SPE Web Events

EXPERTS • TECHNOLOGY • EDUCATION

JOIN THE CONVERSATION

@SPE_EVENTS

#SPEWEBEVENTS

SPE International

SPE International

Balcones Section

Total Solutions Approach to Vapor Recovery

Jeff Voorhis; P.E., EMS-LA

HY-BON Engineering Company, Inc.

Email: jvoorhis@hy-bon.com

Cell 512-694-8455

PRESENTATION AGENDA

Introduction to HY-BON

Regulatory Considerations

General Overview of Vapor Recovery

Compressor Selection Criteria

Vapor Recovery Towers

Vapor Combustion Units

Bio-Filters

Vapor Recovery Project Examples

Gas Measurement (HY-BON IQR)

HY-BON Experience and Value Add

What Does HY-BON Do ?

We take waste gas emissions and convert them into revenue, while keeping you in Compliance and Safe.

- **Wasting resources and most importantly additional revenue!**

Actual Measurement

- 530 tons per year VOC Emissions
- 55 MSCFD x $4 / MSCF x 2000 BTU
  = $132,000 revenue per year
- Project Cost: $100,000 (VRU, VRT, VCU and install estimate)
- PAYOUT 9 Months!!!!!!

EPA Amends Definition of Storage Vessel Affected Facility

- A single storage vessel located in the oil and natural gas production segment, natural gas processing segment or natural gas transmission and storage segment and has the potential ***for VOC emissions equal to or greater than 6 tpy MUST reduce the emissions by 95%*** taking into account requirements under a legally and practically enforceable limit in an operating permit or by other mechanism.

6 tons per year sounds like a lot, but is it .....

Threshold based on potential to emit VOCs - 6 tons per year or more

Daily *equivalents could be as low as:*

- 33 pounds emission
- About 1 mcf emission
- 1 barrel of condensate produced
- 20 barrels of oil produced
- 2000 barrels of water with 1% oil carryover processed

Applicability Date

- Same as current rule = August 23, 2011
- Replacement storage vessel is considered a new source and an affected facility if it has PTE* of 6 tpy or more and is put into service after August 23, 2011

August 2011						
SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Determination of Affected Facility

- Each storage tank or vessel
- Date of installation, reconstruction, modification
  - Prior to Aug 23, 2011 (not affected)
  - Aug 23, 2011 to April 12, 2013 (Group 1)
  - After April 12, 2013 (Group 2)

Group 1

- Storage vessels constructed or modified between August 23, 2011 and April 12, 2013
- PTE of 6 tpy or greater
- Initial determination by October 15, 2013
- Initial notification by

  January 15, 2014
- Control required by

  April 15, 2015

Group 2

- Constructed or modified after April 12, 2013
- PTE of 6 tpy or greater
- Applicability determination and control by April 15, 2014 or 60 days after startup, whichever is later

Emission Limitations

- Proper capture
- 95% control
  - 40 CFR 60.18 (flares)
  - Vapor combustors
  - Vapor recovery units (*Process unit…not a control device*)

Emission Limitations

- The 6 tpy limit is on a per tank basis. Even if the tanks are manifolded together in a series the PTE needs to be looked at on a per tank basis. So if all of the flash is occurring in the first tank of the series, and as a result it's PTE is 10 tpy and the remaining tanks are only 1 tpy each, then the first tank is an affected source under OOOO and the others are not. Since the flash is occurring in that first tank, those emissions must be accounted for for that tank's PTE and cannot be averaged out to the other tanks in the series.

- **Oklahoma**
- Kendal Cody Stegmann
- Sr. Environmental Manager
- Compliance and Enforcement Group
- Air Quality Division
- (405) 702-4150

- **Texas**
- Joe Shine
- Team Leader, Rule Registrations Section
- Air Permits Division
- joe.shine@tceq.texas.gov
- (512) 239-6595

Alternative Compliance

- Sustained **uncontrolled** emissions less than 4 tpy for 12-mo (confirm every month)
- Option to remove controls
- Remain affected facilities (records, monitoring, etc.)
- If increase emissions to 4 tpy or more, must achieve 95% control
  - 30 days or
  - Immediately on handling liquids if re-frac well

From EPA

We agree that it is better to recover resources than to burn them. **(However, by law, if someone meets the 95 percent control requirement, we cannot specify how they must meet it. In other cases, where we cannot set a numerical limit, we can set work practice or equipment standards, but there are specific criteria we must meet in order to do so.)**

