



In Brief...

GAS PROCESSORS ASSOCIATION EUROPE

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GPA looks at the future of Carbon Capture

GPA Europe hopes, in some of the forthcoming meetings, to include papers or perhaps a dedicated session on this topic.

The world is very fast catching up to the very real possibilities of global warming. Attention is being applied to the impact that our industrial activities are having on this and on the one hand the very significant risk that it represents to the future economic growth for the larger economies of the world, as well as, quite literally, the survival of the populations of some of the less well endowed. The topic is on the agenda of all of the leaders of the OECD countries and many more besides. Some within the UK have described this as "an issue of national security".

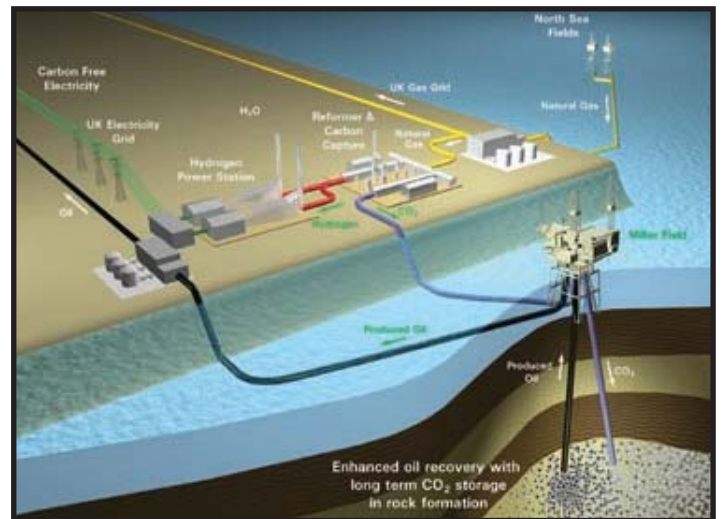
The technologies are available to

radically reduce carbon emissions, but at a price! The rate at which these new technologies are adopted around the world will depend upon the perceived magnitude of the problem, the vested interest of the parties who are involved in financing new projects, the actions of governments and the large energy companies and - most importantly - the combination of the necessary technologies to most cost effectively meet the challenge. This session is intended to focus on the topic of global warming and the technological responses to meet the forthcoming challenge. It is an opportunity for the paper presenters



not only to present work or a development in which they have been involved but also to get out their crystal balls and take an unashamed look at how they think the future will look.

Malcolm Harrison (Photos courtesy of the bp website article 'Introducing hydrogen power')



Our September Conference will be held in Oslo, Norway, hence the photo taken in the Snohvit field with the midnight sun (*photo courtesy of Statoil*). The Conference opens with a reception on Wednesday evening, 20th September, and is followed by a day and a half of intensive technical sessions. As usual there is a companions' programme and a chance to unwind on the Thursday evening as we dine at the renowned "art deco" Ekeburg restaurant. The venue for the Conference is the Hotel Bristol with modern facilities in a cultural setting. Registration forms are available via our website. *Editor*

View from the Top

Last February I made my first 'View from the Top' statement pointing out the challenges that we will be facing in the years to come. Some of you may be aware that one of my challenges is that not long after being elected as Chairman, I was asked to take on the Business Development function for AMEC Oil & Gas in their Kuala Lumpur, Malaysia, office and I have been based here in the tropics since April. As a consequence, I have not been as active as I would like to have been on behalf of the GPA Europe and it is therefore my intention to hand over the chairmanship to Ed Bras of Shell Global Solutions at the AGM in November rather than serve out the normal two year period. (You will see a photo of Ed on page 8). I am sure that Ed will continue to serve the best interests of the GPA Europe with panache, and considerably more effectively, being based within the European area. I do hope to be present at the Oslo Conference and at the November AGM and will see many of you there, and I can only pass on my regrets that I have not been as effective as you would have liked.

In my period as Chair I was honoured to attend the Gas Processors' Association Annual Convention in Grapevine, Texas, in March of this year and was able to jointly chair the International Forum with Tito Bonnadonna from the Venezuelan Chapter. The convention was a great success as usual, and it was an interesting measure of the activity in the US gas processing business that the numbers were not as high as expected, because people were too busy to attend! I know we are all seeing a similar trend in Europe as the high price of fuel makes the development of hydrocarbon resources more attractive and the increasing demand for clean gas sources makes our industry even more buoyant. This is very true within my new region where all engineering companies and suppliers are stacked out with work and the operators are now beginning to see shortages and increasing costs for their developments. It is through organisations such as the GPA



**GPA Europe Chairman
Sandy Dunlop**

Europe that opportunities exist for Producers and Suppliers to network together to find effective ways of dealing with these challenges at our various meetings.

We have had two effective meetings this year so far in London and Antwerp - of which more further in this edition, and I look forward to a busy schedule in Oslo in September and to the AGM in November. Whilst we are working hard to develop the programme for 2007, our thoughts have already turned to 2008 when the GPA Europe will celebrate its 25th Anniversary. Much more information will be forthcoming over the next months, but I can assure you that we are planning that 2008 will be a memorable year with new innovations and a significant Annual Conference in Paris. Our plan is that while we will produce a 'History of the GPA Europe', 2008 should not be seen as looking backwards, but as an opportunity to think where we will be going in the next 25 years. Watch this space for more information.

Once again my continued thanks for your support of the GPA Europe and may I wish you all every success in the coming years. I look forward to being able to support the GPA Europe in any way that I can and I wish my successor and his colleagues on the Management Committee all best wishes.

Sandy Dunlop, Chairman

You know you are an old Draftsperson when...

An old 'wag' at the recent GPA management committee meeting was heard to say, "I am not aware that anything has changed!"

You know you are an old Draftsperson when... You know how to control line weights by rolling your pencil.

You know that a French curve isn't a grade change on a language exam.

You remember when blueprints were blue.

You've erased sepias with chemicals.

You've had a roll of toilet paper on your drafting board.

