unit shall be provided to produce and recover C2+ heavier components. The selected process is Gas Sub-cooled Process (GSP) which is using turbo-expander and C3 refrigeration as a cooling medium. The NGL Unit shall comprise of following major equipment
   a. Turbo-Expander / Brake Compressor
   b. Cold Boxes
   c. De-methaniser Column
4. Fractionation Unit (Unit 233)
5. Product Treating Unit (Unit 234)
6. Propane Refrigeration and Deep Refrigeration System (Unit 235)

Increasing Raw NGL Recovery by In-House Process Retrofitting

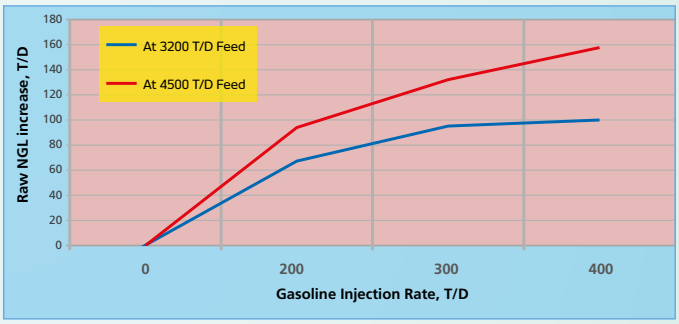
Mr. Jaber Shafah Al-Marri, QP, Qatar

Heavy hydrocarbons have affinity to absorb lighter hydrocarbons. Due to this affinity, methane, ethane and LPG streams are present in the crude oil at atmospheric pressure and hence the crude oil is stored in ordinary floating roof tanks without any pressurization. This principle was implemented in LPG plant (NGL-2) stripping unit to increase raw NGL production.

LPG plant (NGL-2) stripping unit, originally, was designed for liquid reinjection from Offshore. However, this facility was abandoned since 1999 due to plugging of liquid line from Offshore. As a result, a minor reduction in raw NGL production was noticed because of the reduction in chilling due to cut off the liquid. A trial for the raw NGL injection from Fahahil Stripping Plant (FSP) (associated stripped raw NGL) to LPG plant (NGL-2) stripping unit was also tried in 2006 to improve chilling and reduce the delta pressure across the chilling heat exchanger. However, this activity was abandoned due to lack of proper positive results.

Gasoline injection from fractionation plant (NGL-4) to LPG plant (NGL-2) stripping unit was considered as the next option for increasing raw NGL production and improvement in chilling as envisaged during original liquid injection.

The following graph representing actual raw NGL increase with respect to different rate of gasoline addition and OFFRAG flow rate.



The advantages of implementing the for-mentioned modifications are as follow:

1. An increase in the raw NGL production, from 101 to 158 MT/D when the OFFRAG feed rate is between 3225 to 4500 MT/D. This raw NGL figure is after deducting LPG return from QAPCO and small carryover of gasoline to Qatar Fertiliser Company (QAFCO) stream.
2. Increased C2 recovery from 27 to 40 mol %
3. Eliminated/reduced SAG flaring due to consumer limitation
4. Eliminated gasoline back pressure from NGL-4 as part of the gasoline diverted through alternative route.
5. Increased chilling at E-2002 A/B (-31 to -35 deg C) and reduced pressure drop across the chiller. This means flexibility to increase gas processing capacity and increase the raw NGL production further.
6. Easy to correct NGL condensate RVP since gasoline is further treated in NGL-2
7. Reduced the foaming problem in QAPCO. (Due to the heavy hydrocarbon contents in SAG condensation was occurred in the QAPCO amine system.

The Technical-Financial Impact by Adopting RBI Methodology

Mr. Salah A. Aziz, GPIC, Bahrain

Risk Based Inspection (RBI) is a methodology used to develop inspection program requirements in refinery, petrochemical and other facilities. As described by the API 580 Recommended Practice, the primary objective of RBI is that risk is taken into account when developing inspection plans on an equipment level. Inspection plans developed allow cost-effective where possible risk assessment and mitigation. At the same time, the plans will identify equipment not requiring some form of mitigation because of the low level of risk associated with the equipment's current operation.

