T2 CATALYST TECHNOLOGY INC.

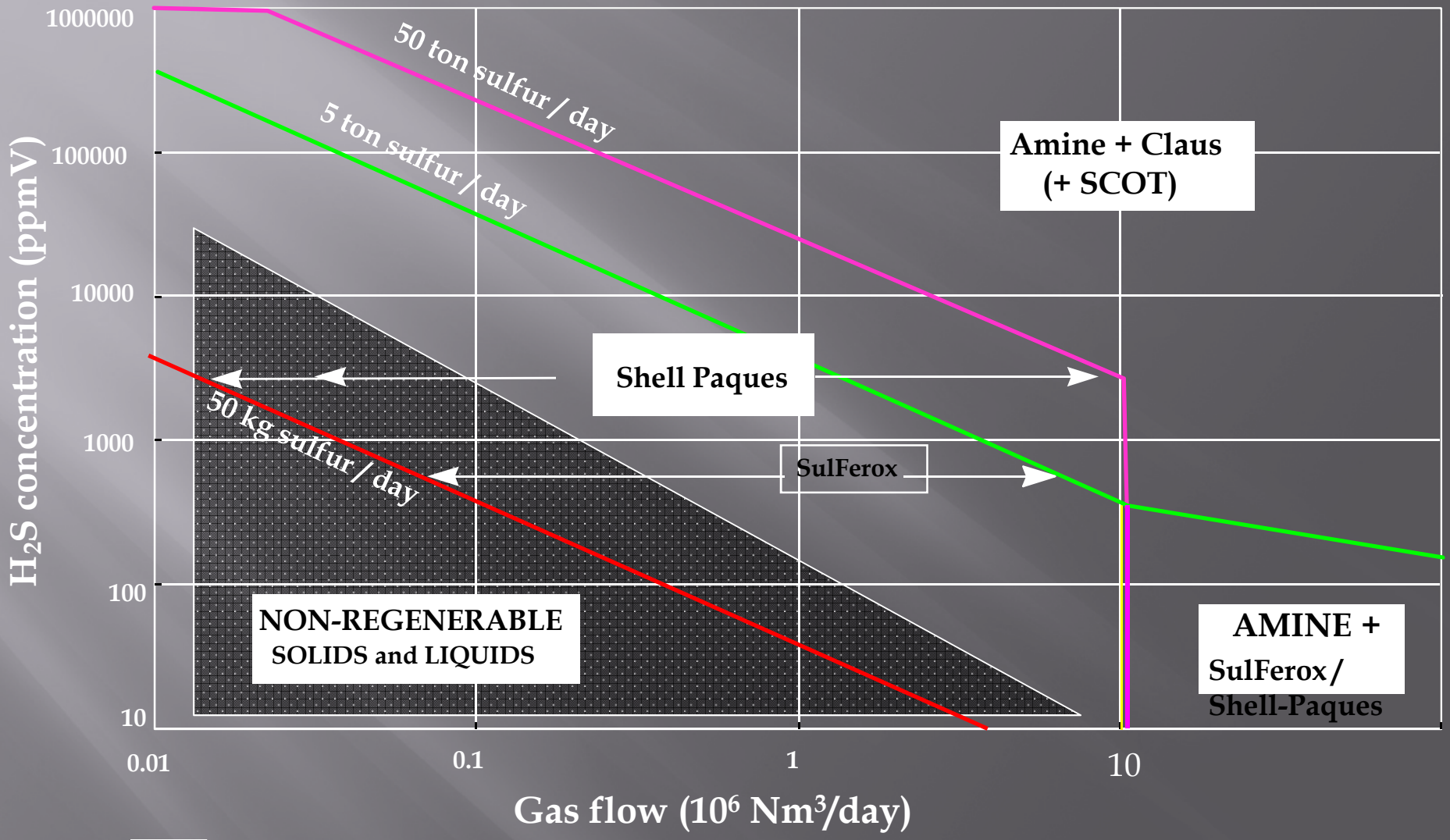
Gas Processors Association

November 10 , 2011

Agenda

- Background
- The Technology
- Market application
- Role out strategy
- Questions

Typical H_2S removal processes



Background

- Market demand for economic treating solutions for gas or liquid streams which contain low-level sulfur impurities
- Need is massive …it's claimed that well over 4 TCF / day of gas streams are purified using single use reactants
- 60 plus percent of the sour hydrocarbon reserves in the Western Canadian sedimentary basin have less than 20,000 ppm (2 %) sulfide concentrations

Background…2

- T2 foundation is a metal based complex containing cobalt, molybdenum and nickel in a hydrated form
- Source unique / patented
- Substrate Options - Current choice well studied
  - fluidized / boiling bed reactor option

