sity of Technology followed up on a paper presented at SOGAT 2010 on a condensed rotational separation technology for highly sour gas, based on pressure distillation at semi-cryogenic temperatures.

Elemental sulphur that is dissolved in a gas well at high pressures and temperatures can become insoluble as the fluid moves up the well, leading to sulphur deposition in the equipment. The solution is generally to use a hydrocarbon solvent, but this then presents disposal issues. What is ideally needed is a regenerable solvent. In a joint paper with ASRL, **C Graham** of Fluor examined what a suitable solvent might look like, with key requirements of high uptake of sulphur, low volatility, and resistance to the hydrotreating processes needed to recover the sulphur as H_2S. Fluor have developed what they call *Econo-Sulf*, a sulphur solvent regeneration technology to provide just such a regenerable solvent system.

Angie Slavens, now with WorleyParsons, asked delegates to take a fresh look at *FLEXSORB* for operations other than the familiar ones (high capacity, high –>99.9% – sulphur recovery, lean enriched acid gas etc). She acknowledged that the high cost and license fee can be offputting, but argued that if overall life cycle cost is considered, *FLEXSORB* can also show savings in other applications, and showed some work WorleyParsons had done to try and establish what the threshold was in terms of capacity at which at which *FLEXSORB* became the cheaper option compared to MDEA, and what the H_2S concentration threshold was at which acid gas enrichment became the better option. The conclusion was that acid gas enrichment was cost effective at up to 39% H_2S concentration, and, for smaller *FLEXSORB* units, possibly up to 45%, and Angie argued that designers of tail gas treating sections ought not to relegate *FLEXSORB* only to the most technically challenging applications but consider it any time acid gas enrichment and/or tail gas treating was being contemplated.

Panel discussion (L-R): Alexandra Duguay, Ad Punt, Peter Clark, Michael Gai.

Henk ter Maat of Procede Gas Treating BV described the *Vitrisol* system that Procede has developed in conjunction with Frames Biogas Processing for removing H_2S from CO_2-containing industrial gases. The system uses a metal sulphate solution to convert H_2S to an insoluble metal sulphide. The process has been used at a pilot/demonstrator plant to treat biogas with 0.2% H_2S, and the company is now looking for newer and larger scale applications, as well as working on a regeneration technology.

Claus plant operation

For Wedensday morning's session the topic was Claus plant operation. **Lorenzo Micucci** of Siirtec Nigi looked at the challenges facing designers of SRUs for sour gas projects. In particular, he said, the Claus unit have to be arrangement in order to have the maximum possible flexibility required to process a wide range of feedstocks and to allow the smooth and reliable operation of tail gas treatment process under the light of the potential integration with other units for the best economic operation of the gas field facility while protecting the environment.

Scott Willis of Dolphin Energy reported on two unplanned shutdowns of the SRUs at Dolphin in 2011 due to condenser tube failures. An analysis of the incidents found plugging in the tubes of the condersers, caused by improper flow distribution at the entry nozzles. The system has now been modified to eliminate steam vapour entry and incorporate early tube leak detection and operator alarms.

Changing regulations on SO_2 emissions have led to Shell to change the way its atmospheric sulphur degasser works. Previously degasser vent gases were fed to a flare stack, but the levels of SO_2 generated by this are becoming increasingly

Sulphur treatment at wellheads

In the wings of the conference, Calgary-based oil and gas field services company AMGAS announced a new tie-up with the Singapore-based Rutledge Group to license AMGAS technology and capabilities in the Middle East and North African (MENA) region.

Oil and gas producers in the Middle East experience the challenges of producing resources laden with hydrogen sulphide (H_2S), with increased risks to the safety of workers and corrosion of equipment adding to project operating costs. Product recovery and flaring during well operations have a significant impact on the environment and are difficult to manage when H_2S is present, and AMGAS has created innovative ways to safely handle and process H_2S. The company offers a wide range of services, including H_2S removal and control measures aimed at mitigating the dangers associated with processing sour oil and natural gas, and use of a chemical/mechanical recovery process using a proprietary solvent to treat volumes of sour oil and gas produced by wells during pre-production, recovering a saleable product and allowing easier storage, handling and disposal of sulphur-containing wastes.

AMGAS have been providing their proven technology to North American clients for 25 years, and have now partnered with Rutledge E&P Pte Ltd., who provide service for upstream drilling and exploration activities. Rutledge is based in Singapore and has operations throughout the Middle East. As well as providing H_2S safety service for upstream drilling and exploration activities the company also provides safety services for downstream refineries and petrochemical plants operation and construction.