Inspection requirements can be significantly reduced in such equipment as well. This may provide substantial reductions in costs associated with these inspections. Hence the ultimate goal of Risk Based Inspection (RBI) methodology is to develop a cost-effective inspection and maintenance program that provides assurance of acceptable mechanical integrity and reliability. Gulf Petrochemical Industries Co. (GPIC) are more than 65% into the developing and implementing such program. This paper presented a technical-financial outcome by adopting the RBI methodology for selected critical items and try to answer is it really cost effective and dose it really provide assurance of mechanical integrity.

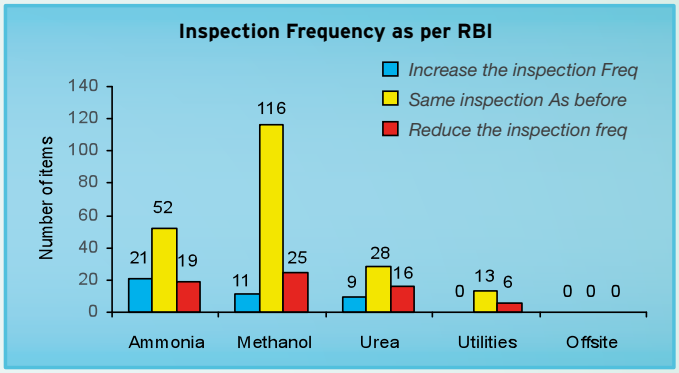


Fig.1: Inspection Frequency as Per RBI study

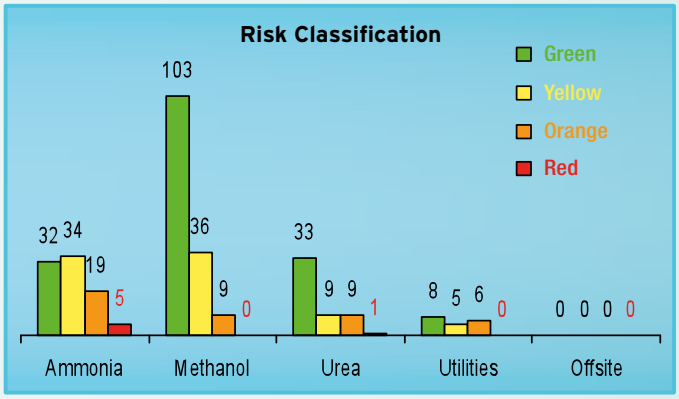


Fig.2: RBI Risk Classification

Recognition

Mr. Fahad Al-Subaiey & Mr. Mohammed Al-Otaibi

The **GPA GCC Chapter** wish to extend their sincere thanks and appreciation to **Kuwait Oil Company (KOC)** for sponsoring and supporting the ***19th Technical Conference*** in Kuwait.

Thank You!

Kuwait Oil Company
A Subsidiary of Kuwait Petroleum Corporation

Afternoon Session
Chairman:
Mr. Abdul Khaleq Al-Ali
Manager
Public Relations & Information Group, KOC

Successful Amine Cleaning Technology Application in Saudi Aramco

The main objective of this paper was to give an overview of the amine shield slipstream technology recently tested in Saudi Aramco facilities and reflect on the potential implementation at its gas plants.

The amine shield slip stream unit is a multifunctional unit that removes solids, hydrocarbons and heat stable salts from amine system to produce clean/pure amine solutions. The performance of the amine solution in gas plants is mainly reduced by contaminants accumulation such as suspends solids, hydrocarbon liquids and degradation products. Several amine treating units at Saudi Aramco gas plants experiences amine losses, poor quality amine and foaming. Anti-foam is injected continuously at many units and the current conventional solution filtration systems (Precoat filter) are inefficient.

The technology test was successfully implemented in two gas plants, Hawiyah Gas Plant and Uthmaniyah Gas Plant and revealed a high impact on the amine performance and quality. The results showed that suspended solids removal rate across the unit reached up to 90%. The total amine system solid content dropped by approximately more than 80% at HGP GT-3 unit. Such treatment will significantly reduce contaminants and hence decrease problems related to foaming and fouling in the system.