The Technology – It's Not Iron Sponge

Absorption

$Fe_2O_3 \cdot H_2O + 3H_2S \rightarrow Fe_2S_3 \cdot H_2O + 3H_2O + 14.9$ kcal

Reduction

$Fe_2S_3 \cdot H_2O + 3/2O_2 \rightarrow Fe_2O_3 \cdot H_2O + 3S + 145$ kcal

If hydrated iron oxide is regarded as a catalyst i.e. when air (O_2) is added to the sour gas stream, the complete process can be expressed as:

$3H_2S + 3/2O_2 \rightarrow 3H_2O + 3S + 160$ kcal

Performance Overview

- Exceptional Sulfur loading densities 1.5 – 1.8 times wt. (6 times when blended with O_2).
- On or off line regeneration
- Single use or option of in situ Sulfur desorption
- Immediate on spec – no recycle requirements
- 99.999 % removal /conversion
- Pressure independent

Performance Overview …2

- Full spectrum Mercaptan capture
- Low Temperature < 40 deg C
- Linear
- $ 1.50 - $ 2.00 / lb H2s removed
- Sole source of the catalyst base material is unique and is comprehensively protected
- Gas or Liquid treating
- Highly efficient O2 scavenger

T2 MERCAPTAN INVESTIGATIONS CORE LABS

Mercaptans Investigations - Objectives

Tests conducted to test mercaptan scavenging using an isopropyl mercaptan sample.

Objectives:

- Qualitative determination of gas phase species generated from the reaction by GC SCD.
- Qualitative determination of chemical species bound to the bed after testing
- rate on breakthrough time and bed loading.
- Calculation of ultimate bed loadings by mass balance.
- With / without sub-stoichiometric O_2
- With / without pre humidification

T2 Mercaptans Evaluation

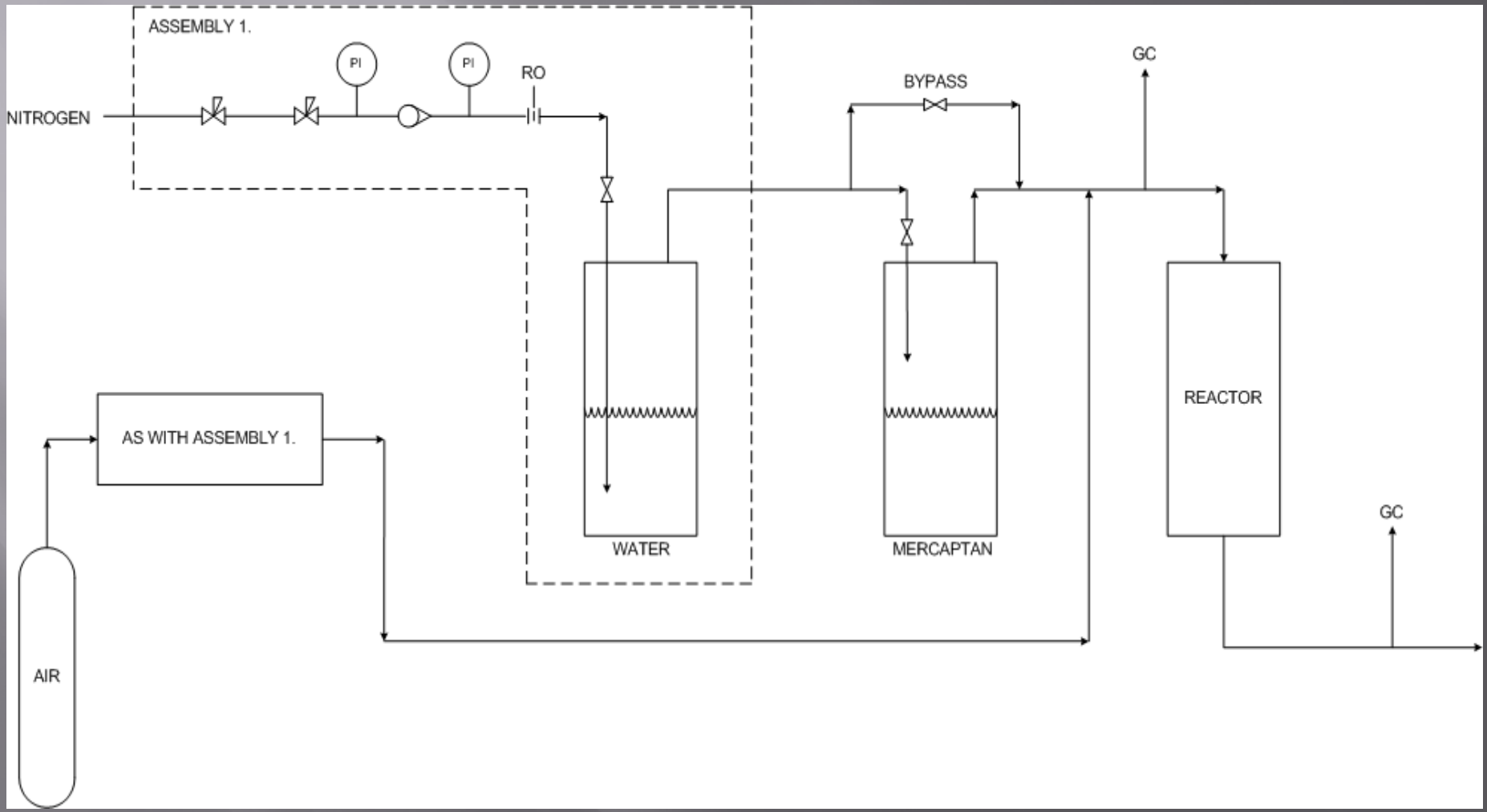
- Four runs have been conducted to date.
  - All runs conducted at atmospheric temperature and pressure.
  - All runs used 50g of pellets loaded in 2.5 cm x 44 cm reactors.
  - Inlet gas was humidified using a bubbler.
- Conditions specific to each run are found in the table below:

