

SulfaTreat

A Business Unit of M-I SWACO, A Schlumberger Company

H₂S Removal Through Fixed Bed Technologies

9th Biogas Conference

Hotel Gouverneur

Place Dupuis, Montreal

May 25, 2011

SulfaTreat is M-I SWACO

- M-I SWACO is the leading supplier of engineered fluid systems and drilling waste management solutions to the worldwide oil exploration & production industry
- M-I SWACO is owned by Schlumberger, Ltd. (France)

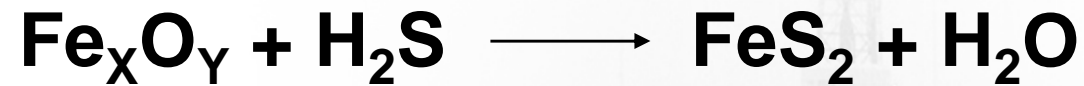


SulfaTreat Products

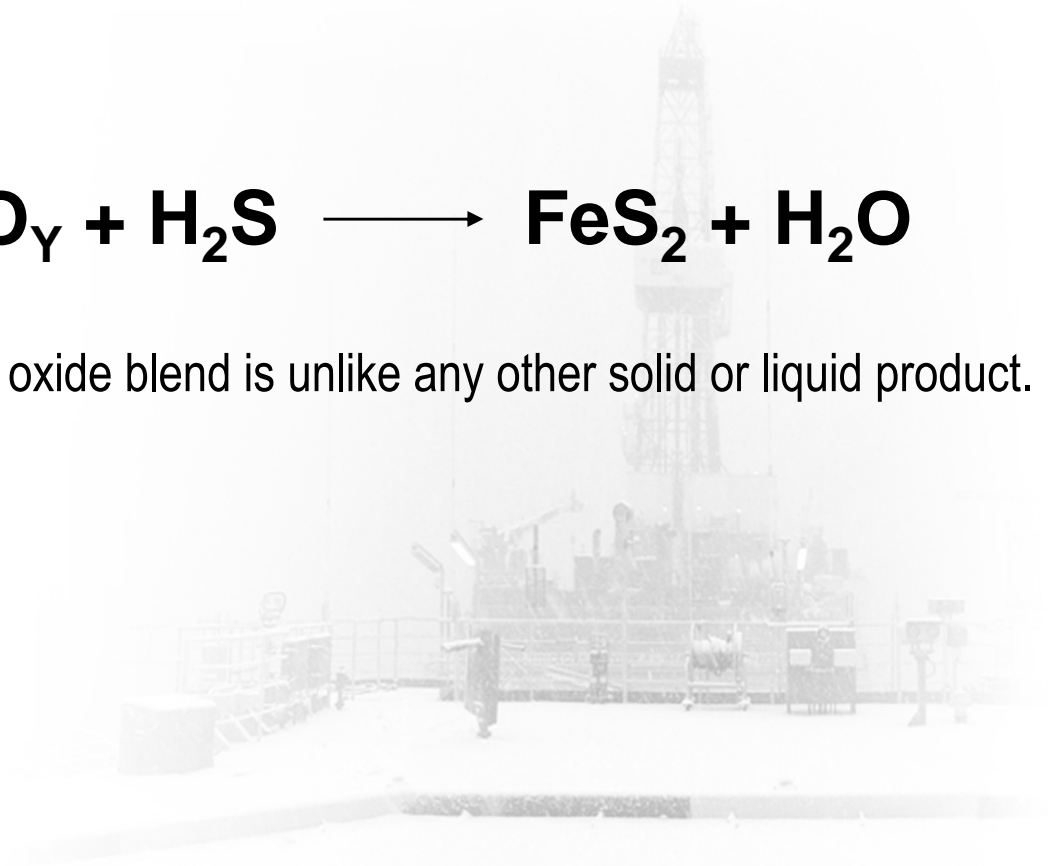
- **SulfaTreat**
 - The original SulfaTreat product, rated “the best H₂S scavenger” by the Gas Research Institute
- **SulfaTreat CHP**
 - For sweetening gas that is less than fully water saturated or for faster reaction speed with fully saturated gas
- **SulfaTreat 410 CHP**
 - For low pressure applications such as vent gas or odor control
- **SulfaTreat XLP**
 - Similar to the original SulfaTreat product but with up to 2.5x the bed life
- **Sulfatreat HC**
 - For sweetening hydrocarbon liquids such as liquefied propane gas , liquefied nitrogen gas, propane and diesel



SulfaTreat Iron Oxide Chemistry



Synthetic iron oxide blend is unlike any other solid or liquid product.