Based on the results obtained from UGP and HGP field test of the Amine Shield Slipstream Unit technology, the following conclusions were made:

- The Amine Shield Slipstream Unit has shown excellent performance in cleaning the DGA solution. Although the unit processing capacity was limited to 35-70 gpm which represent less than 1-3% of UGP HP DGA and HGP GT-3 circulation rates, it resulted in significant improvement to the DGA quality in short period.
- Up to 95% removal rate of suspended solids could be achieved across the Amine Shield Slipstream Unit.
- Up to 90% reduction in suspended solids content in the amine system is achievable by the Amine Shield Slipstream Unit.
- Using hot water at 80-90 °C (175-190 °F) for unit regeneration is critical to ensure good performance of the Amine Shield Slipstream Unit.
- The current conventional filtration equipment (the Precoat filter and carbon filters) for the DGA solution in gas plants are inefficient.
- Current amine analysis methods for suspended solids at gas plants laboratory are inaccurate and require revision and update.
- The amine shield slipstream unit capability are better demonstrated at high contamination level (more than 100 mg/l TSS and 100 ppmv H/C)
- The use of this technology will significantly reduce the contamination level in the amine/glycol system, which will help improve the solvent performance, minimize foaming and equipment fouling and reduce solvent losses. Additionally, the long term benefit of sustaining clean system will minimize T&I activities and equipment repairs.

Mr. Suad H. Al-Mudaibegh, Saudi Aramco, Saudi Arabia

Increasing Turndown Ratio of Centrifugal Compressor by Installing Independent Surge and Capacity Control Systems

The turbine driven multistage (LP/HP) centrifugal compressor for natural gas installed at Gathering Center of Kuwait Oil Company (KOC) was equipped with Anti-surge control valve & control system to prevent surge and also to control capacity. This was limiting the lower operating range of compressor. The non-availability of required High Pressure or Low Pressure Gas was resulting in frequent opening of Anti-surge valve which was offloading HP stage of compressor. A modification was done to install a recycle valve in parallel to Anti-surge valve. Moreover, a control system was also modified for independent control of compressor capacity. This has significantly increased the turndown ratio of compressor.

This paper shared a field experience of limitation of compressor operating range without dedicated recycle valve for capacity control and provides guideline for designing and installing independent recycle control system for capacity control to increase lower operating range of centrifugal compressor. It explained capacity control system for multistage LP/HP compressor based on suction flow rate and turbine speed. It also described Anti-surge control system for parallel operation of centrifugal compressors.

It was observed that actual turndown ratio of compressor improved from 55% to 20% after installing an independent recycle valve for capacity control. This improvement has increased capability to operate Gathering Centre at lower production rates without gas flaring.

The paper also justified need for installation of a dedicated recycle valve for capacity control in parallel to Anti surge valve to increase turndown ratio of multistage compressor.

In conclusion, the control philosophy of dual stage compressors where both the stages are connected to the same shaft and receiving different quantities of Gas must consider installation of a dedicated recycle valve in addition to Anti-surge control valve to balance varying requirements of gas flow rates between two stages to improve turndown ratio of compressors and prevent frequent offloads at lower throughputs.

Mr. Chirag Parikh, KOC, Kuwait

KNPC Approach on Reducing SO_X Emissions from FCC Unit

Mr. Mohammed A. Abdulrahman, KNPC, Kuwait

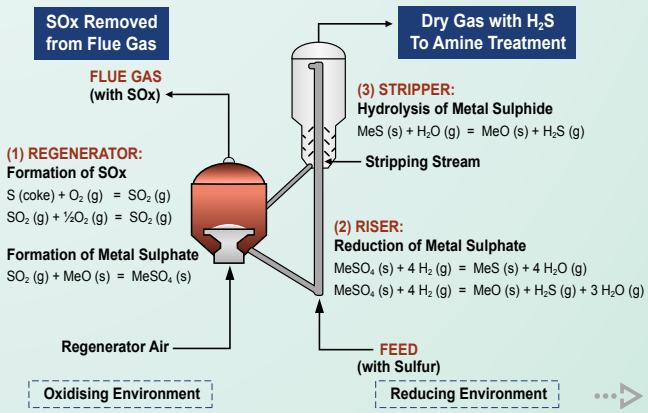
The Fluid Catalytic Cracking Unit (FCCU) will continue to play a key role in the overall profitability of the refining industry due to its inherent flexibility. The FCCU of the Mina Al Ahmadi (MAA) refinery of Kuwait National Petroleum Company (KNPC) processes several streams containing high sulfur from different process units. The feed sulfur is distributed into various products, including coke which is burnt in the regenerator. The sulfur in the coke is then oxidized to sulfur oxides (SO_x) and exits with the flue gas through the stack.

