

Gulf Coast Consulting

Presents

The Gas Recovery System "The GRS" Presentation



Gulf Coast Consulting
Strategy & Technology Consulting
Houston, TX

Is this Your
Flare?



GRS
2010

Introduction

- The GRS Evolution
- New Model
- Today's Industry
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THE GRS

Or... is this Your
Flare?



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THE GRS

Need to reduce HRVOCs to sub-PPB or low-PPM levels during purging, cleaning, or abatement operations?



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THE GRS

Reduce Flaring Chapter 115 HRVOCs with an Emerging Technology



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THE GRS

YOUR FLARE'S NEW GREEN TECHNOLOGY PARTNER



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INTRODUCTION

Introducing the world's smallest patented gas recovery system. The GRS development began in 1997 with support from I.M. Skaugen and SINTEF. The abatement unit, is compact designed, skid mounted, transportable, and mobile for onsite applications. The GRS Unit is a flare-less gas recovery system for recovering products from gas carriers, tank barges and bulk storage spheres. Currently, GCC is developing strategies for Rail and Pipeline Maintenance markets.

The Gas Recovery System

Your Flare's New **Green** Technology Partner

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The GRS Development Partners

The GRS technology was developed in cooperation with:

NGC - Norwegian Gas Carriers

SOI - Statoil International Oil & Gas Company

SINTEF - The Foundation for Scientific & Industrial Research at the Norwegian Institute of Technology.

DNV - Det Norske Veritas

IMO - International Maritime Organization-Green Ship Program

AGA - The American Gas Association

Multimaskin AS - Production Engineering for Ship, Offshore and Process Industries

SND - The Norwegian Industrial and Regional Development Fund & Northern Norway Secretariat



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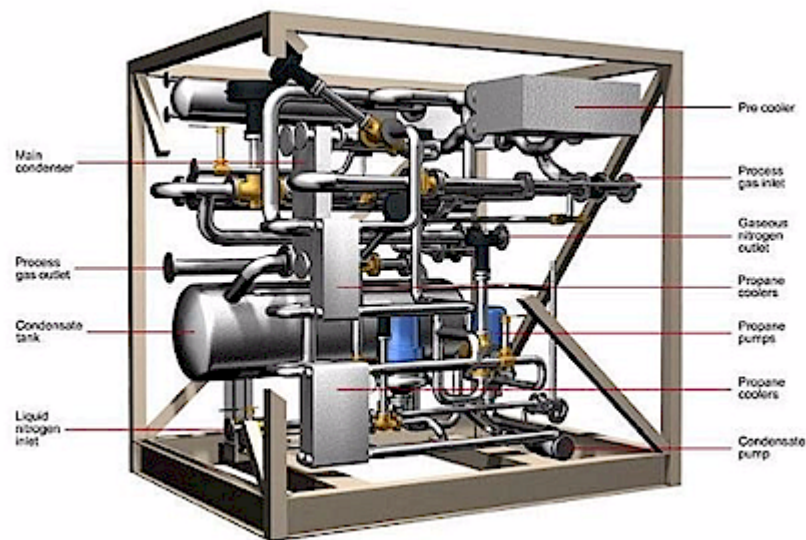
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TECHNOLOGY

The GRS is a new **green** and emerging technology that is poised to support several industries by reducing the time required to purge, clean, recover, and now reclaim materials from gas carriers, barges, rail tank cars, and bulk storage spheres, while combining related activities to streamlining the abatement, recovery, and reclamation process including the reduction of flaring, annual emissions, and associated costs, while meeting stringent environmental mandates and public health associated risks.