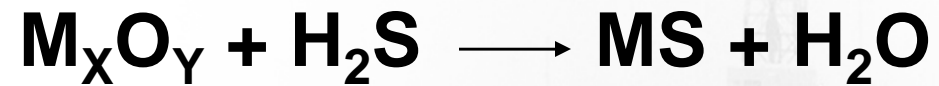


SulfaTreat Select Products

- **SulfaTreat Select HP**
 - Mixed metal oxide for the low temperature. Desulphurization of gas streams. Treatment temperature range 50-140 deg F
- **SulfaTreat Select Ultra**
 - High activity / broader temperature range. Mixed metal oxide for the ultra purification of gas and liquid streams. Temperature range: 50-400 deg F
- **SulfaTreat Select HC**
 - Mixed metal oxide for low temperature desulphurization of light liquid hydrocarbons. Treatment temperature range 50-140 deg F
- **SulfaTreat Select Premium**
 - Same Chemistry as Ultra with 2x the capacity



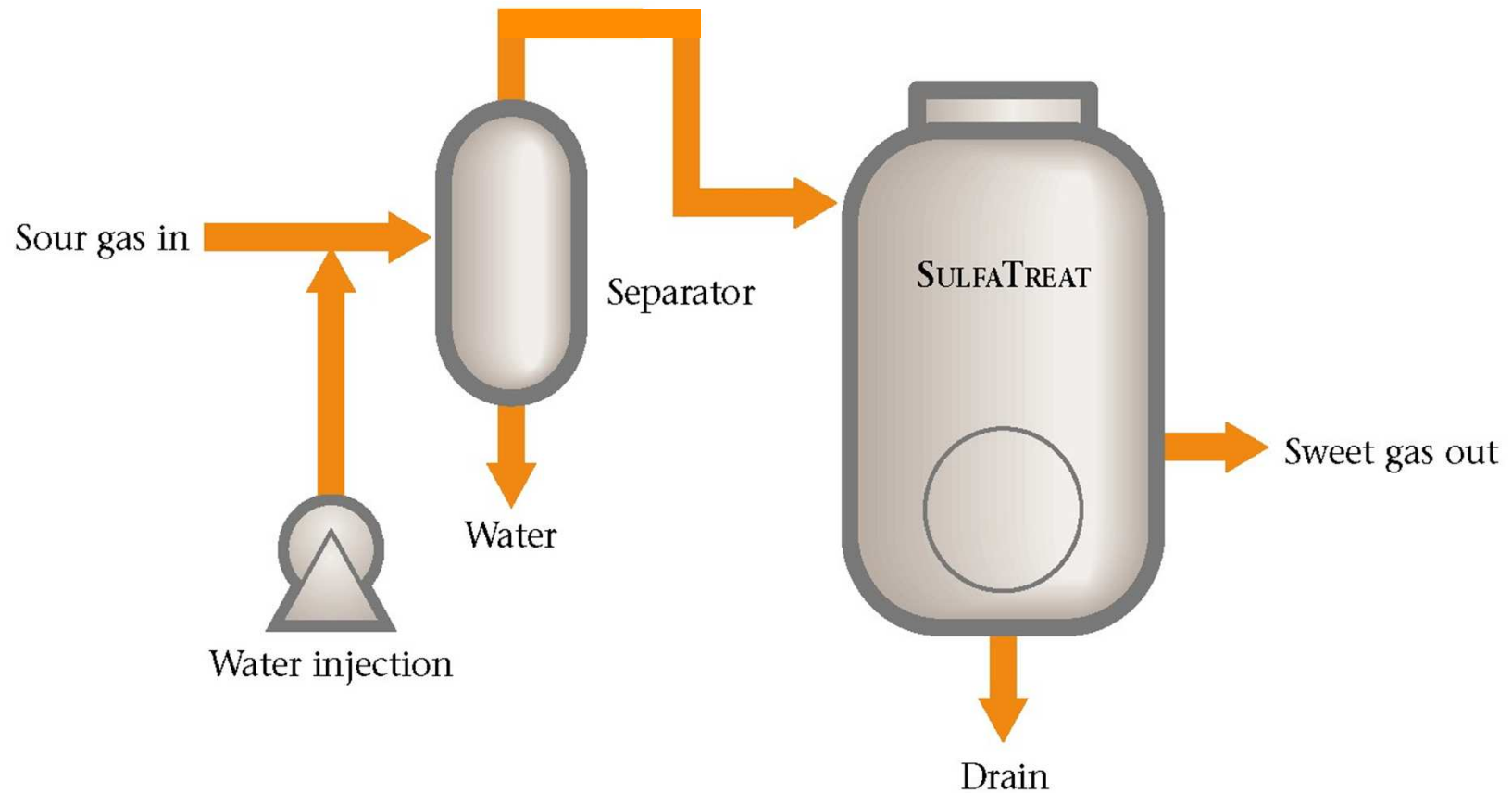
SulfaTreat Select Chemistry



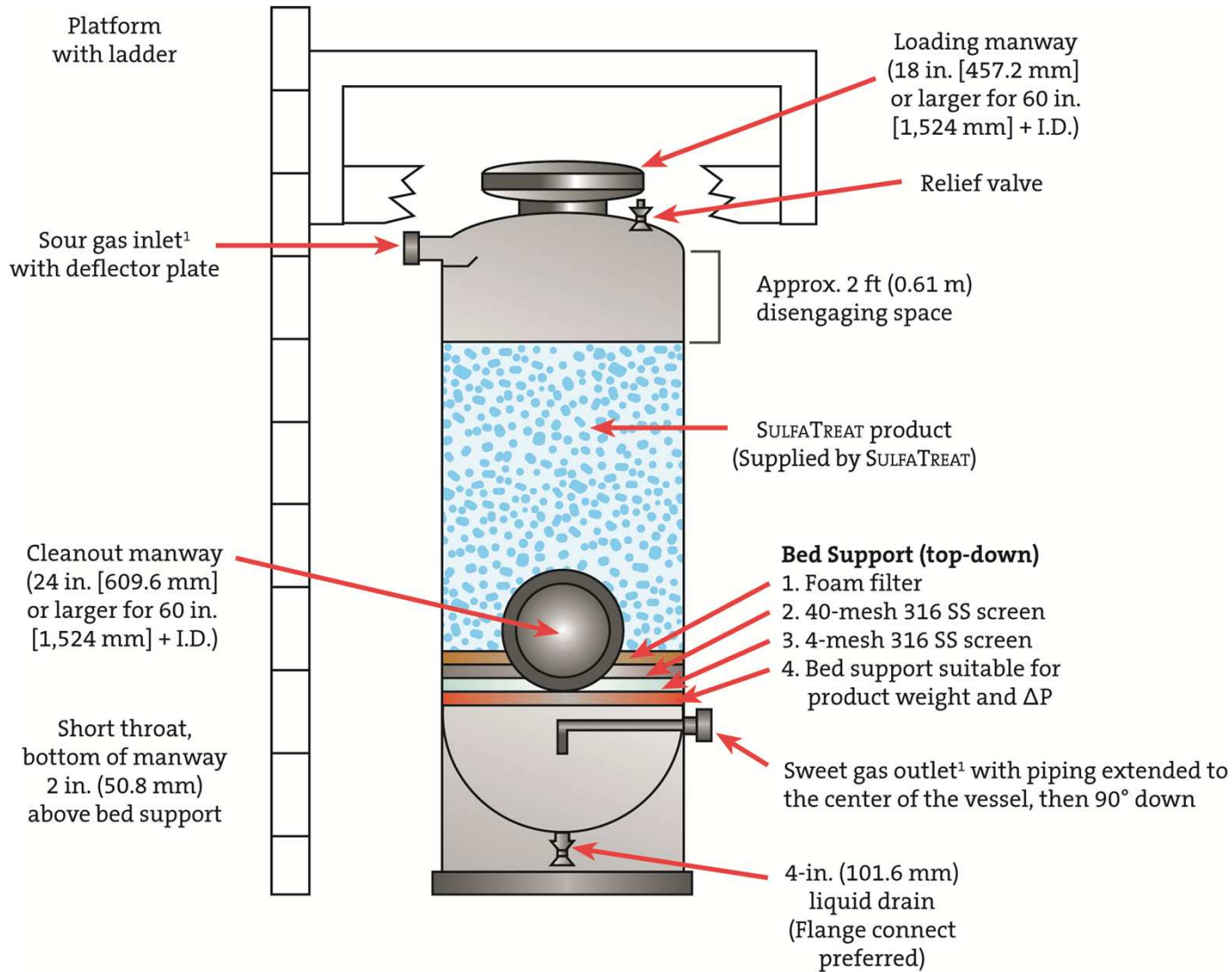
Metal oxide blend reacts with hydrogen sulfide to produce metal sulfides and water.