Test Conditions for Completed Runs.

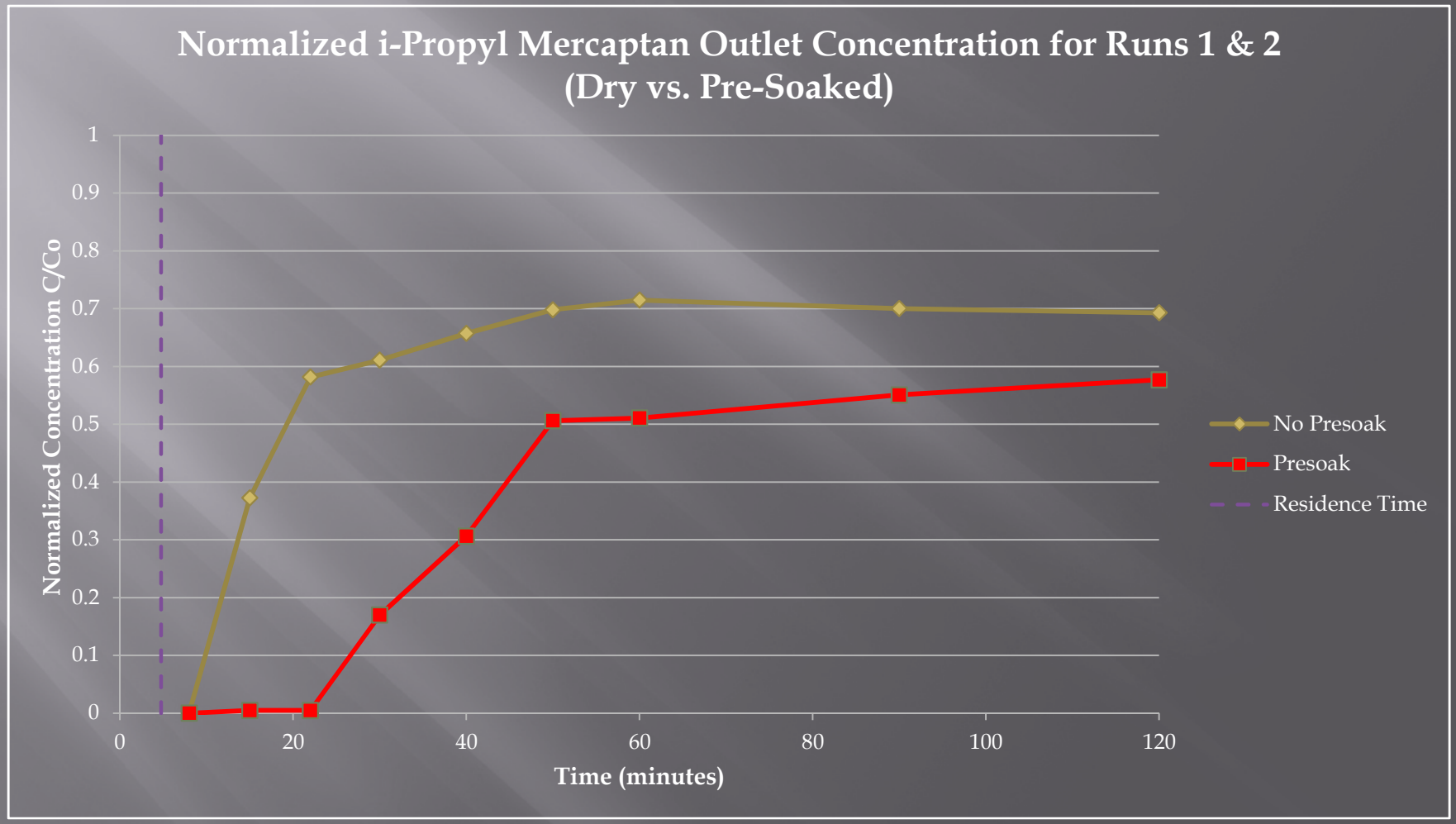
	Carrier Gas	Bed Presoak? (Y/N)	Flow Rate (cc/min)	Inlet iC3SH Concentration Co (ppm)*
Run 1	N_2	N	50	95250
Run 2	N_2	Y	50	127250
Run 3	N_2	Y	10	284800
Run 4	AIR	Y	10	214725