THE PAST



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THE GRS

THE PRESENT

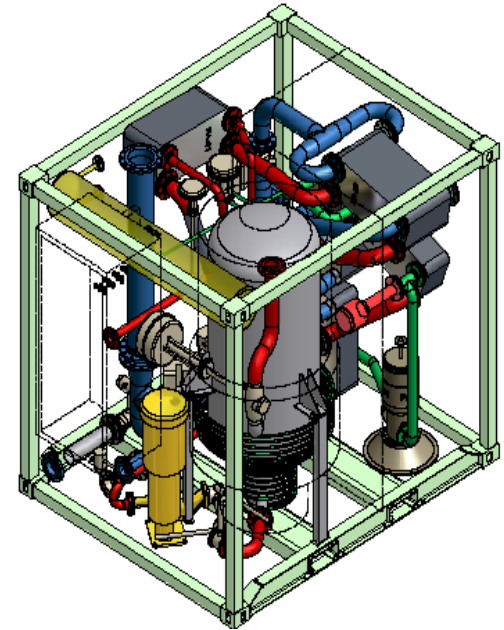


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THE GRS

THE FUTURE

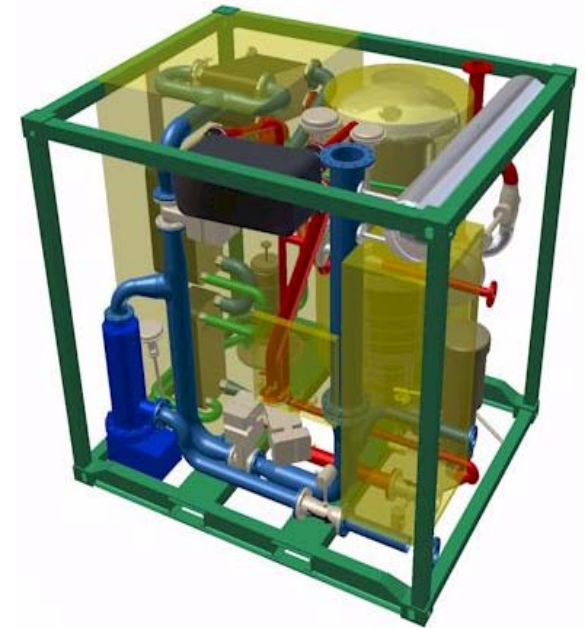


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THE GRS

AND THE FUTURE IS NOW



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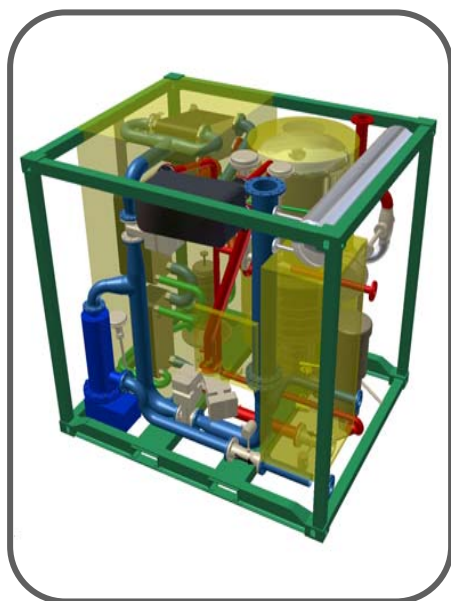
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THE GRS

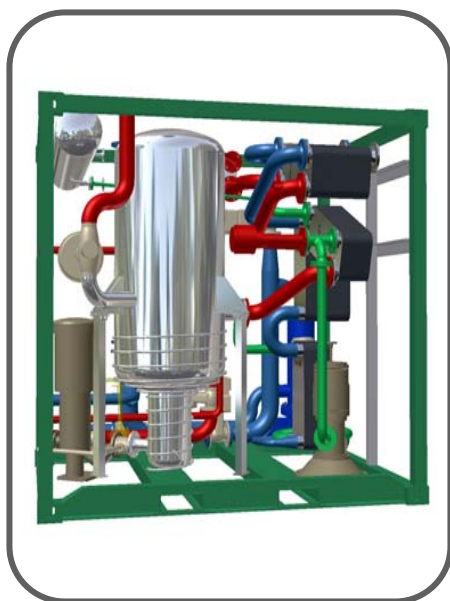
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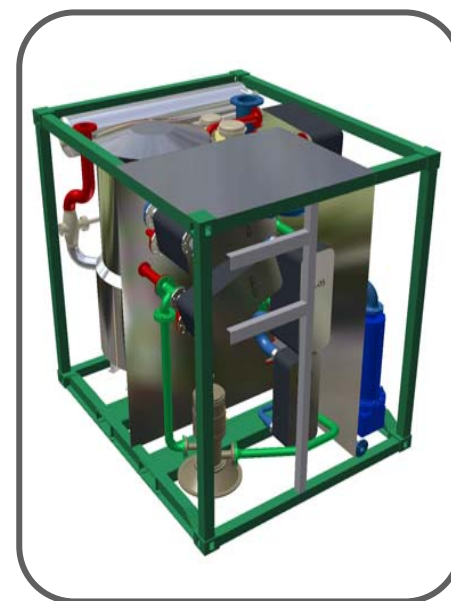
VIEWPORT: FRONT