The SulfaTreat Process

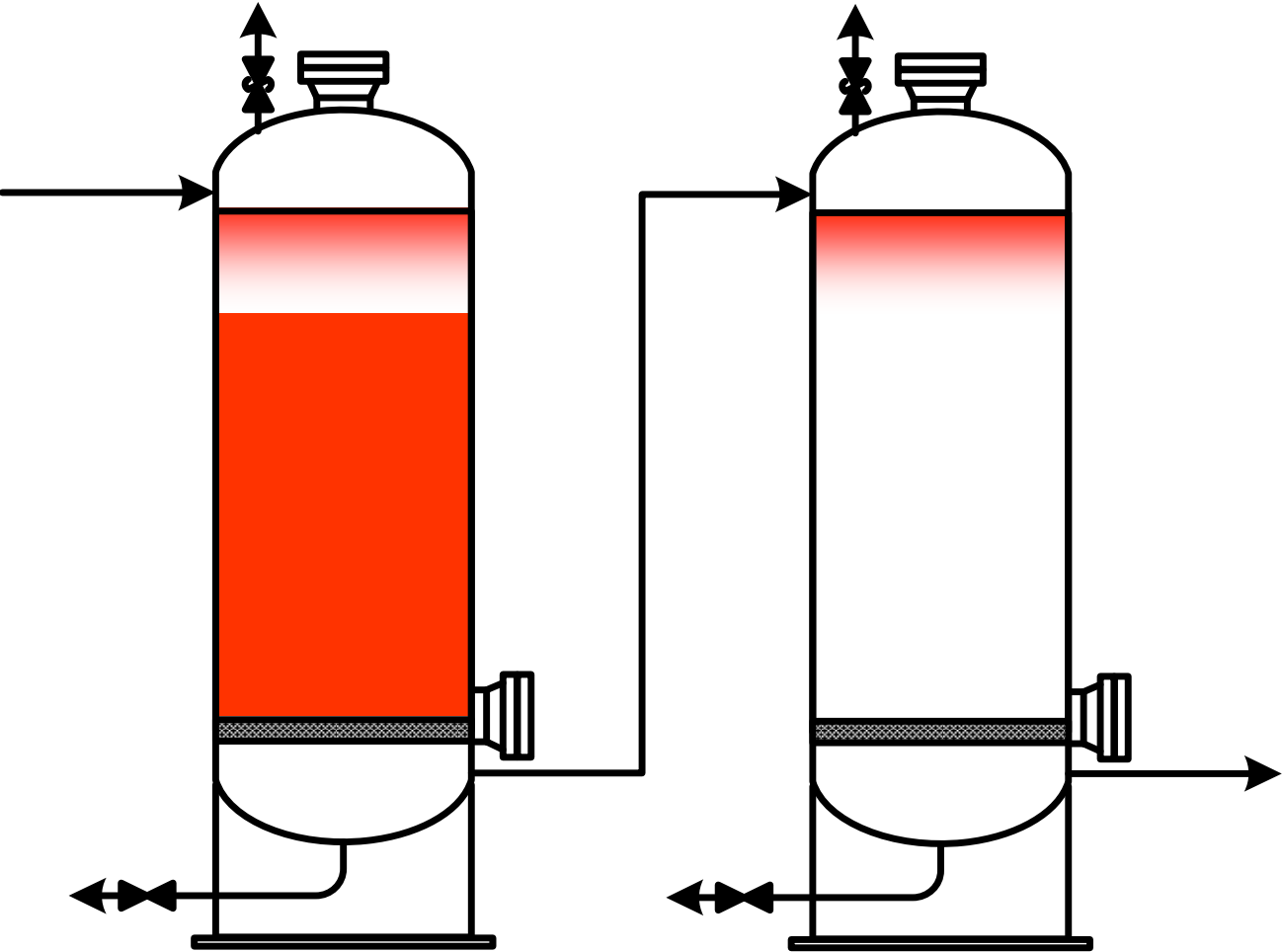
Simple and Passive