** Inlet concentration increased throughout the course of the test as RSH bubbler level decreased. Inlet RSH concentrations listed are an average.*

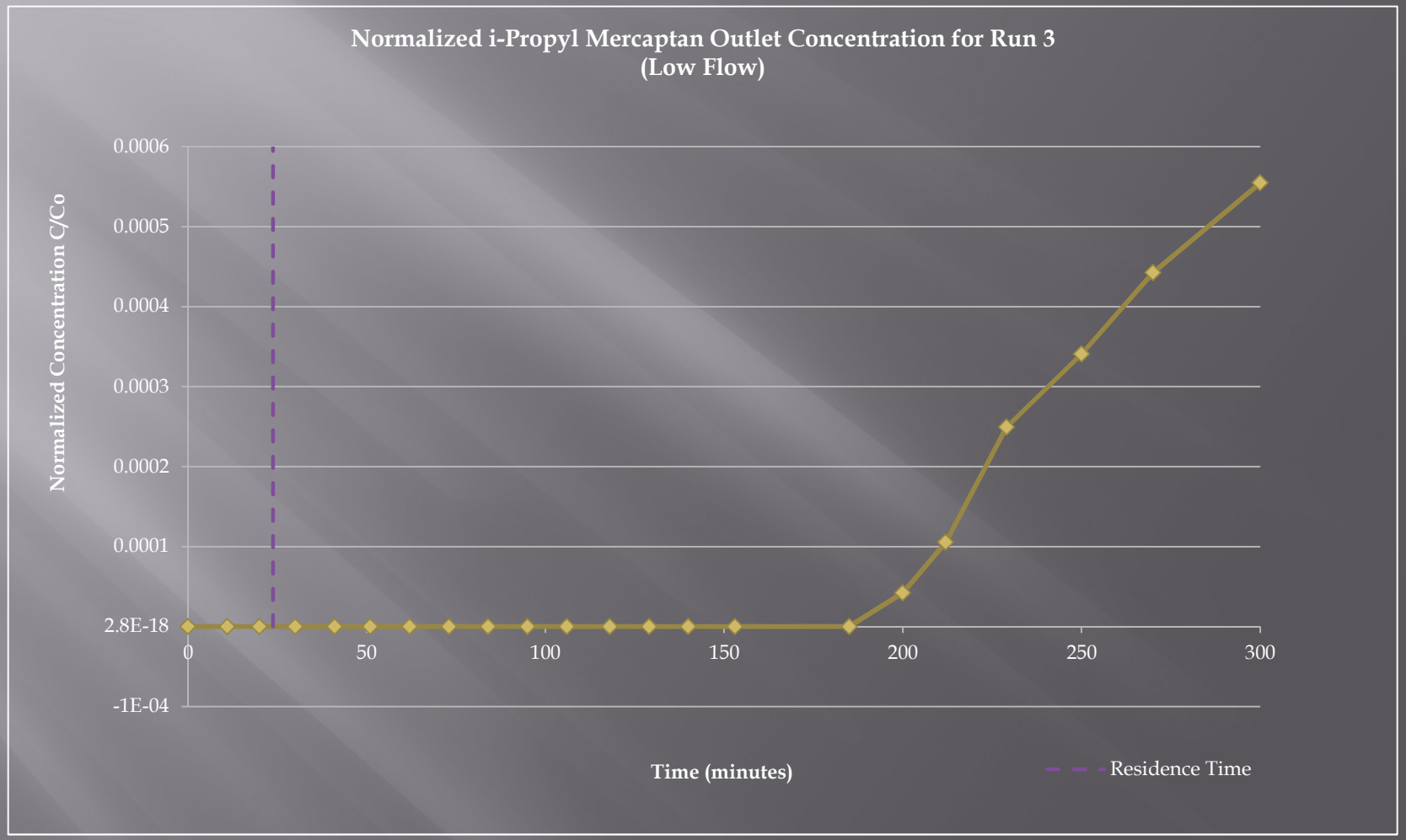
Current Tests – Laboratory Apparatus