You remember when templates were plastic and not a type of electronic file.

You know what sandpaper on a stick is for.

You know that a compass draws circles and not used to find the North Pole.

You remember the head rush from the smell of ammonia.

You own a roll of masking tape so dried out, it will never be tape again.

You've done cut and paste with scissors and sticky back.

You've etched your initials into your tools.

You have had a brush tied to your drafting board.

You've come home with black sleeves.

You've made hooks out of paper clips to attach to your lamp.

You know an eraser shield isn't a Norton program.

You've used "fixative" spray.

You've had a middle-finger callous harder than bone.

You have a permanent spine curvature from bending over your table.

You also were accurate from 100 paces with an elastic band.

You went to the pub most lunchtimes.

Friday afternoons were spent colouring in.

There was an office junior.

Your drawing board was held at an angle with bricks.

You'd have a set of blunt razor blades but not for shaving

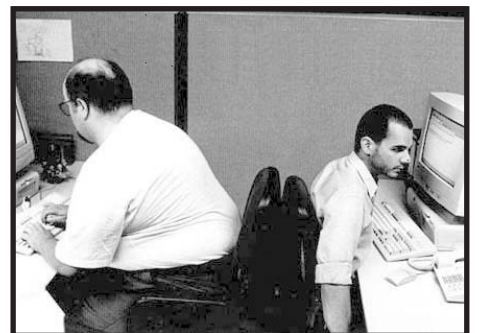
You'd have the 'taste' of an old white rubber on your tongue

They'd be more than one way to sneak back into the office after lunch

You'd actually do a time sheet on a Friday

You learnt to fold an A0 drawing to get the title on the front

.....and your timesheet bore no relevance to the hours you had worked.



"As Sandy notes, the industry and we all as individuals are very busy, which is great, but can also be very stressful. Please bear in mind there will always be someone worse off than you!"

Technical Conference - London

Morning Session - 'The Present'

The February meeting held in London comprised one day of technical presentations with one of the GPA subsidised Training or "Knowledge Sessions" the afternoon before. One of the GPA Europe aims is to provide free training for people entering our industry, on this occasion the topic was offshore processing. A brief review of the session follows after the main conference write-up.

The first paper was *CABGOCE's Angolan Offshore Experience, Past to Present*. The Sanha Condensate Project's objective is to eliminate routine gas flaring while increasing oil and LPG production in Block O. Corwin Rose of Chevron Texaco gave an overview of the size and operation strategy of the Sanha areas, including the complexity of the processes and the details of the various phases of upgrading the facility to maximise production and minimise impacts on the environment.

Corky's presentation highlighted the need for skilled operators to handle such complex operations who required detailed knowledge of the various systems and processes on the field. Corky also showed that, for a Project of this size and complexity, a Global approach to Project Management, Engineering and Fabrication sites was required.

Corky then went through the details of the Sanha LPG FPSO, its construction schedule, processing

units, etc, and the level of detail required to Assure Safe Operation. Key here, as well as the traditional QRA/HAZOP/HAZAN, etc, was the Operations Training Plan and OTS. Corky's summary was focussed on Safety, no lost time incidents after 3 million man-hours invested in the Project with the world's largest LPG FPSO performing in the top operating quartiles for the industry. After the presentation there was a lively discussion around the issues that had been faced with the Project.

The next paper *Issues & Design Trends in Onshore Gas Reception Facilities* discussed the requirements for greater safety, lower environmental impacts and lower CAPEX leading to reduction or (preferably) elimination in upstream processing.

Nishant Gupta, on behalf of co-authors Ed Bras and Paul Clinton, presented Shell Global Solutions view on the interface issues required when subsea processed fluids reach the 'topside' of the plant. This meeting point was defined as the 'interface' and was the focus of his presentation. Nishant first outlined some of the key issues and trends in 'offshore processing' especially in the manner of 'how much offshore processing' is required. Examples were drawn from some Shell facilities that have 'Complex' offshore processing to 'Simple' and to 'Almost None'. This presentation aligned nicely with the Chevron paper which was focussed on complex operations with significant operations required.

Nishant gave an interesting presentation about the control and operations problems and several proposed ways and means to improve situations during the arrivals of slugs but also of sour gas. He highlighted that Shell Global Solutions had investigated the inclusion of a new 'dump vessel' just down stream of the Slug Catcher which could improve operations and product quality. The products from the 'dump vessel' are recycled to appropriate locations downstream of the slug catcher, which would assist (and in some cases - reduce) some typical

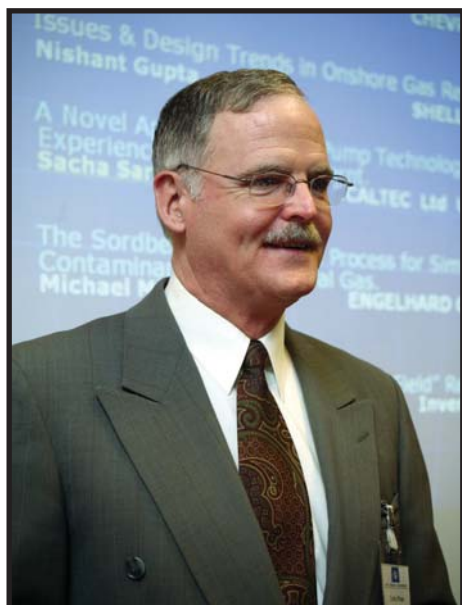


Nishant Gupta

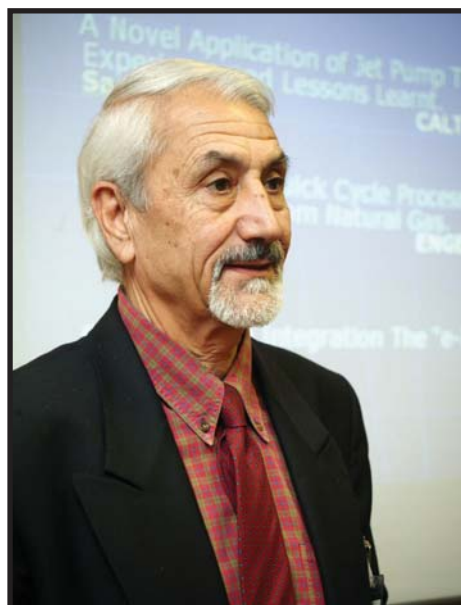
offshore operations problems (for example solids arrival). The presentation invoked a long and detailed Q&A session which ran for quite a while and into the scheduled coffee break!