VIEWPORT: BACK



VIEWPORT: LEFT



VIEWPORT: RIGHT



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NEW MODEL

Introducing: The Newly Re-designed Patented Cryogenic, Flareless, Skid Mounted and now Double-Capacity, with continued Low-Level HRVOC Emissions Gas Recovery System

NOW DOUBLE CAPACITY

Recovery Capacity:

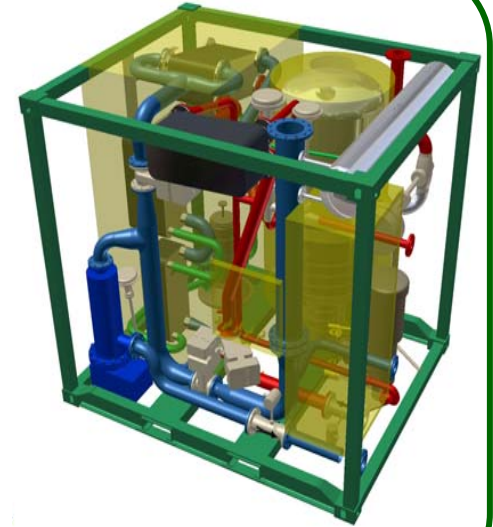
- 4-6 Metric Ton per Hour

Vapor Flow approx:

- 4000 Nm³ per hour

Emission Levels:

- HRVOCs can be reduced to sub-PPB and low PPM levels during a purging operation.



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NEW MODEL

The New GRS Model handles double the capacity of the recent model. The GRS purges, cleans, recovers and reclaims the remaining liquid heels and gases in pressure vessels and containment structures with proven efficiency. Product recovery and reclamation has been achieved as high as 99.99% with product separation results of on-grade specifications, allowable for reuse, resale or return to customer or manufacturer.

TODAY'S INDUSTRY

TCEQ - Chapter 115 Control of **H**ighly **R**eactive **V**olatile **O**rganic **C**ompounds

- Texas Commission on Environmental Quality (TCEQ)



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TODAY'S INDUSTRY

HRVOC Rule

To achieve federally mandated Ozone attainment compliance, the Texas Commission on Environmental Quality (TCEQ) is requiring the reduction of HRVOC emissions from Flares. These new regulations call for the on-line measurement of specific HRVOC and Total HRVOCs.

TODAY'S INDUSTRY

HRVOC Rule Timeline

TCEQ - Chapter 115

Control of **H**ighly **R**eactive **V**olatile **O**rganic **C**ompounds

- *Texas Commission on Environmental Quality (TCEQ)*



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TODAY'S INDUSTRY

As part of the regional Ozone reduction efforts described in Chapter 115, Highly Reactive VOC (HR-VOC) emission from process Flares and Cooling Towers are to be reduced. A number of compounds such as Ethylene, Propylene, 1,3 Butadiene and Butenes are targeted and have to be measured. By measuring these components as well as flows, temperatures and pressures, TCEQ believes emissions can be quantified and eventually reduced. **But why wait when the GRS can help NOW.**

TODAY'S INDUSTRY

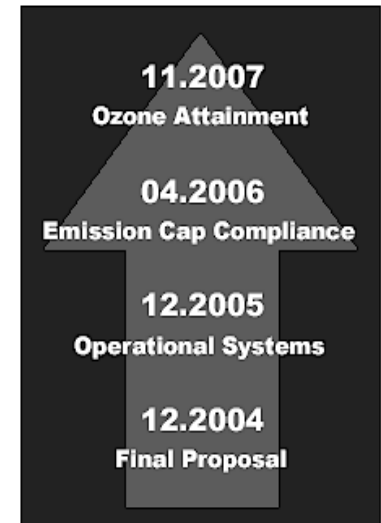
HRVOC Rule Timeline

TCEQ - Chapter 115

Control of **H**ighly **R**eactive **V**olatile **O**rganic **C**ompounds

- Texas Commission on Environmental Quality (TCEQ)

Timeline



TODAY'S INDUSTRY

HRVOC Rule Timeline

When does this take effect?