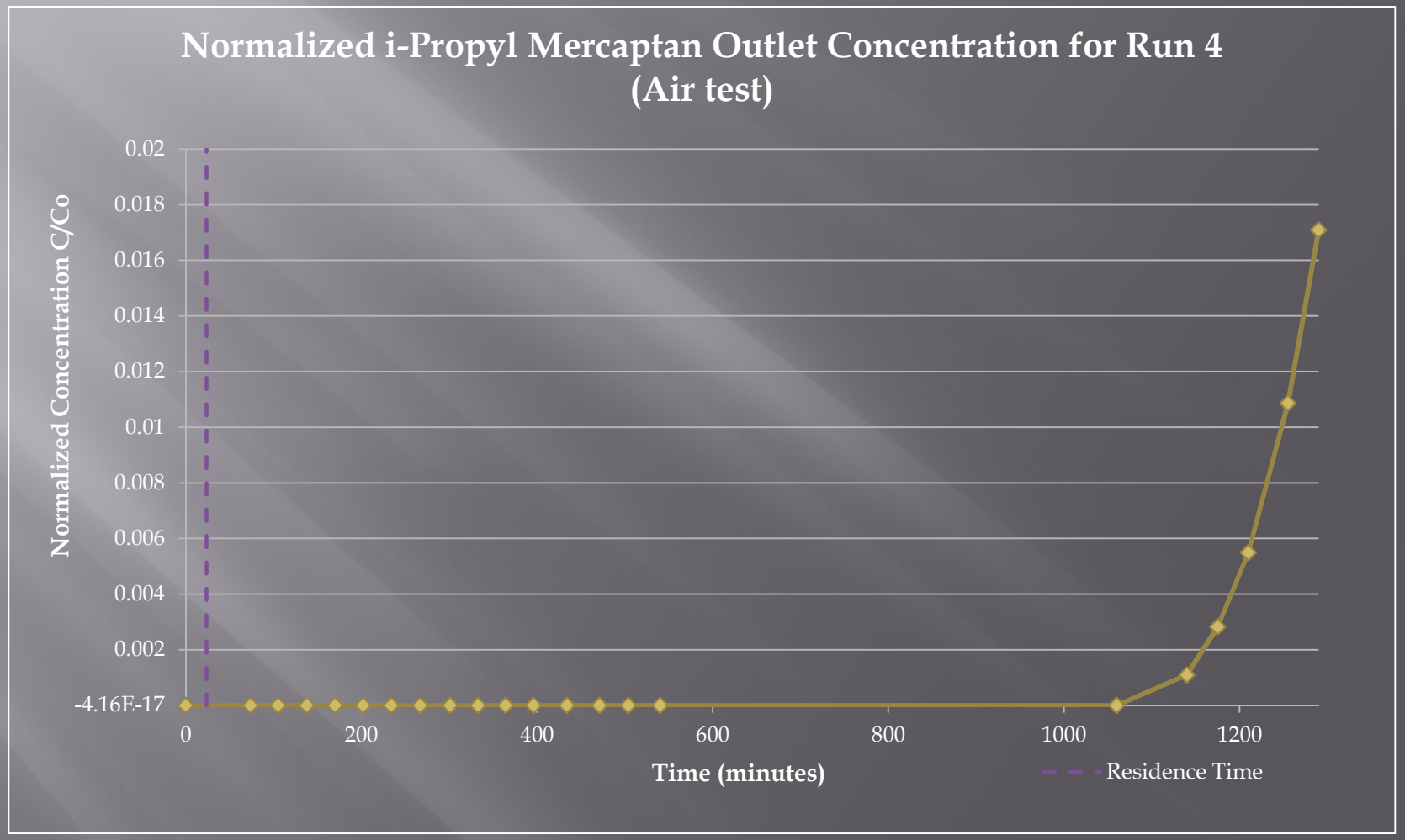
Current Tests – Bed Pre-Soak Effect



Current Tests – without O_2



Current Tests – Air (O_2) Flow



Current Tests – Mass Balance Results

Quantitative data is summarized below:

Breakthrough Times and Mass Balance Results.