Sacha Sarshar, co-author Najam Beg, of Caltec Limited gave the next presentation: *A Novel Application of Jet Pump Technology to Boost Production from Oil and Gas Fields - Field Experience and Lessons Learned*. This covered the offshore solutions using the 'Jet Pump' technology to increase recovery from mature fields, as well as reducing flaring, debottlenecking compressors and down-hole improvements (gas lift).

Sacha explained the technology behind the Jet Pump and some of the



Corky Rose



Sacha Sarshar

Technical Conference - London

results of applications where Caltec have implemented the Jet Pump technology. He also indicated the advances in the Jet Pump technologies, including turn down ratios and controllability as well as applications in harsh environments. Sacha also pointed out the economic benefits for considering Jet Pump technology.

Developments in the Sorbead™ Adsorbent and the Quick-Cycle Process for Simultaneous Removal of Multiple Contaminants from Natural Gas was presented by Michael Mitariten, co-author Waldemar Lind, of Engelhard Corporation USA and Germany. Engelhard's Sorbead silica gel is a premium silica gel based absorbent for the single step removal of heavy hydrocarbons and water from natural gas ('quick cycle' units).

Michael gave a very detailed presentation regarding the various processing steps in gas units and how the Sorbead unit can help in the removal of gas contaminants easily and quickly. Michael showed how the Sorbead systems were very stable, more durable than conventional 'granular' systems and how this process can be used to treat Amines (and reducing foaming), reduce Amine Plant VOC emissions and remove BTX from Claus units. Michael also discussed how these units could be used for Mercaptan and mercury removal. Indeed, Michael showed how the



Intense questioning

inclusion of the Quick Cycle Units can in fact improve the operation and removal of contaminants by placing the Sorbead unit further upstream in the process and simplifying some of the downstream processing requirements. He then went on to show how the quick cycle units were operated and gave some actual examples of where the Sorbead units had been installed and the benefits they achieved. Michael's presentation highlighted some comparisons against competing technologies which raised some interesting Q&A from the floor.

Steve Robinson of Invensys, UK, then presented *Offshore Data Integration - The 'e-Field' Revolution*, which answered the question: SMARTFIELDS™, Intelligent Fields and e-fields what do they mean and why is it of interest? He explained how the market was fast moving in a traditionally 'slow moving' market and that there were significant benefits to be gained with the implementation of some relatively simple integrations of data information and management tools into the 'Four Rights' - Right Information to the Right Person at the Right Time and in the Right Context.

Steve drew the analogy of a 'bank vs. an ATM' to differentiate how these 'e-fields' might be used and also how these tools can be used to

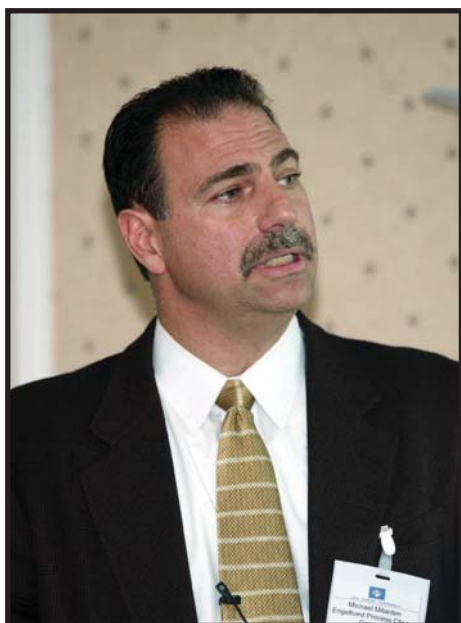
'de-man' or remotely operate the more remote or harsh/dangerous fields. Steve's presentation stunned most of the attendees into silence but eventually the questions came and then these questions became more of a flood as many people realised the impact and capabilities of the solutions presented.

Lunch followed Steve's presentation, followed by the afternoon session.

Paul Seccombe

Afternoon Session - 'The Future'

After a satisfying lunch, the afternoon session kicked off with a paper presented by Brian Lane (on behalf of David Appleford) from



Michael Mitariten



Steve Robinson

Technical Conference - London

Alpha Thames Subsea Ltd, entitled *Introducing the imminent benefits of system modular technology for seabed gas compression and processing*. The increase in the world's energy demand has resulted in gas fields being developed in increasingly deeper waters, remote from present facilities, either on or offshore. The modular, sub-sea AlphaPRIME technology has been developed to enable gas producers to develop remote gas fields more quickly and at lower cost.

As with most new concepts, system reliability is unproven, so the aim has been to simplify the installations by using as much proven technology and modular construction as possible, thus reducing the need for new, complicated or expensive equipment. Much of the new technology that has been developed, such as the high voltage power supply connector, failsafe actuator and electric valve actuator, has been actively supported by Shell.

The basic building block of the new system is the 'KeyMAN' manifold to which various system modules can be attached. Such modules could be wet gas compressors, or driers. Any pressure drop resulting from a drier could be restored by re-compression within the same module. Such autonomous modules would normally be installed in pairs to provide redundancy and allow for the recovery of one module while the other maintains production. As

the field ages, or gas conditions change, modules could either be up-rated or added to as and when required, avoiding up-front investment for later stages in the project's lifecycle. The technology would also be applicable on, say, an FPSO or a platform with the appropriate planning.