The ruling by the TCEQ specifies that the sites must start reporting HRVOC emission by the end of 2005 and be in emission site-cap compliance by April 2006.



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TODAY'S INDUSTRY

HRVOC Rule Solution

The GRS has become a new topic of discussion for TCEQ & the (EVT) Emerging Technologies Verification Program.

- Acro Technologies, Inc., Austin, TX.



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TODAY'S INDUSTRY

The GRS is a process technology that challenges the requirement for HRVOC applications, including abatement, reclamation, and emissions reductions. The GRS provides the only proven gas recovery solution throughout the world's industrial markets.

- Acro Technologies, Inc., Austin, TX.

THE GRS MARKETS

The GRS can be used for VOC recovery for:

- Port Terminals
- Onboard Large Gas Carriers
- Petrochemical Facilities
- Offshore Installations
- Rail Tank Car Terminals
- Transloading Terminals

The GRS is looking to keep good company

Rail

Union Tank Car Corporation
GATX Corporation
Rail Serve Inc
RESCAR Corporation
Progressive Rail Services Inc

Chemical Manufacturers

Valero Corporation
Lyondell Chemical
Celanese Corporation
PEMEX PMI

Marine Transport

Kirby Inland Marine LP

Ports

Port of Houston
Port of Corpus Christi & PIC

Transporting/Transloading

TRANSFLO Terminal Services

Service Providers

Halliburton Corporation
Approved Oil Services
GAINCO, Inc.



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APPLICATIONS

The GRS has created a buzz among industries and companies realizing the paradigm shift and environmental mandates to reduce emissions. Industries are under increasing pressure to control the emissions of HRVOC generated during their operations. The present-day BACT Best Available Control Technologies, natural gas flares and regenerative thermal oxidizers are energy and cost-intensive with costly dependencies on natural gas supply.

THE GRS RECOVERY & RECLAMATION PRODUCTS

- Ethylene
- Ethane
- Propylene
- Propane
- Butadiene
- Butane
- NH3
- Halons
- Vinyl Chloride Monomer
- Chlorofluorocarbons
- Isoprenmonimer
- Freon P11, P12, P114
- Isobutane - **recent**



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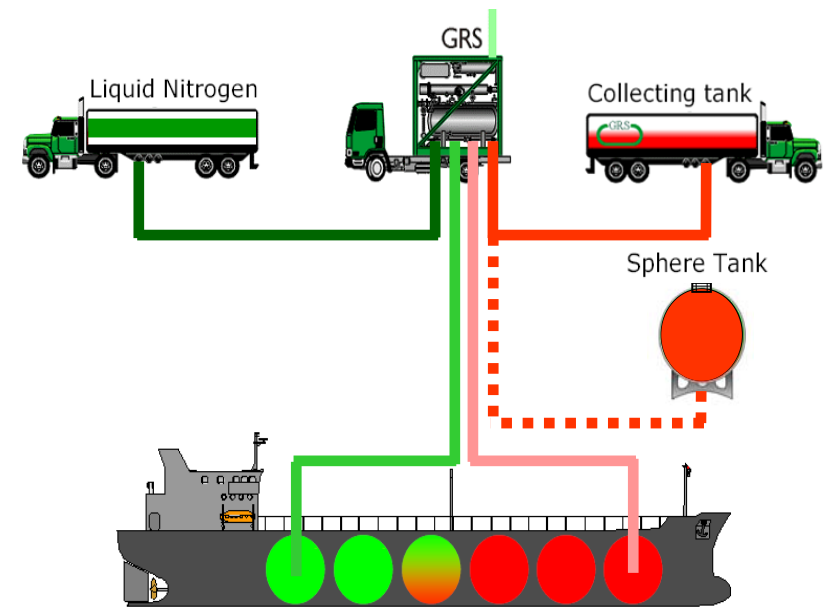
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APPLICATIONS

Most GRS application products are flared or incinerated even though they are valuable chemical feedstock. The cost of product loss and flaring operation's overhead is the lack of a complete recovery solution in today's markets. **Not any more...**

Shipping Industry Gas Carriers

- Purge
- Clean
- Recover
- Reclaim
- Return



GAS CARRIERS

The GRS conception was an idea envisioned by a ship captain, from his need to purge and clean large gas pressure marine carriers for companies such as Norgas Carriers and I.M Skaugen Marine Transportation of Norway. In 1994 the GRS inventor began designing and engineering a cryogenic process to efficiently purge and clean with added design features to recover and reclaim the remaining liquid heels and gases from these transport vehicles.