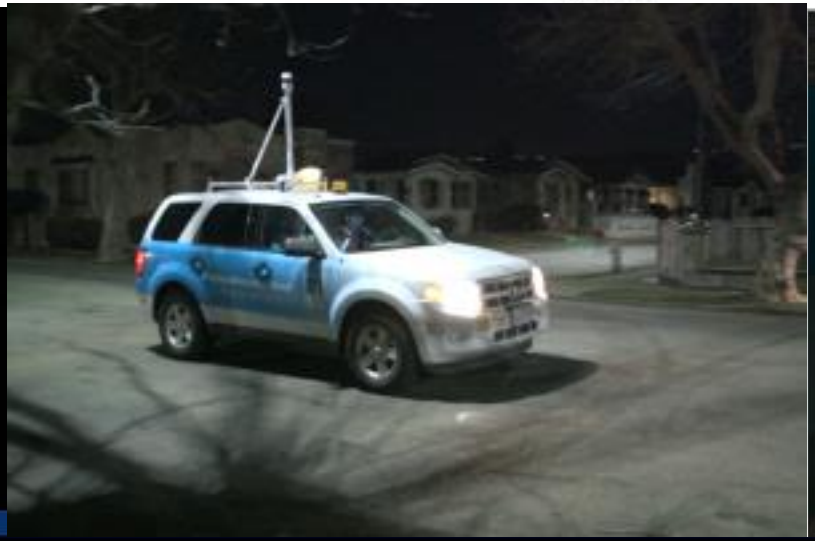

FLIR
HI
MANUAL
WH
7/26/08 5.07.53PM
LOW

WHAT GETS SEEN, GETS MEASURED

WHAT GETS MEASURED, GETS CONTROLLED

WHAT GETS CONTROLLED, CAN MAKE YOU MONEY

PICARRO REAL TIME MEASUREMENT

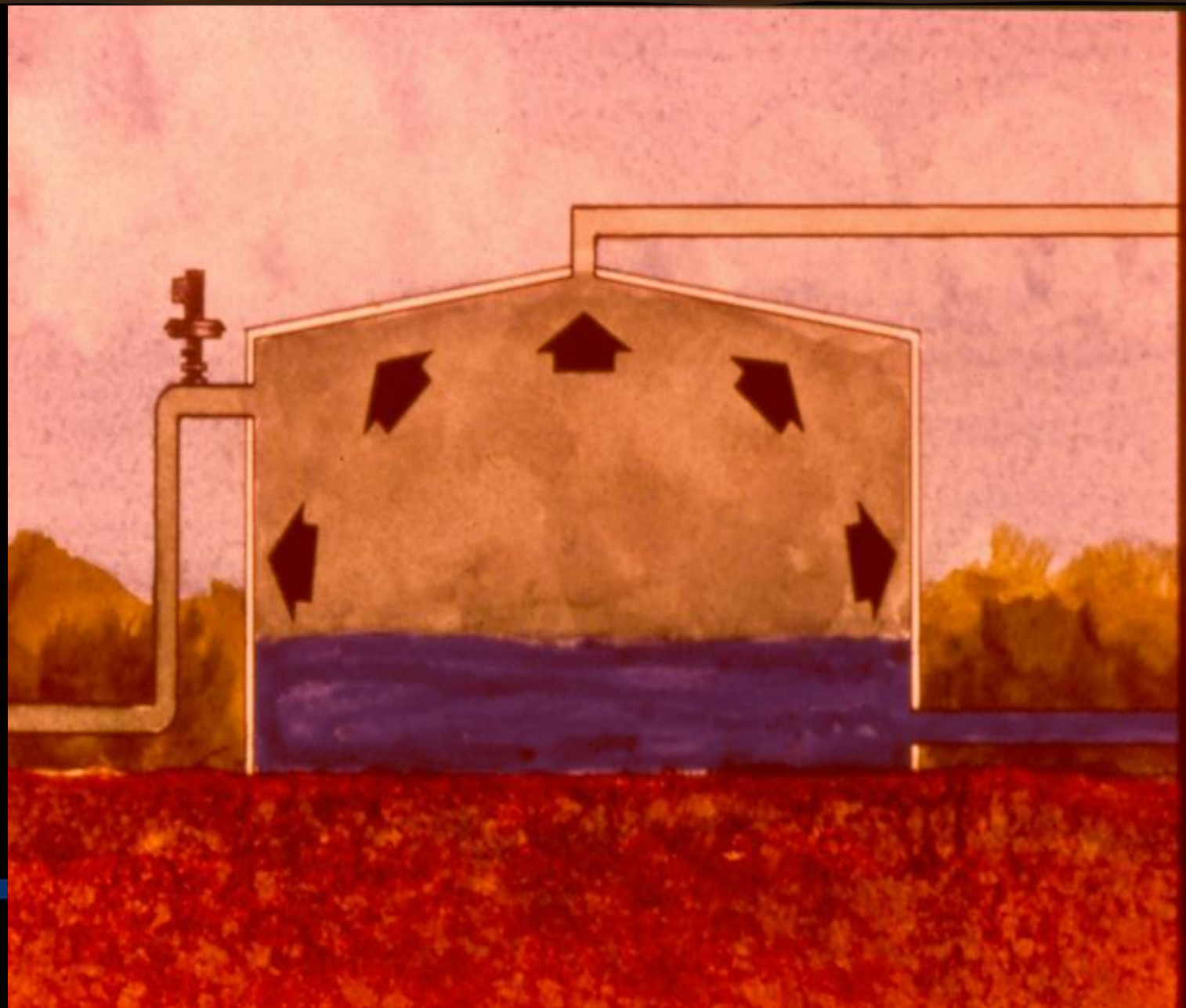


VAPOR RECOVERY SYSTEMS

What is Vapor Recovery?

TANK OPERATIONS

As the oil resides in the tanks, it gives off vapors, thereby increasing the pressure inside the tank.



Sources of Methane Losses

Flash losses

- occur when crude is transferred from containment at a high pressure to containment at a lower pressure

Working losses

- occur when crude levels change and when crude in the tank is agitated

Standing losses

- occur with daily and seasonal temperature and pressure changes

- Approximately 26.6 BCF/YR of Methane is lost from storage tanks Does not include VOC's

Source: Natural Gas STAR Partners

GAS COMING OUT OF SOLUTION

VAPOR RECOVERY SYSTEMS

Methane has 25X the greenhouse gas effect of CO_2 (1 ton CH_4 = 25 tons CO_2e) – and costs the oil company money.

What money?

Un-captured profits and regulatory risk (*additional liability*)!!

An average tank battery can emit from *$500 to $50,000* in natural gas per month!

VAPOR RECOVERY SYSTEMS

Hydrocarbon gas venting from a condensate storage tank in a gas field.

Gas is invisible to the naked eye – but the volumes of vent gas off of these tanks are often quite amazing.

VAPOR RECOVERY SYSTEMS

PURPOSE

Vapor Recovery units are designed to comply with regulatory standards, provide additional profits to the oil producer and eliminate the emission of stock tank vapors to the atmosphere.

Most vapors contain varying amounts of methane, ethane, propane, butanes and pentanes, etc. and contribute to the gravity of lease crude.

Dissipation of these products to the atmosphere on a conventional tank battery means a reduction in gravity of the liquid in the tank, thereby **decreasing its value.**