Realizing the challenges associated with upgrading these streams and the gravity of the consequences of SO_x emissions on the environment, KNPC has to operate its FCCU in accordance with local regulations. This is due to the fact that the amount of SO_x emitted from FCCU accounts for most of the SO_x released from the refinery.

In order to comply with these regulations, KNPC evaluated various options. These include FCC Feed Pretreatment (FPT) to reduce feed sulfur levels, installation of a Wet Gas Scrubber (WGS) to reduce SO_x levels in the flue gas and the use of a SO_x-reduction additive. Both the installation of WGS and FPT require high capital expenditure and operating costs, whereas an additive approach requires no capital investment and can be discontinued whenever the feed sulfur levels are low, offering high flexibility. The use of a SO_x-reduction additive has been found to be a far more cost-effective solution.

In 2010 KNPC initiated a trial using a SO_x-reduction additive targeting 60% reduction in SO_x emission levels from FCCU. A baseline was established to enable an accurate assessment of the SO_x additive performance. The evaluation of the trial indicates the successful achievement of the targeted 60% reduction in SO_x emissions.

This paper compared the economics and benefits of the different options evaluated in order to sustain FCCU profitability from processing heavier feedstock without violating KNPC commitment towards environmental legislations.



The paper concluded that based on the analysis of all options explored, installation of a Feed Pretreatment & Wet Gas Scrubber requires high capital investment and the operating costs are significant. In addition, the WGS option generates a waste stream which needs further treatment. In contrast, an additive approach requires no capital investment and can be adjusted/stopped when the feed sulfur (the actual source of SO_x emissions) levels are low. This is also the only option with no lead time and can be applied following the completion of evaluation of additive suppliers.

Qatar Route 77 to LNG Storage and Re-Gasification Facilities (Terminals) and the Ultimate Value Chain

The objective of this paper was to share with GPA-GCC team the Qatari achievement of becoming world leader in LNG production at 77 MTPA. The aspects of LNG production in Qatar over the past 30 years and a closer focus on the past 14 years to achieve the 77 MTPA were discussed in the paper.

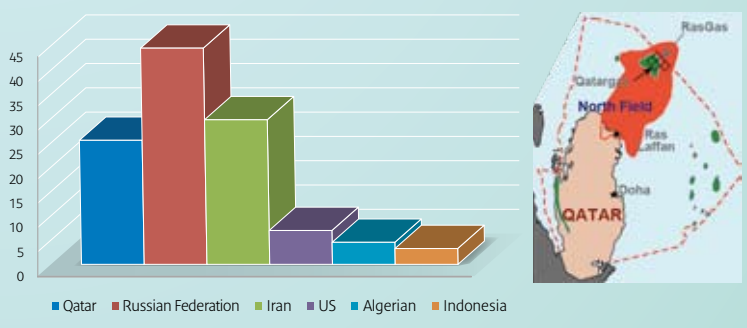
The paper covered the area related to Gas Reserve, Value chain Aspect, first of a kind world Offshore LNG Terminal and LNG Market. The paper also highlighted Challenges faced during Project implementations and lesson learned.

There were a number of main challenges that Qatar Gas Industry undertaken as follows:

- **Technology & Risk**
  The Mega scale Technology were not implemented anywhere the main Risk taken were associated to Rotating equipments part of the liquefaction units.
- **Change of Regional Regulation and Social influence.**
  We have shown that Value chain it associated to LNG from reservoir to consumers. After rigorous search for best fit location the Terminals were decided to be built in UK, Italy & USA.
  Each country poses different National, Regional & International stringent Regulatory frame work which needs to be adhered.
  All sites were assessed with Environmental Impact Assessment which is a common practice. This was followed with compliance with community legislation on noise, water, waste and protection of flora and fauna.
  In the case of UK the visual impact of the facility were revisited and Tank design were modified to ensure that this visual impact was mitigated to meet the Social influence.
  In the case of Italy the issues become more complicated due to the fact that Italians were referring to National/Regional and European legislations and resulted to build the facility offshore rather onshore.
  In the case of USA only social issues related to LNG safety which was addressed to neighboring communities.
- **Politics.**
  One major driver towards a floating pipeline concept is the burden associated with building pipelines to transfer LNG.
- **Competition and promoting LNG.**
  In today's high energy demand and the need for clean source of energy supply, LNG becomes one of the major players this was promoted by Qatar.
- **Unknown**
  During the course of the project there were still uncertainties related to LNG prices and supply balances and the weather project team were prepared for any unknowns "IKE Hurricane".
- **Choose your site very carefully.**
  Market efficiency and Security of supply need a strong final decision maker as in most cases Regulatory Agency Controls the Clock.
- **Assemble a good team.**
- **Meet with all potential interested entities.**
- **Establish a Strategy**
  Pervious experience and reflection into future. In the case of QGII Train-4 and Train-5.
- **Future Development & Improvements.**
- **Be ready for the unexpected.**