The potential benefits of such a sub-sea concept are considerable. Extrapolating the continuing trend towards unmanned production platforms, networks of processing modules located at depths up to 3000m on the seabed will allow more gas to be processed without constructing any expensive platforms. Module redundancy assures continuous production, and the seabed locations remain unaffected by extreme sea conditions, eg Hurricane Katrina's effects on the Gulf of Mexico. Significantly, the time taken to get the gas to market is reduced, as it is not dependent upon the long lead times and large capital investments in platforms. These advantages could ultimately turn a marginal field into a profitable one.

The concept will now be tested offshore Malaysia, and it is hoped that actual field performance data will be available later in 2006.

Leo Festen, of ABB Lummus Global BV, presented the second paper entitled *Offshore LNG Production*. The Niche LNG™ Process, a novel combination of LNG plant and FPSO that has been conceived to monetize stranded gas reserves both reliably and safely, was introduced.

Leo's preamble established gas as the fuel of the future, replacing coal by 2020 as the world's second most important energy source. The pre-eminence of LNG, compared to other 'gas to money' technologies, was highlighted. This is due partly to its maturity, having been first transported by ship in 1964. Another reason is that once the gas market is over 2000 km from the gas reserves, LNG is easily the most energy-efficient means by which the gas can be transported.

Leo then reviewed the different liquefaction processes currently being used in base load LNG plants. The reasons for the lack of success



Leo Festen

to date in convincing the conservative LNG industry to invest in a floating LNG project were summarised. These included the high complexity of most liquefaction processes, questionable availability of the whole train, potentially increased safety risks and uncertain technology steps.

Thus if the LNG industry is to be convinced, something 'radically simple' must be offered. As in the previous paper, there has been a deliberate attempt to keep the NicheLNG™ Process simple, using only proven technologies, and involving technology partners with specific expertise. These include Randall Gas Technologies for the liquefaction process, and offloading systems by SBM Offshore NV due to their FPSO experience. In this way it was possible to design an LNG FPSO built with existing, proven technologies.

It was assumed that gas to the floating LNG plant comes from an oil FPSO located nearby, which would also receive the stabilised condensate. The main choice for the power hungry LNG process is the type of liquefaction compressor driver. On safety grounds, power generation for this task was by steam boilers supplying steam turbines that provide power to variable speed electric motors. This is common on most LNG carriers. Thus for a plant which will produce 1.6Mt/a LNG, the resulting hull design was 301m long, 56m wide, with a draught of 15m.



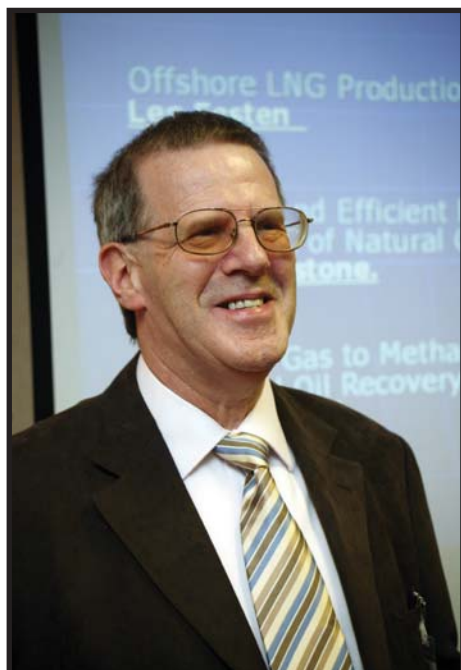
Brian Lane

Technical Conference - London

The shorter equipment list, compared to an MRP, demonstrates the process simplicity, which leads to enhanced safety, as there is more space between equipment items. The minimal inventory of liquid hydrocarbons, lower potential for cryogenic damage and the use of electric motors all contribute to a safe operational environment. And when the field becomes marginal, the LNG FPSO, unlike a base load plant, can be moved to the next location. All Leo needs now is a customer.

Peter Goldstone, from Air Products & Chemicals Europe, presented the third paper of the session. Peter's paper, *The safe and efficient provision of oxygen for remote, offshore conversion of natural Gas*, dealt with another 'gas to money' challenge offshore. Peter and his co-author, M A Kalbassi, investigated the possibility of installing large scale, high efficiency air separation units (ASU) on an FPSO as part of a Gas To Liquids (GTL) process. Once again, the flexibility offered by an FPSO, compared to a larger onshore facility, can be seen as a major advantage as the previous paper demonstrated. The major challenges will include the safety and environmental aspects.

The installation of ASUs in aircraft carriers goes back 50 years, as they were used to provide oxygen for pilots. Although small scale, many



Peter Goldstone



The presenters and chairmen for the London Technical Conference

of the operational problems already encountered have been addressed. More recently, a major design study was performed for a platform-based nitrogen flood for a large EOR project in the Ekofisk field. Containment of large volumes of cryogenic liquid has already been addressed in the design and operation of LNG tanks.

In order to convert natural gas to liquid form, the first step is to synthesise a mixture of carbon monoxide (CO) and hydrogen (H₂) to form a so-called syngas. The conversion is traditionally made by catalytic reforming of hydrocarbon feedstock with steam or oxygen and steam to partially oxidise the hydrocarbons. Although early plants used air rather than oxygen, this has many disadvantages, principal among which would be the construction of a much larger plant. For offshore applications, this would be a particular disadvantage. The layout of the equipment on the FPSO deck is determined by the ranking of risks to operating personnel. In this ranking, the oil and gas risers and flare are at the high end of the risk spectrum, with the control room and the ASU at the lower end. In this way, if the highest risk areas are placed near the bow, then the lower risk processes will be installed towards the stern, where the living quarters are located. Minimising the effects of the marine environment on the ASU operation

will require fine-tuning the lessons already learned over the years, and the application of newer, proven technology such as structured column packing.

Peter described at length how the safety challenges offshore could be met, with measures as diverse as perimeter insulation and secondary containment in the cold boxes, to atmospheric dispersion studies. In summary, these safety challenges will prove to be the key to installing a large scale ASU on an FPSO. By using advanced technology allied to proven operating design, the challenges of operating such a plant in a marine environment can be overcome.