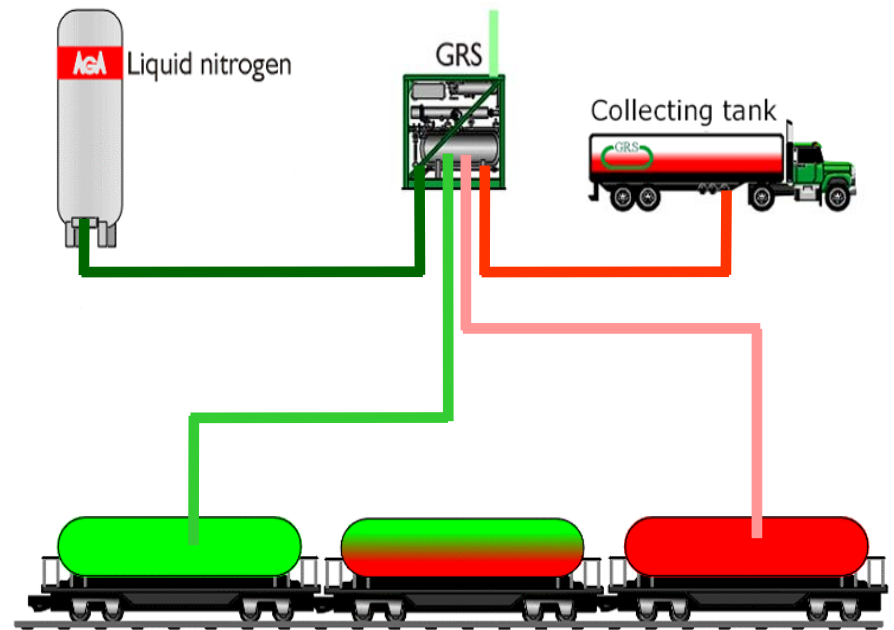


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Rail Industry Pressure Tank Cars

- Purge
- Clean
- Recover
- Reclaim
- Return



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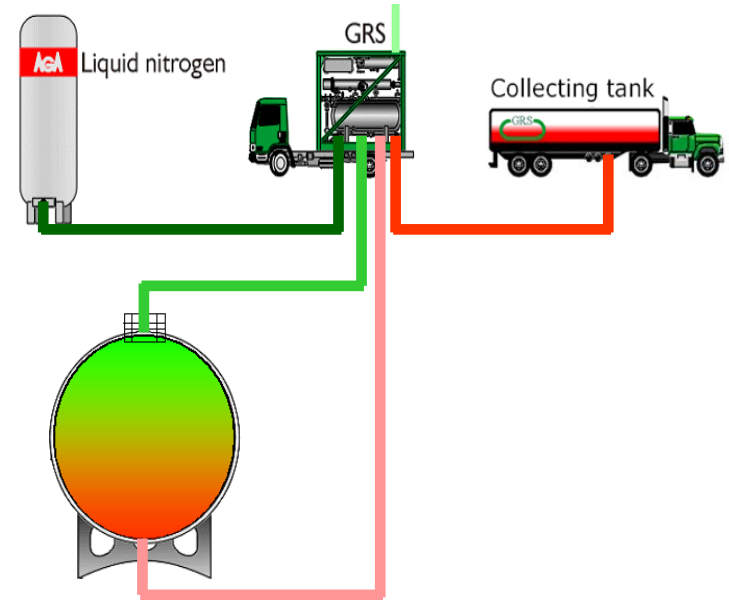
PRESSURE TANK CAR

Today the GRS offers the Rail industry a new technology to meet and surpass short sighted tank car abatement methods. Purging and Recovery options of multiple commodities will expand any railcar cleaning terminals' capabilities and services. The GRS unit's ownership will give Rail terminals the competitive edge for expanding its core business operations. The GRS will potentially increase revenues through its ability to more efficiently expedite tank car cleaning, while meeting RCRA mandates, and eliminating the need for building dedicated rail tank cars for each product handled by the terminal.