Mr. Adel Sheeban, QPI, Qatar

Qatar today not only named Route 77 to Ras laffan main entrance Road. However, partnership with Major IOCs in these Mega projects has brought to Qatar the exposure to knowledge and power of the drop has extended globally.

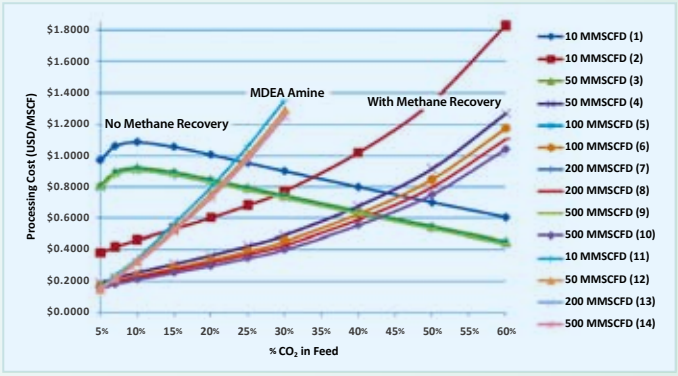


Natural Gas Sweetening using Hollow Fiber Membrane Technology for Offshore Applications

Mr. Motasem Ahmed, Petrofac International Ltd., UAE

The removal of carbon dioxide (CO_2) from natural gas using hollow fiber membrane technology is one of the innovative leading technologies, utilized for on-platform crude natural gas treatment in offshore gas fields. Membrane system has the advantage of less weight and area requirement compared to conventional MDEA CO_2 removal process. These advantages increase the reliability in installing membrane systems on platforms to export sweet gas directly from platforms, saving major costs in exporting the gas to onshore plants for pretreatment prior to exportation. This paper compared the economics of CO_2 removal from natural gas using membranes and MDEA chemical solvent system.

It concluded that the economical advantage of cheaper processing cost, system area, weight, ease of installation and startup are all factors that gives membrane system advantages over MDEA. Membrane systems with methane recovery stage are the most economical way to treat crude natural gas with a feed consisting of more than 10% CO_2. However, as CO_2 concentration in the feed exceeds 35-45%, the installation cost of a recovery stage becomes unjustified, and single stage process will be the most economical system.



Gas Processing Cost for Different CO_2 Removal Technologies

from 1

6th SPECIALIZED TECHNICAL SEMINAR
Energy Optimization in the Gas Processing Industry

Translating Strategies into Realities: a Superior Energy Efficiency Program for Industrial Facilities
By: Mr. Fahad S. Al-Dossary, *Saudi Aramco, Saudi Arabia*

Carbon Dioxide Recovery Plant at GPIC
By: Mr. Mohammed Al Naham, *GPIC, Bahrain*

Gas Plant Process Cooling Via Steam-Driven Absorption Chiller Technology
By: Mr. Ali H. Al-Qahtani & Mr. Hassan M. BaAqeel, *Saudi Aramco, Saudi Arabia*

Energy Optimization in the MAA Gas Processing Facilities
By: Mr. Abdullah Al Ajmi, Mr. K. S. Sabapathi, Mr. Musallam Al-Rashidi & Ms. Shaimaa Ali Ameen, *KNPC, Kuwait*

Ethane liquefaction by Installing Addition Heat Exchanger in NGL Turbo-Expander Plant
By: Mr. Yahya Hassan Al-Faifi, *Saudi Aramco, Saudi Arabia*

Exchanger Selection and Design in an LPG Recovery Unit
By: Mrs. Lakshmi Venkatesh, *Petrofac Engineering India, India*

NGL Shipping Energy Optimization
By: Mr. Alsadat H. Al-Ghamdi, *Saudi Aramco, Saudi Arabia*

The session chairman was Mr. Ismail Abdulla, Manager Support Services WK of KOC.