The final paper of the session was entitled *A compact gas to methanol process and its Application to CO₂ Enhanced Oil Recovery* and was presented by Svend Rumbold, from the Heatric Division of Meggitt (UK). His paper, co-authored with James Banister, introduced a compact gas to methanol process using feed gas rich in CO₂, the goal of which is maximising the produced gas value while minimising the capital and operating costs.

Svend set the scene by summarising the techniques of improved oil recovery (IOR) in the North Sea using CO₂ injection, and CO₂ fracturing in the tight Permian basin region of the US. In both cases, as more CO₂ is pumped into the

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Svend Rumbold

reservoirs, then over time, the CO₂ content of the produced gas will begin to increase, say from 4% to 40%. As venting of CO₂ at the platform or wellhead will likely attract increasing penalties in the

future, such as a 'carbon tax', a process that can make a 'virtue out of a necessity' is attracting genuine market interest.

Heatric have identified one path to monetise this natural gas 'contaminant' by steam reforming the gas and converting it to methanol in a unique, once-through reactor design.

The reformer design is based upon Heatric's printed circuit heat exchanger design, where flat metal plates are chemically milled before being joined by diffusion bonding. The resulting high efficiency, cost effective reactor combines the strength of the parent metal together with the ability to combine cross-, counter-, - and co-current flow heat exchange within a single unit. It is a stand-alone system with no import or export of steam and only a 3 barg pressure on the process side. This enables a passively controlled

temperature profile throughout the block. The advantage of this process is that it can be used in several niche applications, and without the huge capital investment currently required for base load GTL projects. Following the success of a small prototype tested at the University of Sydney, the first industrial installation has now been commissioned in Los Angeles, California. It is hoped that a successful outcome of this work, and subsequent commercial application, will result in a reduction in much of the industry scepticism currently surrounding the larger gas-to-liquid processing plants.

At the end of the meeting, participants were invited to remain behind to chat and network with each other, facilitated by the free bar.

Justin Hearn

Knowledge Session - Offshore Overview

The Knowledge Session, held on Wednesday, 22nd February in London, was attended by approximately 30 engineers ranging from young to senior level. Chris Glover, a senior consultant from AMEC Oil & Gas Division, gave the presentation on Offshore Processing. He covered many aspects of offshore processing from the basic process

engineering data required (eg designs basis, PFDs, P&IDs, layout consideration, etc) to how it is developed for an offshore facility (process optimisation). Typical process systems that can be found on offshore facilities like wellheads/flowlines, oil pumping & export and gas compression & dehydration were discussed, together

with a focus on some specific items of equipment that are typically used (eg hydrocyclones for desanding). The process input to the screening of development options of an offshore facility were also reviewed.

Chris answered many questions during the presentation and was able to draw from his 31 years of experience in the oil and gas industry.

Olawale Jenmi

Technical Conference, Antwerp, Gas Pretreatment and LNG

Morning session

It was a warm spring morning as Ed Bras of Shell, the GPA Europe Deputy Chairman, welcomed some 85 eager listening registrants to this one and a half day meeting. Mr Bras duly thanked UOP for their generous sponsorship of the Wednesday night reception before outlining the programme for the rest of the day and next morning. He then handed the stage management over to Sigbjørn Svenes of Statoil, being the morning session chair. The morning session theme, 'Gas pre-treatment', was introduced by the session chair stressing the fact that whatever you want to do with the gas, pre-treatment will be a part



Ed Bras thanks Jos Demandt on behalf of UOP, sponsors of the welcome reception

Technical Conference, Antwerp, Gas Pretreatment and LNG

of it, and that in an environment of high prices and high demand, sources of gas are diversified in origin, quality and requirements for pre-treatment. Having said this, Sigbjørn went on to introduce the first of the five morning session papers.

The first paper of the morning was entitled *H₂S Bulk Removal with the SPREX® Process - First Operational Results*. Francois Lallemand of Total presented the paper in which he also acknowledged his co-authors, Fabrice Lecomte of IFP and Christian Streicher of Prosernat. He started by giving a background for developing the SPREX (Special PRe-EXtraction process) based on the amount of sour gas reserves left to be developed worldwide. Then he went on to describe the general features of the SPREX-process itself in which cryogenic extraction of an H₂S rich stream combines with a much reduced size MDEA-based amine process to achieve pipeline specification for the natural gas, with the liquefied H₂S-rich stream available for injection to a disposal well. The process is suited for highly sour gas, typically 18 mole% H₂S or more. The second part of the presentation focused on the pilot plant installed in Total's Lacq field in France used to demonstrate the process. The main focus was on the test results from the first three months of operation of the unit in the range 17-30 mole% H₂S



Francois Lallemand



Alan Foster

as H₂S-rich liquid could be recycled to the feed, and results used to verify models for heat and cooling duties as well as extraction performance. However, the audience was also given an insight into the extensive experimental work undertaken to select materials for the process, and the safety studies including detailed gas cloud dispersion modelling to assure the safe operation both of the Lacq pilot plant and future commercial plants.

Next, Alan Foster of J M Campbell had the task of convincing the audience *Why Gas Processors should have an Interest in 'Oily' Water*. Alan started off by defining the amount of water to be produced and processed in connection with oil and gas production around the world. Statistics are uncertain of this, varying from 120 to 400 million barrels per day, easily outnumbering current worldwide oil production. He then went on to briefly describe various disposal methods feasible and the varying oil in water discharge limits applicable to main production areas of the world ranging from 10 to 50 ppm dependent on discharge place (creeks, rivers, lakes, oceans, etc.), and how this also is influenced by various international agreements (OSPAR, Montreal protocol and more) to give future directions and limits on other components in effluents as well. To solve these challenges industry have developed a range of technologies to meet those goals, and Alan gave a brief

overview of the history of these technologies from the enormous API separators, via plate separators/filters and flotation units to more compact solutions often preferred as current proven technology such as hydrocyclones and even more advanced state of the art technologies like C-Tour where condensate injection is combined with hydrocyclones to increase efficiency through an extraction process. In the end, I guess the gas processors also showed an interest in 'oily' water and could spend their coffee break exploring this subject even further.