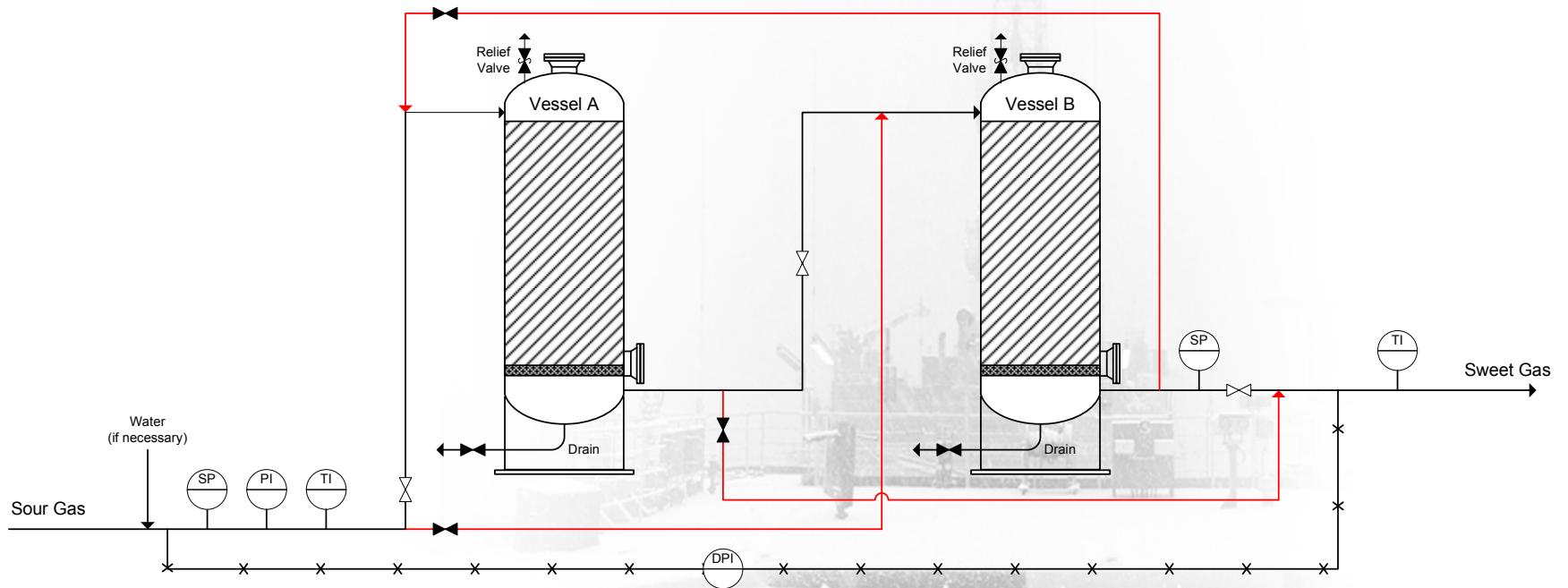
The SulfaTreat Process – Vessel



Wave-front (MTZ)