	Test Duration (min)	Total Sulfur Scavenged (g S)	Total Bed Loading (g S/ g bed)	Breakthrough time (min)*	Sulfur Scavenged at Breakthrough (g S)	Test Bed Loading (g S/ g bed)
Run 1	120	0.25	0.0050	7.3	0.01	0.0002
Run 2	120	0.54	0.0108	8.2	0.03	0.0006
Run 3	300	1.07	0.0214	187	0.63	0.0126
Run 4	1290	3.58	0.0796	1175	3.26	0.0724

** Breakthrough time taken at 10ppm iC3RSH.*

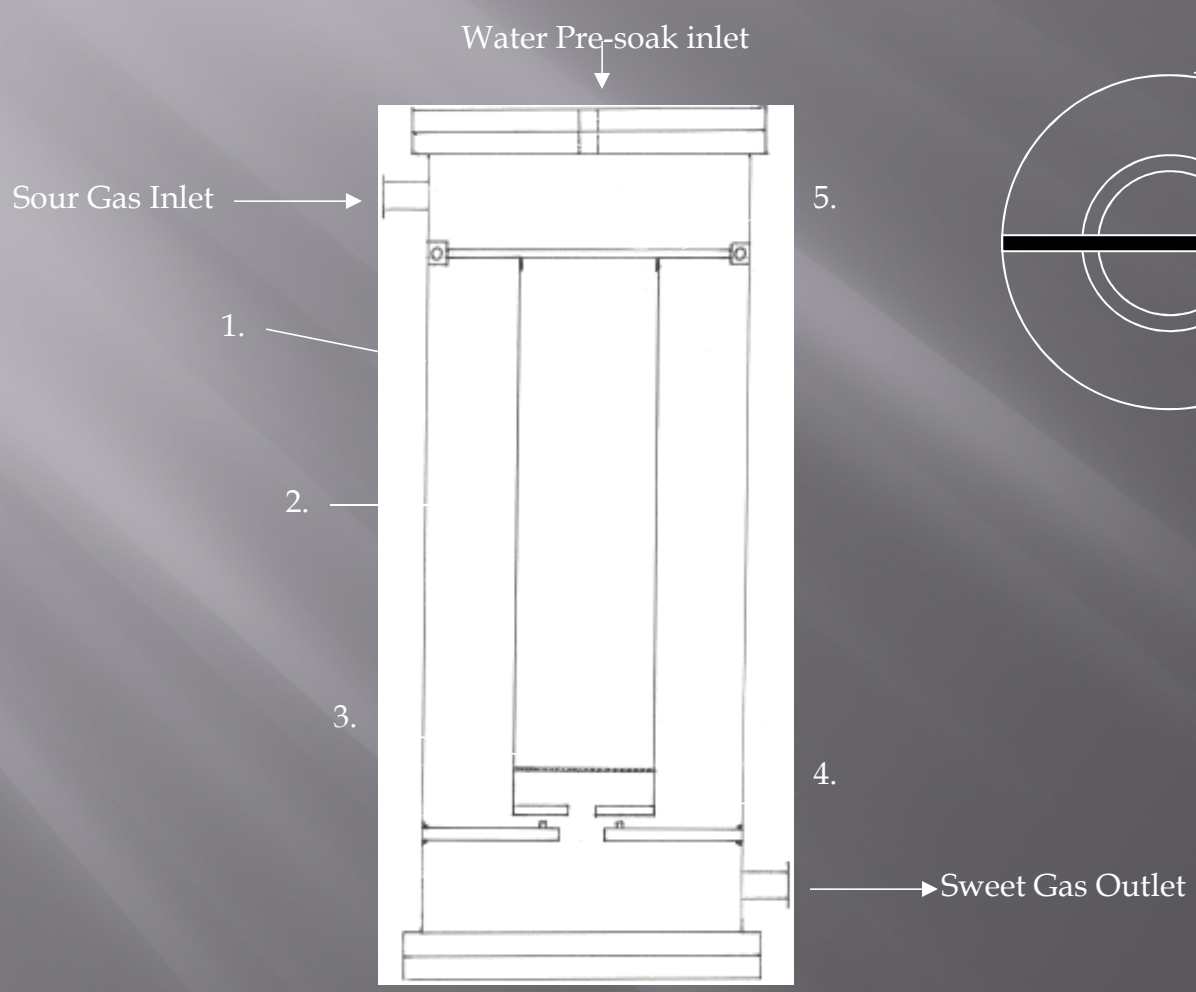
Ratio of inlet to outlet concentration vs. time for each run are found in the upcoming slides.

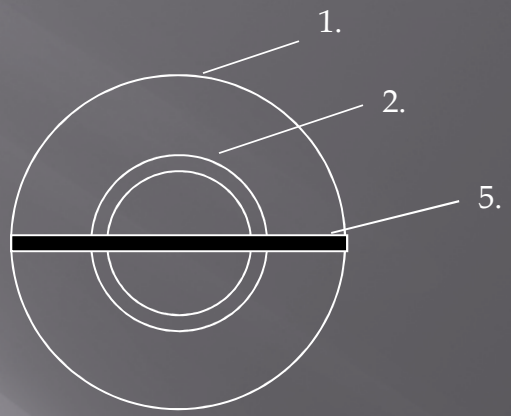
Mercaptan Conclusions

Results from preliminary testing are exceptional

- The catalyst has the ability to completely scavenge mercaptans at very high inlet concentrations.
- The catalyst showed no measurable start-up time (time to less than 10ppmv iC_3SH) at test conditions.
- Using stoichiometric air as a carrier instead of nitrogen increased the loading of the bed at breakthrough by a factor of SIX.
- GC SCD does not show evidence of generation of sulfides and disulfides, or other mercaptan species.