After the coffee break Stephen Massie of Criterion Catalyst turned up the heat with his paper *Less Fuel - Less Fire - Less Pollution using Low Temperature Tail Gas Catalysts and Catalytic Incineration in Sulphur Plants*. Stephen outlined how carefully developed catalysts could be used to bring down the reaction temperature and thus the feed temperature to the typical Claus unit hydrogenation step, giving opportunities for reduced capital and operational costs. A reduction of 40 to 55°C was foreseen based on proprietary cobalt-molybdenum catalysts. Coupling this technology with a current available incineration catalyst was claimed to have a potential for energy savings up to 60% compared to regular thermal incineration Claus Tail Gas Units. Performance of the catalyst was



Stephen Massie

Technical Conference, Antwerp, Gas Pretreatment and LNG

shown, based on test data from a refinery unit in Port Arthur, Texas, over a 15-20°C temperature range. Discussing several issues of the benchmark of a successful process, Stephen focused on success criteria like meeting environmental permits, high throughput, long cycle lengths/trouble free operation and robustness. Finally, Stephen also stressed that developments should be brought even further, and that another catalyst to bring down the temperature towards 200°C is being developed.

For the fourth paper of the morning, Josep Anton Feliu of Aspentech's Barcelona office showed good sportsmanship taking over as presenter from Wim Van Wassenhove of Aspentech's office in Belgium. Aspentech's paper, *Using a More Thermodynamically Adapted Model Improves Modelling of TEG Dehydration Units - Allows Better Operation and Efficiency*, focused on the challenges of developing models applicable to efficiently simulate and design triethylene-glycol (TEG) dehydration units. To allow more accurate TEG system modelling to include phenomena like glycol losses to the gas phase and equilibrium of BTEX in water/glycol systems, the recent Twu-Sim-Tassone (TST) equations of state were implemented in Hysys and compared to the current used classical Peng-Robinson (PR) equation of state. Josep focused on the extensive validation work



Conference in session

performed with the TST model using research data presented by GPA/GPSA for these systems (GPA Research Report 131 mainly). Validation work included both vapour liquid equilibrium (VLE), liquid-liquid equilibrium (LLE) considerations including impact of acid gases and solubility of compounds in interacting phases. Based on the validation work Feliu et al have undertaken, the proposed model (TST) will be more applicable over a wider range than current typically used (PR) and will be available in coming releases of process simulation software.

Steve Jackson of Costain Oil, Gas & Process, on behalf of co-authors Adrian Finn and Terry Tomlinson, delivered the 5th paper of the morning. His paper was entitled *Processing UK Gas Imports* and addressed the challenges of meeting the UK transmission network (NTS) gas specification with differing sources of imported gas (pipeline and LNG). He started by giving an overview of the history of natural gas production and processing from the UK continental shelf, starting in the mid-sixties in the southern North Sea. This was followed by large scale developments in the northern North Sea including more advanced gas processing in the St Fergus area, when H₂S and or CO₂ also had to be removed. Developments continued through the eighties and nineties with gas coming in from the Irish Sea on the

west coast and to Teesside from the Central North Sea. Currently, demand for natural gas leads to high prices and new sources in the UK sector and imported gas seems to have qualities outside the current NTS Wobbe Index (WI) band, consequently needing to either reduce inert content (low WI) or increase it (high WI). Steve went on to show the status of various domestic and imported gas qualities (both pipeline and LNG) and discussed various means of meeting the objectives of controlling the natural gas quality. The issue of LNG quality was particularly discussed as most viable sources for the UK market are normally outside the UK Wobbe Index band. Adjustment of LNG quality either



Josep Anton Feliu



Steve Jackson

Technical Conference, Antwerp, Gas Pretreatment and LNG



A wonderful lunch and setting

extraction were discussed concluding that site specific factors (feed, LPG market, regularity and efficiency) would be decisive in the choice of handling the UK market increasing dependency on LNG imports. With this paper concluding the morning session, the delegates broke for lunch on time and had all been given some background for issues to be dealt with in the afternoon session on LNG.

Sigbjørn Svenes

Afternoon Session:

The afternoon session, chaired by Murtaza Khakoo of BP Exploration, covered five excellent papers on the LNG technology theme. The first paper, *Egypt's LNG Project Establishes new Industry*

Benchmarks, was presented by Martin Mayer of KBR on behalf of co-authors Gonzalo Fernandez of SEGAS, Ricardo Villanueva of Union Fenosa Gas and Don Hill and Charles Durr also of KBR. This paper provided an update on the Damietta LNG project and feedback on operating performance since start-up during 2005. Calling it 'Egypt's Premier LNG Project', Martin described the essential features of the current largest LNG plant with 5mtpa nominal capacity with many firsts such as shortest time from conception (4.5 years); 30% cost reduction from previous industry benchmarks; liquefying sales quality gas from local pipeline grid. As with most plants, they also



Wiveka Elion

had to deal with a few startup issues including some harmonics on the large electric motor driven inlet gas compressor and removal of heavy ends in low reflux environment of lean gas to mention a few.

This was appropriately followed by Shell's paper entitled *LNG Technology for Large Trains* presented by Wiveka Elion (co-authors Kees Buijs, Barend Pek and Ed Bras) which discussed Shell's technology offer for larger LNG plant capacities of 7-10mtpa and even greater in a low temperature environment. The Shell paper discussed three of their innovations: the split casing propane compressor arrangement that gets over flow limitation to achieve 5mtpa from



Martin Mayer



Lunchtime - a chance to followup a contact

Technical Conference, Antwerp, Gas Pretreatment and LNG

2Fr7 configuration; the parallel mixed refrigerant (MR) concept that doubles up the Fr 7 MR compression and associated main heat exchanger to achieve 8+mtpa. and lastly, their electrically driven DMR process utilizing ~65MW motors (potential to even go to 80MW) that is currently planned for use in Nigeria.