The papers touched on subjects of high interest to the audience which provoked good interaction between presenters and participants, sharing their knowledge and experience. The success of the sixth specialized seminar proved the importance of the selected subjects and the need to continue with these specialized sessions focusing on areas of high and common interest to the GPA-GCC Chapter member companies.

These successful achievements demonstrated the valuable and effective efforts of the GPA-GCC Chapter in expanding its activities to better serve the oil and gas companies of the region by providing the platform for the professionals to share the knowledge, experience and industry best practices.

Best Paper Award 2011

The GPA – GCC Chapter "Best Paper Award" is granted to recognize outstanding technical papers which are delivered during the Annual Technical Conferences.

The best papers of the 19th Technical Conference held on May 4th, 2011 at Safir Marina Hotel - Kuwait, as ranked by the audience are as follows:

"Erosion and Corrosion in Acid Gas Removal Units"
Mr. Justin Hearn, *BASF SE (Germany)*

"Successful Amine Cleaning Technology Application in Saudi Aramco"
Mr. Saud H. Al-Mudaibegh, *Saudi Aramco (Saudi Arabia)*

The Best Paper Speaker will be awarded by the Chapter Chairman and other Executive Committee members at the forthcoming Annual Technical Conference to be held on 9th May 2012 in Dubai.

18th Technical Conference - 2010 Best Paper

"Solvent Swap for Acid Gas Removal Unit at Gas Recaycling Plant"
Mr. Soud J. Al-Ruwaili, *Qatar Petroleum (Qatar)*

About the GPA - GCC Chapter

OUR MISSION

To serve as a forum for the exchange of ideas, technology and information that will benefit both the upstream and downstream Gas Processing industries, and their Suppliers, with a view toward improving Plant Operations, Health, Safety and Environmental performance in the GCC countries.

OUR VISION

To be the focal point and the main source of information on the Gas Processing industry in the Gulf Cooperation Council countries.

MEMBERSHIP

Membership in this organization is open to GCC Representatives of:

- Companies owning and/or processing gas. These are classified as "Members".
- GCC-based organizations involved in the supply and/or service to the gas industry. These are classified as "Associate Members" and are entitled to vote on all matters in the Organization's Annual meeting except for the Executive Committe elections.

All membership applications are considered and approved by the Executive Committee.

EXECUTIVE Committee of the Year 2011-2012

NAME	DESIGNATION	COMPANY/COUNTRY
Mr. Saad Turaiki	Chairman	SAUDI ARAMCO - Saudi Arabia
Mr. Fahad Al-Subaiey	Vice - Chairman	QPI - Qatar
Mr. Ahmed Y. Majid	Secretary Treasurer	BANAGAS - Bahrain
Mr. Ahmed Ghuloom	Member	GPIC - Bahrain
Mr. Abdullah Al-Ajmi	Member	KNPC - Kuwait
Mr. Mohammed Al-Otaibi	Member	KOC - Kuwait
Mr. Khalid Taher	Member	Tatweer Petroleum - Bahrain
Mr. Eisa Al-Kubaisi	Member	QP - Qatar
Mr. Samir N. Khoury	Member	CCC - UAE

TECHNICAL Committee of the Year 2011-2012

NAME	DESIGNATION	COMPANY/COUNTRY
Mr. Kefah A. Al-Faddagh	Chairman	SAUDI ARAMCO - Saudi Arabia
Mr. Ismail Alami	Member	SAUDI ARAMCO - Saudi Arabia
Mr. Mohammed Bu-Rashid	Member	BANAGAS - Bahrain
Mr. Ahmed Ghuloom	Member	GPIC - Bahrain
Mr. Abdullah Al-Ajmi	Member	KNPC - Kuwait
Mr. Mohammed Al-Otaibi	Member	KOC - Kuwait
Mr. Khalid Taher	Member	Tatweer Petroleum - Bahrain
Mr. Ahmed Khaja	Member	QP - Qatar
Mr. Mohamed A. Egab	Member	ADGAS - UAE
Mr. Marwan Al Hammadi	Member	GASCO - UAE

GPA GCC Chapter
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