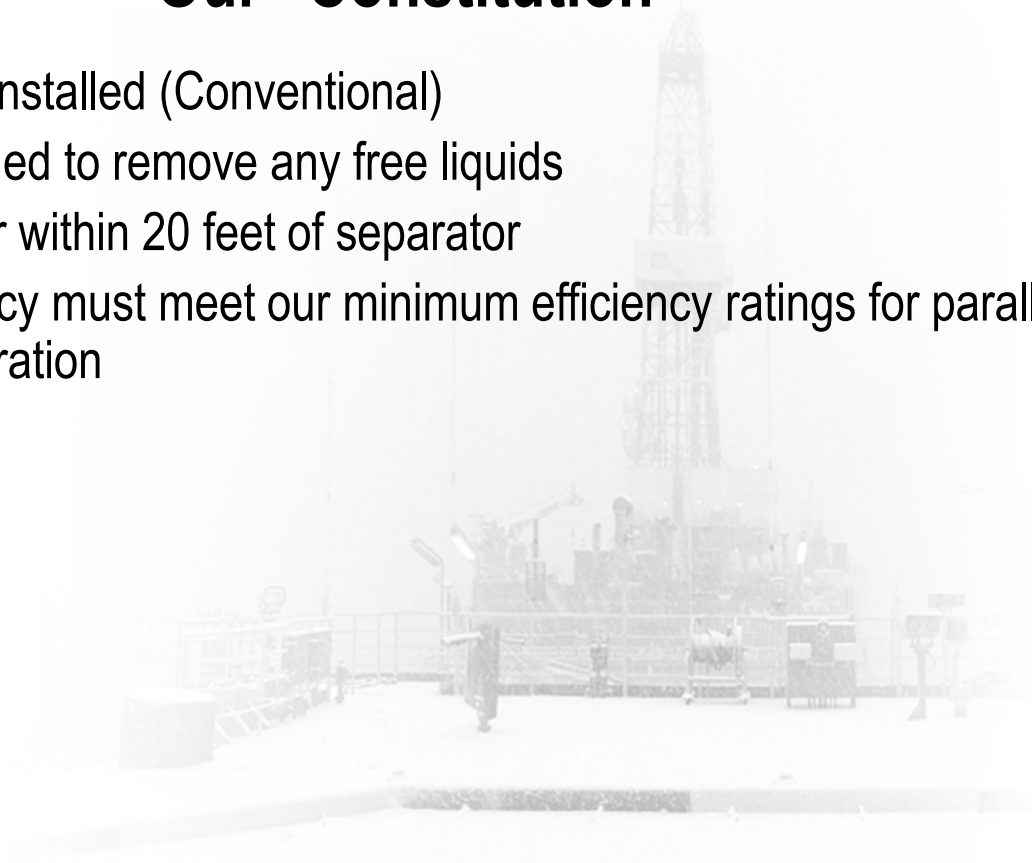
The SulfaTreat Process – Lead/Lag Design



The SulfaTreat Process – SulfaTreat Quality Assurance

Our “Constitution”

- Water injection installed (Conventional)
- Separator installed to remove any free liquids
- SulfaTreat tower within 20 feet of separator
- Process efficiency must meet our minimum efficiency ratings for parallel and lead/lag configuration



Economic Advantage – Engineering Consulting



A Division of M-I L.L.C. 17998 Chesterfield Airport Road - Suite 215 - Chesterfield - Missouri - 63005 - USA
 Tel : 636.532.2189 - Toll Free: 800.726.7687 - Fax: 636.532.2764 - info@sulfatreat.com

SULFATREAT ESTIMATED PERFORMANCE SHEET

DATE: 9/12/2002
REPRESENTATIVE: Joe Sales
COMPANY: Oil CO. USA
LEASE NAME: Anywhere
LOCATION: Texas
ATTENTION: Gas Engineer
TELEPHONE: 555-5555 (FAX:555-5556)

NOTES:

REACTOR DIMENSIONS	
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Number of Vessels	1
System Design	Parallel
Inside Diameter(inches)	60.0
Bed Height (feet)	17.5
SulfaTreat Loading (lbs)	24,000
Minimum S/S Height (feet)	19.47

OPERATING CONDITIONS	
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Gas Flow Rate (MMscf/d)	2.500
Gas Pressure (psig)	500.0
Inlet H ₂ S (ppmv)	500.0
Maximum Outlet H ₂ S(ppmv)	4.0
Gas Temperature (°F)	90
Water (lbs/MMscf)	Saturated*
CO ₂ (Mole %)	
O ₂ (Mole %)	

PREDICTED RESULTS			
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Gas Velocity (ft/min)	2.5	H ₂ S Removed (lbs)	2,297.9
Total Pressure Drop (psi)	1.22	H ₂ S Removed (lbs/day)	109.4
Days to Maximum Outlet H ₂ S	21	Product Cost/Vessel (USD)***	\$7,440
Gas Volume Produced (MMscf)	51.286	Cost/MCF (USD)	\$0.1451

*** \$0.31/lb FOB St. Louis

* Water saturated gas is required for optimum results. (Water injection may be necessary)

Economic Advantage - Product and Warranty

- Predictable and consistent product performance
 - Consumption of media versus mass of H₂S is consistent
 - Breakthrough of H₂S, slow and manageable
- Self regulating
 - Product will only react with H₂S
 - No shut down or start up procedures
- Product Warranty
 - Based on parameters from EPS
 - “short runs” will receive product credit

Safety Advantage – HSE

- Experienced field technicians are available to be “on site” for first time vessel fills, startups and first change outs
- Simple, unmanned operation
- Environmentally Friendly
 - Conventional is non-hazardous in both fresh and spent forms
 - Select products can be recycled

Questions