The third paper was presented by Christof Fey of Tractabel who stepped in at the last minute on behalf of Albert Meffert. The co-authors with Albert are Xiang Dong of Gh LNG, Eginhard Berger of Linde and Li Wei Bin of SINOPEC for the paper entitled *Overview of an Economic Mid-sized LNG Liquefaction and Storage Project in China with a capacity of 400,000 Tonnes/Year*. The paper perhaps reaffirms the concept that 'size does not matter' but only the local economics. Driven by the need to utilize 'waste gas', the project executed by Linde, involved building a 0.4mtpa liquefaction unit, LNG storage tanks (by Tractabel) and transport system by trucks to satellite stations/customers over 4500km away. The presentation showed fascinating pictures of the sheer scale and logistical challenge of LNG transportation by truck, which obviously works since there is intent to build two more similar ones!

Hot from presenting at the OPC Conference in Houston, Phillip Cox of Technip (co-author Raul Risi) presented their paper *Cryogenic*



The speakers flank the session chairmen and Ed Bras.

Pipe-in-pipe Technology - Qualification Requirements and Perspectives for Industrial Application. The paper discussed the development and testing of their technology which they now believe is available for real applications. These include the possibility of in-ground or subsea installation, straight in-line layout, etc, that dramatically enlarge the choice of potential sites for locating LNG terminals or production plants.

The final paper entitled *Zeebrugge LNG Terminal Extension*, was given as a prelude to the site visit to the Zeebrugge Terminal on the next day. Presented by Eric Van

Ingelghem of Fluxys, the paper provided a pragmatic perspective of the planning and consultation process undertaken for expansion of the Fluxys Terminal at Zeebrugge. The expansion involved addition of a 140,000m³ tank (partly submerged) and additional send out facilities using submerged combustion vaporizers (SCVs).

In all, a good afternoon session of high quality LNG papers, plenty of questions and discussions at tea time which, overall, is what was needed to keep people through 'the death zone' after the sumptuous lunch at the Radisson SAS facilities.

Murtaza A Khakoo



Christof Fey



Phillip Cox



Eric Van Ingelghem

Site Visit To Fluxys Zeebrugge LNG Terminal

The large party left the hotel early by coach and car convoy for the visit to the Fluxys Zeebrugge LNG terminal. Although the journey was quite long the coach was fairly quiet as many of the participants caught up on lost sleep caused by the previous evening's excellent dinner and after dinner socialising. On arrival at the terminal in the main office we were met by Fluxys personnel, with welcoming coffee, in the large facility display area which included a model of the Zeebrugge facilities.

After coffee we were given an informative and amusing presentation on the structure and history of Fluxys by Francois Des Touches. Francois outlined Fluxys' national network and additional facilities in nearby sites at Zeebrugge. These include a part of the Interconnector terminals linked to the UK which includes Fluxys' equipment relating to the Zeebrugge Hub. This is the location for the Zeebrugge natural gas spot market where international traders buy and sell large quantities of natural gas daily. There is also an LNG peak shaving facility which is adjacent to the main Statoil Zeepipe terminal where gas is brought ashore from



Fluxys Zeebrugge LNG Terminal©Fluxys, used with permission

Troll and Sleipner for distribution in the Fluxys network and on to other parts of Europe. More than 15% of the gas used in Europe passes through Zeebrugge as LNG or through the pipelines.

Francois then described the LNG terminal, emphasising the importance of safety and environmental impact and highlighting Fluxys' excellent record during 19 years of operation. In late 2004 an expansion project

was started to increase the throughput capacity from 60 LNG tanker cargoes per year to 110, by adding another larger storage tank of 153,000 m³ gross capacity to the 3 original tanks, each of 87,000 m³, and by increasing the send out and vaporiser capacity. The new send out capacity is due onstream in 2006 and additional storage in 2007. The energy efficiency of the operation is enhanced by use of combustion heat from the Electrabel 40 MW cogeneration power plant which exports to the local grid.

Following the presentation we had a tour of the complete plant in the buses with commentary by the Fluxys staff. The site housekeeping was evidence of the excellent safety record and the limited view of the new tank under construction confirmed that Fluxys clearly apply the same high standards to all phases of their activities.

After our visit, as we departed, we were presented with very good packed lunches for our journey back the airport and Antwerp.

Thank you Fluxys for your hospitality and your efforts which made the visit both interesting and informative.

David Healey



Fluxys Zeebrugge LNG Terminal©Fluxys Foto: www.Henderyckx.com

Antwerp - Conference & Companions' Tour

The day started with a guided walk to take in the 'Pearls of Antwerp'. First off was a visit to the 17th century house of Mayor Rockox. Nicholas Rockox was a friend and patron of Peter Paul Rubens. Rockox was a humanist and deeply religious man and also a great collector of artworks. His home, which opened as a museum in 1977, was a delightful house to start the visit. Great care and research had gone into the restoration of the house to a museum and it is packed with paintings including works by Rubens, Van Dijck, Brueghal, Patinier, etc. The house is also packed with furniture pieces from the time including many interesting art cabinets used to store small treasures in the homes of the upper classes of the time. These cabinets were decorated with silk embroideries, pearls, rosewoods, ebony with ivory plates and copper sheets and are very rare examples. Next came Borromeo Church or, more correctly named, St. Carolus Borromeus Church (St. Charles Borromeo's Church). This is a Baroque church with a spectacular façade. The church was built by the Jesuits between 1615 and 1621, and Peter Paul Rubens contributed to the façade, the tower and much of the interior. The church interior was designed as a Baroque banqueting hall, providing a foretaste of the banquet with God in heaven. The opulent interior decoration led to the church being known as 'the marble