Petrochemical Industry

Storage Sphere

- Decontamination
- Degassing
- Gassing-up
- Cooling-off
- Pressure Release Recovery



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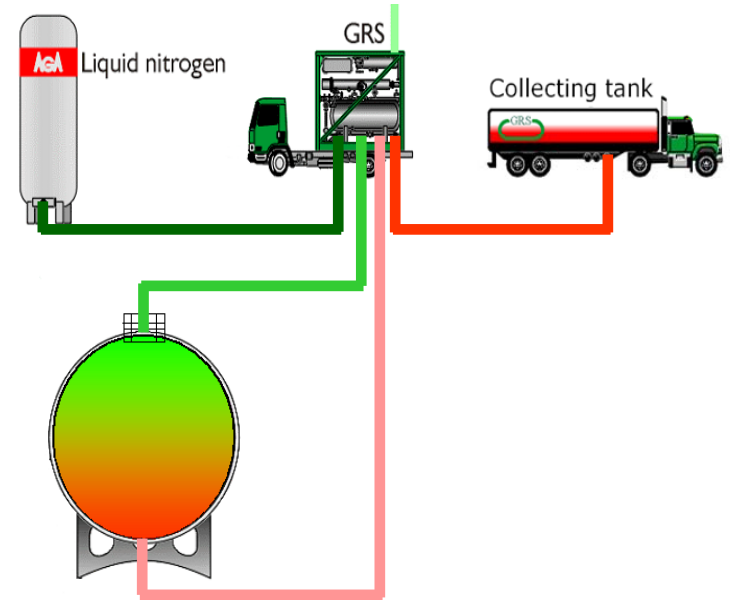
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STORAGE SPHERE

Past barge and sphere reclamation and decontamination projects have recovery results measuring up to 100%. Recycled product quality makes for market on-spec or recycled off-spec feed-stocks, that can be made ready for distribution, resale, or reusable products.

Petrochemical Industry Storage Spheres

- Degas
- Purge
- Clean
- Recover
- Inspect – Ka-Kb EPA Rules
- Return Product



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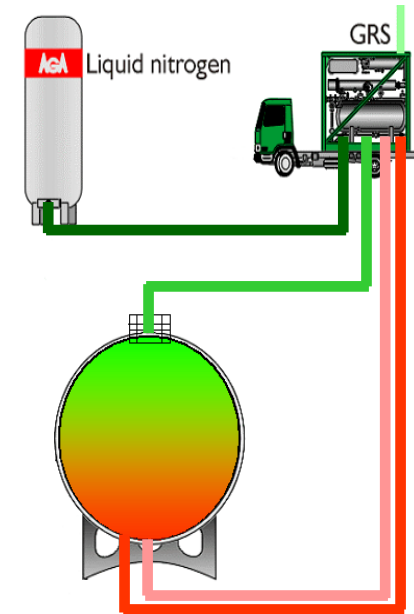
STORAGE SPHERE

The GRS helps industry meet NSPS for New Source Performance Standards Ka-Kb. The rules in 60.112., Subpart Ka – Standards of Performance for Storage Vessels for Petroleum for which construction, reconstruction, or modification commenced after May 18, 1978, and prior to July 23, 1984. Subpart Kb - standards of performance for volatile organic liquid storage vessels (including petroleum liquid storage vessels) for which construction, reconstruction, or modification commenced after July 23, 1984.

