Goar Allison and Air Products specialists will present two papers at SOGAT 2011 (Sour Oil & Gas Advanced Technology. Summaries of the two papers are shown below. Both technical papers will be posted on the web in their entirety after SOGAT 2011.

Paper No. 1

Hydrogen Supply and Sulfur Removal for the Modern, Environmentally Low-Impact, Refinery

Ian Brass, Air Products and Chemicals, Inc.
Elmo Nasato, Goar, Allison Limited
Uday Parekh, Goar, Allison & Associates, Inc.

The paper will review options available as the world attempts to juggle the seemingly conflicting demands of processing an increasingly heavier and sourer crude slate at the highest possible conversion, while achieving ever higher environmental performance. The demand for more, cleaner transportation fuels has resulted in a greater need for hydroprocessing, and therefore higher hydrogen requirements and increased SRU (sulfur recovery unit) capacity. The paper will holistically and quantitatively address these inextricably linked areas and demonstrate how refiners can respond to the challenges of transforming heavier and sourer crudes into lighter and cleaner refined products as cost effectively and with as low an environmental impact as possible.

High conversion refineries cannot meet their hydrogen needs from the byproduct hydrogen from the catalytic reformer. Additional hydrogen is needed from a dedicated “on-purpose” hydrogen plant. Drawing from Air Products’ experience as the world’s largest hydrogen supplier, technical details and the economics of hydrogen production via steam methane reforming and gasification will be provided along with the scenarios where each route has potential advantages. Further, by tapping into Goar, Allison & Associates’ sulfur expertise, the technical merits and economic benefits of oxygen-based SRUs versus air-based SRUs will be reviewed. The paper will cover specific data on the available substantial benefits in capital and operational cost savings, environmental performance, and operational flexibility of the oxygen-based SRU.

Finally, as the world faces potential financial impact from green house gas emissions regulations such as the European Union’s Emissions Trading Scheme (ETS), and with petroleum refineries representing a focus industry, the paper will compare various scenarios for hydrogen supply and SRU configurations in terms of their CO2 footprints. Crucially, the paper will demonstrate how the right choice for new projects and expansions, including incorporation of steam and power requirements as part of hydrogen production, can result in a significantly reduced CO2 footprint.

Paper No. 2

Technical Improvements to Sulfur Degassing System

Steve Fenderson, Goar, Allison & Associates, Inc.
Elmo Nasato, Goar, Allison Limited
Uday Parekh, Goar, Allison & Associates, Inc.

The paper will summarize un-degassed and degassed liquid sulfur handling considerations, highlighting the proper handling of H_2S released into the un-degassed sulfur collection pit, degassing technology options, considerations for pumping or transferring liquid sulfur, and available options for handling the released H_2S vapors in an environmentally beneficial manner. Of note, a processing scheme will be quantified to demonstrate the significant reductions in overall SO_2 emissions from the sulfur processing units when the removed H_2S stream can be successfully recycled to the SRU furnace.

Un-degassed liquid sulfur produced from a Claus sulfur recovery unit (SRU) typically contains 200 to 350 ppm_w H_2S. The dissolved gas is partly present in the form of polysulfides (H_2S_x). If liquid sulfur is not degassed H_2S will be released during storage, handling, loading, and transport. Un-degassed sulfur can create an explosive mixture of H_2S in air, and poses a toxicity hazard as well as a noxious odor problem when H_2S is released from the un-degassed liquid or solid sulfur.

To bring further relevance to the topic several mechanical design, instrumentation and controls' lessons learned from a particular technology will be shared to highlight best practice improvements. In particular, the paper will demonstrate how certain design principles and modifications were applied to the D'GAASS® technology from Goar, Allison & Associates over the past 15 years. The D'GAASS process has over 90 units and 60,000 LTPD of licensed capacity globally. D'GAASS installations have ranged in size from as small as 10 MTPD to as large as 2,600 MTPD. The readers will benefit from the extension of principles applied from the D'GAASS technology to their own liquid sulfur handling facilities.