The sun shines on the Companions' Tour of Antwerp

temple'. On July 18, 1718, lightning struck and 39 ceiling paintings by Rubens were tragically lost in the subsequent fire. Most of the original marble was also destroyed. However, the apse of the main altar and the Mary Chapel were spared and these provided us with an idea of the church's former splendour. One of the church's most unique features are the interchangeable paintings above the altar, making it an outstanding stage set, utilising an original mechanism which is still in working order. A lovely lunch was taken at the Grand Café Horta sitting outside on the terrace in wonderful weather. In the afternoon, sightseeing continued with some of our group

visiting the nearby Cathedral and Rubenshuis and others taking a walking tour of the Diamond area near the Central Station. Antwerp's diamond industry dates back to the 16th century and today Antwerp is the diamond centre of the world. A unique feature of this district is the presence of a large Jewish 'Hassidic' community and there are estimated to be 15,000 - 20,000 Jewish citizens in Antwerp. Finally we returned to the Park Lane Hotel for a well earned cooling drink with everyone's purses and credit cards still intact. Sighs of relief from the men were visibly heard!

Wendy Cooney.



St. Carolus Borromeus Church



Rockox House

OBITUARY

Bob Meckna

A brief reflection by *Adrian Finn*.

Bob Meckna, Enron's project manager for the Teesside Gas Plants and a gentleman whom we remember with affection, passed away in Houston on 6th February after a long, brave battle with lymphoma and MDS. Bob and Richard Fitt encouraged me to be active in the GPA and I remember Bob chairing some meetings including Austria in 1995. A picture of Bob as Chairman at the January 1994 London meeting can be found in the "In Brief" of February 1994, available on our website.

Awards, Presentations etc



Christine Etherington and Ron Coultrup

Christine Etherington and Ron Coultrup have been and continue to be trusted and loyal members of the GPA Management Committee. Christine, who is currently our treasurer, is also a past Chairman of GPA Europe. Ron has been Membership Secretary for many years and has recently handed that mantle over. In addition to their years of visible (and more discreet) service to the organisation, their company, Forcom International Ltd, set up the first permanently manned Administration Office and hosted this for several years, only recently handing this over as retirement beckons. It is in recognition of this dedication that the GPA has awarded Christine and Ron "Citations for Service". Neither were able to make this year's annual Conference in Dallas, so it was with great pleasure and pride that the award was received on their behalf by visitors from the Management Committee and later handed to them personally at one of the management meetings. Christine and Ron, we truly thank you for your service and continued commitment to the organisation.

The Editor



Delighted GPA Europe Chairman, past Chairmen, Secretary and 'In Brief' Editor receive the citations from Rob Martinovich

At recent conferences we have been asking for feedback on topics of interest to GPA members to stimulate ideas for future papers and conference topics. In addition to the front page of this edition, the following topics have also been identified. If you have a paper on such a subject that you would like to present, or "feel the creative energy flowing" in response to the stimulus of these ideas, please contact the GPA, the call for papers can be found on page 15.

- Gas Compressors and Turbines for LNG
- Gas to H2 power CO2 Sequestration
- Case studies in relation to theory
- Operating LNG Terminals (Importation)
- LNG Storage Construction
- LNG Loading Stations
- Oil & Gas Process Purification Methods
- Operating experiences of gas treatment plants/units and production sites
- Gas production / treatment / and green house gas emission reduction
- Hydrates
- Arctic Gas Facilities Design
- CNG
- Energy bridge LNG Re-Gas Projects

As reported in the last edition of 'In Brief', we are fostering connections with the Academic community. Consequently we have created a new membership category, Academic Level, and as you will see from our members list on the back page, we welcome our first member in this category, Heriot Watt university.

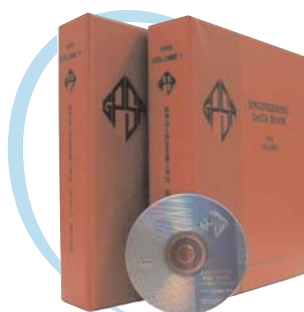


Ed Bras, Deputy Chariman, presents the GPSA Data books to representatives of the Norwegian University of Technology and Science.

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CALL FOR PAPERS

Papers are invited for GPA Europe's future meetings

London - November 2006 • Paris - February 2007
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London - November 2007

Our meetings provide a forum on neutral ground where the users, contractors, consultants and specialists can meet together to receive and discuss relevant technical papers and network informally with their peers.

Papers on any aspect, technical or commercial, of the gas processing industry are requested and contributions from both operating companies and suppliers will be particularly welcome.

Papers may be offered by both members and non-members. Interested parties are requested to provide a title and abstract (100-200 words) as soon as possible. Please include your full mailing address, e-mail address, phone and fax number.

Paper selections will be advised in good time to enable preparation of the paper. Details for the presentation will be given to the speaker after the selections are made. Abstracts and other information should be sent to the Administration Office

GPA Europe, 10 Shetland Way,
Fleet, Hampshire GU51 2UD
email: admin@gpaeurope.com facsimile: 01252 786260

Or to the Programme Committee Chairman:
lorraine.fitzwater@petrofac.co.uk

FORTHCOMING EVENTS

2006

September 20th - 22nd
**Annual Conference,
Programme of Technical
Papers + Conf Dinner**
Oslo, Norway

November 23rd
**Knowledge Session, AGM
and Half Day Technical
Meeting**
London

2007

February 22nd - 23rd
**Knowledge Session and
Technical Conference**
Paris, France

May 22nd-24th
**Residential Meeting and
Technical Conference incl.
site visit to PX (TGPP)**
Teesside, UK

September 26th -28th
**Residential Meeting and
Technical Conference**
Bonn, Germany

November 22nd
**1-day Knowledge Session
and Technical Meeting**
London

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Don and Wendy Cooney

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This listing of current Corporate Members represents the status as at 1st August 2006. In addition to this there are in excess of 180 Individual Members.

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Academic Level (1)

Heriot Watt University

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