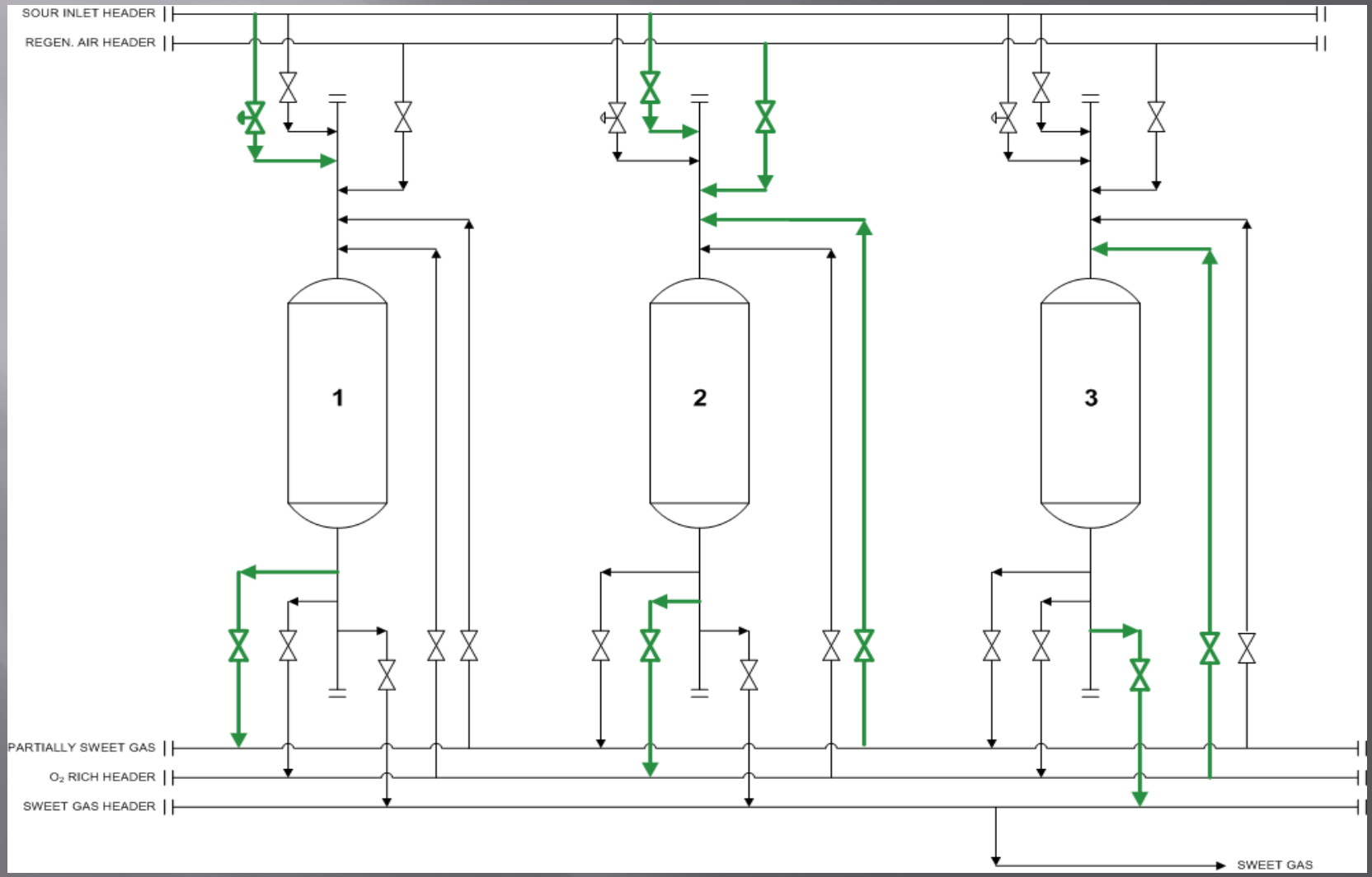
Equipment and Methodology
Preliminary Reactor Design