Petrochemical Industry

Storage Spheres

- Purge
- Clean
- Recover
- Decontaminate
- Return



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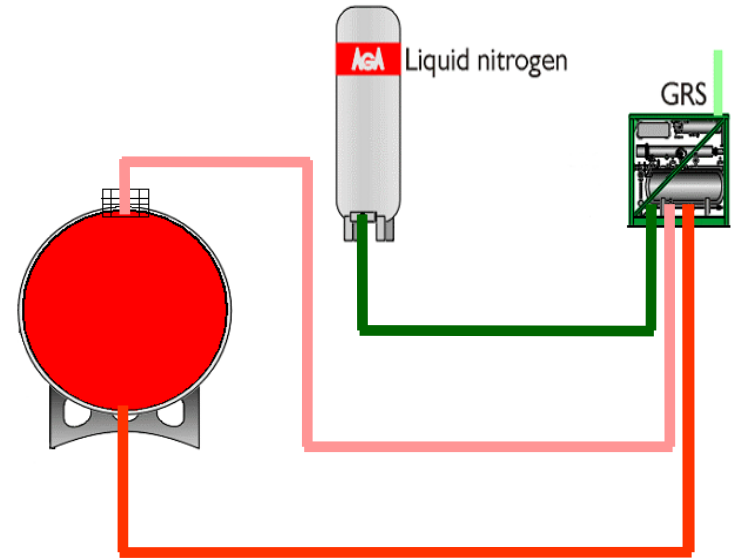
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STORAGE SPHERE

Feedstock decontamination with the GRS, reduces a manufacturer's or storage facility's major profit and product loss. The GRS separation cycle process conditions the feedstock to specifications

Petrochemical Industry Storage Spheres

- Pressure Releases
- Recover
- Reclaim
- Reliquefaction
- Return to Storage



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STORAGE SPHERE

Sphere pressure releases are loss of product and make for costly emissions to manufacturers storage facility's. The GRS can act as part of a system to capture, recover, and return the pressure released product to storage.

THE GRS BENEFITS

Commercial

- Increases terminal versatility
- Mobile & Transportable
- Emergency re-liquefaction
- Total vapor recovery
- Gas-freeing capability
- Degassing capability
- Product Decontamination

Operational

- Easy & Safe to operate
- Few Moving Parts
- Low Maintenance required
- Adjustable flow & concentration
- High chilling capacity
- Fast re-liquefaction system
- Safely discharges overpressure
- No product solidification



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BENEFITS

The GRS Benefits highlight the design functionality and versatility of the system. The system is multifunctional and has capabilities to host several types of vapor recovery and abatement operation scenarios.

THE GRS ADVANTAGES

Economics

- High capacity
- Recovers vapors at on-grade specification
- Purges & Recovers simultaneously
- Low capital & operational cost
- Low maintenance cost
- No need for using IG generators
- Vaporized nitrogen uncontaminated
- Nitrogen recycling capabilities

Environmental

- Eliminates flare system & incineration
- Sub-level PPB to low PPM emissions
- No secondary pollution
- Eliminates human exposure to VOC & toxic gases



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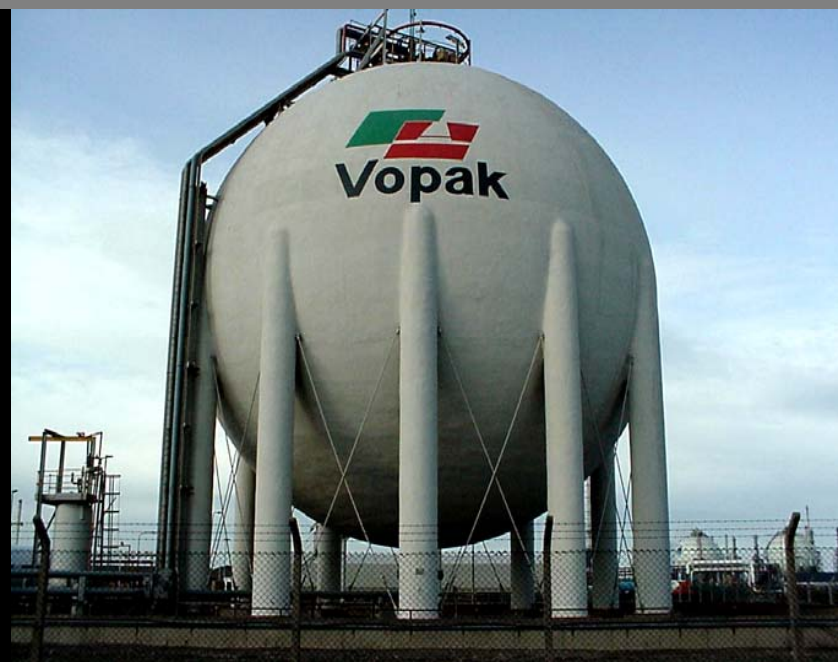
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ADVANTAGES

The GRS Advantages are just a few of the system's economic and environmental capabilities that support investment and ownership of a total solution vapor recovery. The ROI prize percentage can be realized in operations' cost savings through never before product reclamation versus the normally flared and lost feedstock. Environmentally the GRS surpasses compliance limits mandated by most state and federal permitting rules.