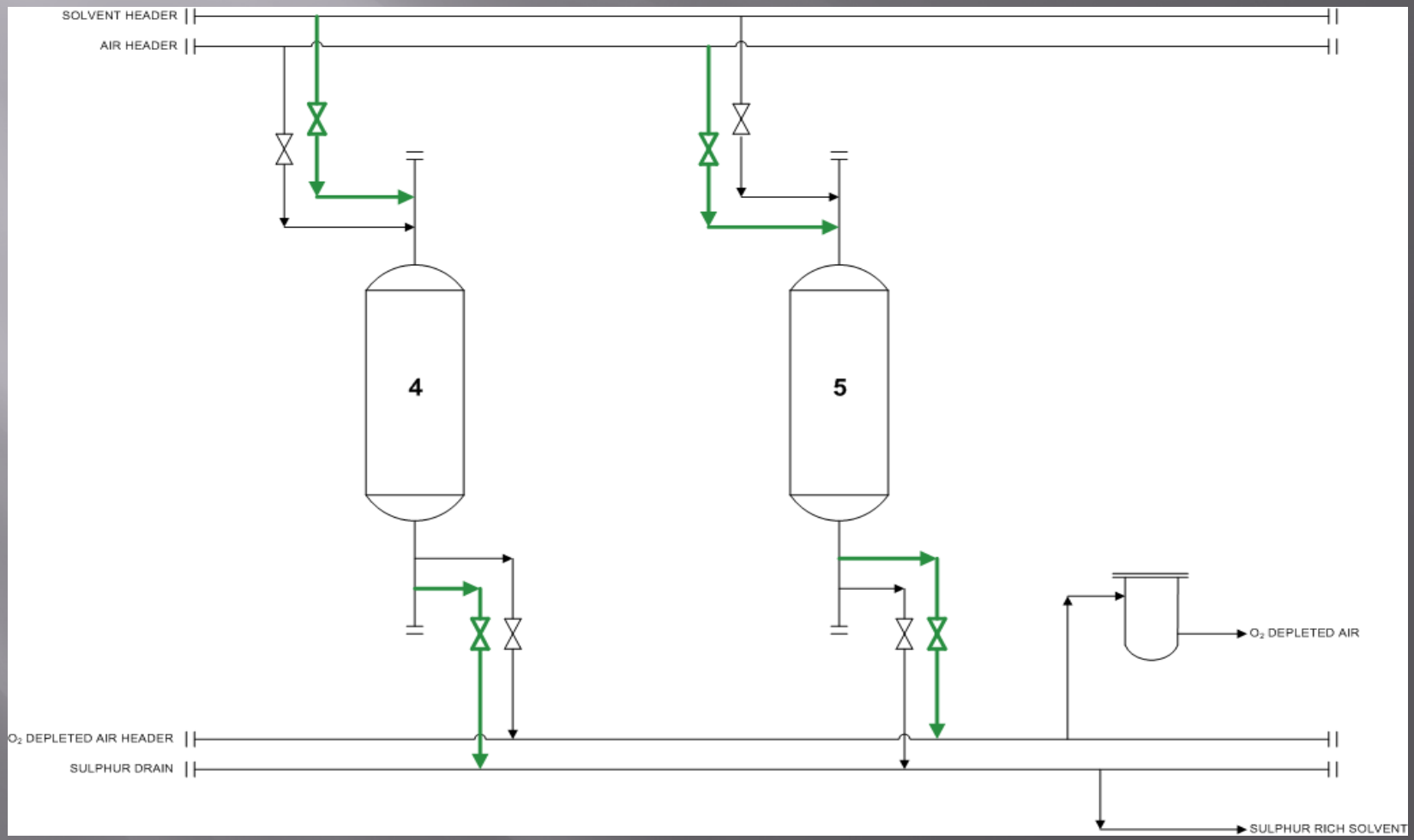


1. Reactor Pressure Vessel
2. Cartridge
3. Bed Support Screen
4. O-ring
5. Bar. Provides Downward Pressure for Seal

Commercial installation / without desorption



Commercial installation / with desorption



Applications

- Sour Natural Gas
- Solution Gasses
- Fuel Gas
- CO2 purification
- Sour Hydrocarbon liquids
- Refinery synthesis Gas
- Tank vents
- Up to 20,000 ppm S application range
- Pressure independent

Role Out Strategy / Universal Pilot

- Lab investigation is complete, next step is pilot at scale and publish the results
- We will first apply this pilot to an application at Glencoe Resources Joffre complex
- Glencoe has agreed to participate in publication of data, not as an endorsement but as a statement of the facts

Summary

- Performance characteristics are potentially “game changing “
- Technology will be commercially demonstrated in early 2012
- Glencoe Resources will be the first application
- We are seeking additional producers who have streams they would like to include in our design basis and subsequent field trials

T2 Catalyst Acknowledgement

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