SEE THE GRS DECONTAMINATION SPHERE OPERATIONS

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VOPAK PROJECT

2001 Vopak 6650 CBM VCM Sphere
Decontamination Operations Project
Teeside, Australia



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SEE THE GRS DECONTAMINATION BARGE OPERATIONS

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CHEMGAS PROJECT

**2002 ChemGas Vinyl Chloride Barge
Decontamination Operations Project**
Marl, Germany - Chemiepark



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The Gas Recovery System



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GRS CLIENTS

The GRS has achieved great results for European & Australian service customers.

Vopak
Vintron
Simon Storage
Maersk Australia
Australian Vinyl Corp
Norsk Hydro
Aga Norsk
Chemgas Shipping
Infracor Marl
Glaxo Smith Kline



CLIENTS

These are some of the serviced worldwide clients the GRS has provided decontamination or sphere mandated inspections. We have achieved great results and created repeat customers through 2010. The next scheduled GRS project is our repeat client Australian Vinyl Corporation and their 3300 CBM sphere for inspection and maintenance.



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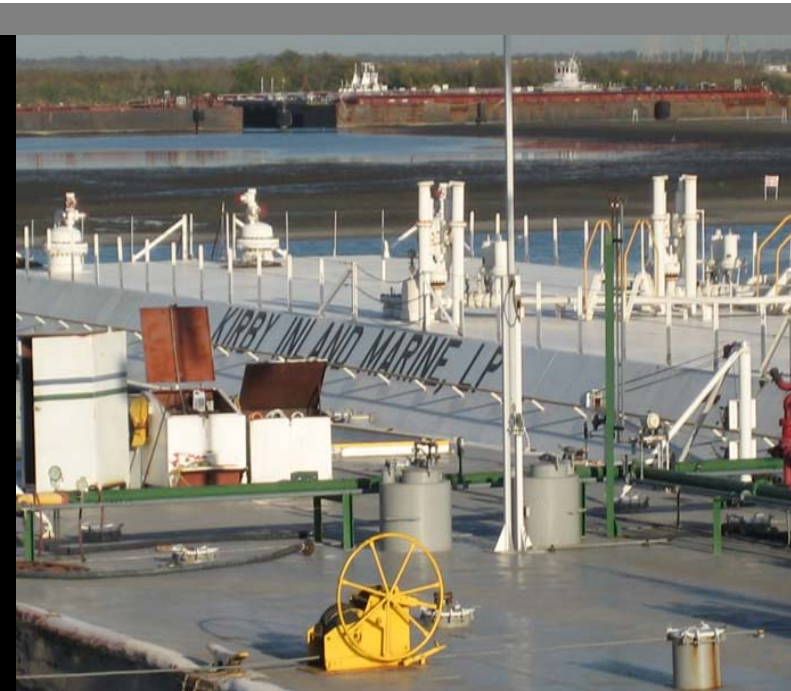


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The GRS Demonstration was a Success!
On May 4, 2006, the GRS recovered for the first time ever, an Isobutane Barge for Kirby Inland Marine, LP in Channelview, TX

This event will be certified with an official results report by Acro Technologies, Inc. and to be submitted to as final part of TCEQ's Emerging Verification Technology Program and EPA's BACT application.



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CLIENTS

This May, Gulf Coast Consulting presented the first ever GRS, U.S. Demonstration hosted at Kirby's Barge Flare Dock. The subject was a typically purged and flared 33,000Mb barge containing Isobutane heels. Look for a full results report to be posted at our website for complete details next month.

GRS CONTACTS



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CONTACTS

Contact your authorized Gas Recovery System representatives for additional information. We welcome your inquiries.

Email us at: GRS@gulfcoastconsulting.net.



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