How the System Works

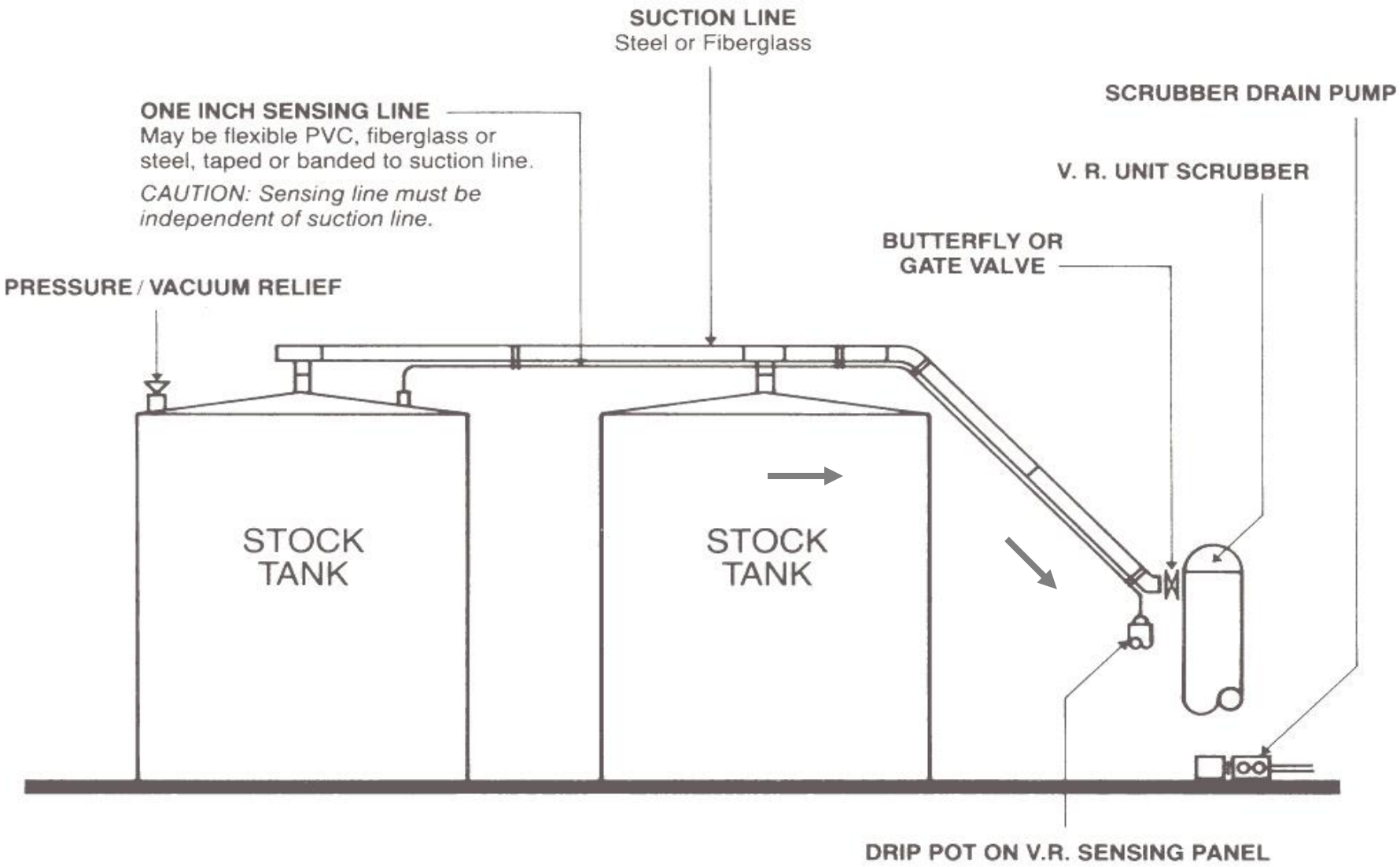
A tank (or tanks manifolded to a common suction line), is piped to the suction scrubber on the vapor recovery unit.

An independent sensing line, generally 1-inch, is run from any one tank to the drip pot on the control panel. This sensing line should be an independent connection to the tanks and as far as practical from the suction line.

The discharge piping from the VRU is connected to the gas gathering line, a meter run, the suction of the field gas compressor, or a combination of all three.

The scrubber drain system is piped either to waste or back to the stock tanks.

The electrical control panel may be mounted remotely, or in an explosion proof (NEMA 7X) enclosure on the skid.



NOTES
All lines must be horizontal, or sloped down to V.R.U. suction as shown.
Scrubber fluid is piped back to tanks or to waste.
The system must be closed — no air entry.

Maintaining Integrity of the System

Maintaining a “closed” system is imperative to a successful Vapor Recovery system.

Systems are programmed to start automatically at a predetermined set point. As a general rule a 2½” W.C. pressure will start the unit.

As the tank(s) pressure is reduced to approximately 1½” to 2” W.C., a by-pass mode is initiated and a small percentage of the discharge volume is diverted back to the suction scrubber. This allows the tank pressure to increase and, as it reaches the 2” mark, the by-pass closes. If, while in the by-pass mode, that tank pressure continues to diminish, the unit will stop and wait for the start pressure to be attained.

To avoid pulling a vacuum on any tank, shut-down pressure is generally at 1” W.C.

Benefits of Vapor Recovery Units

- $ Capture up to 100 percent of hydrocarbon vapors that accumulate in tanks. Up to you to prove.
- $ Recovered vapors have much higher BTU content than pipeline quality natural gas
- $ Recovered vapors can be more valuable than methane alone
- $ Reduce regulatory & liability exposure

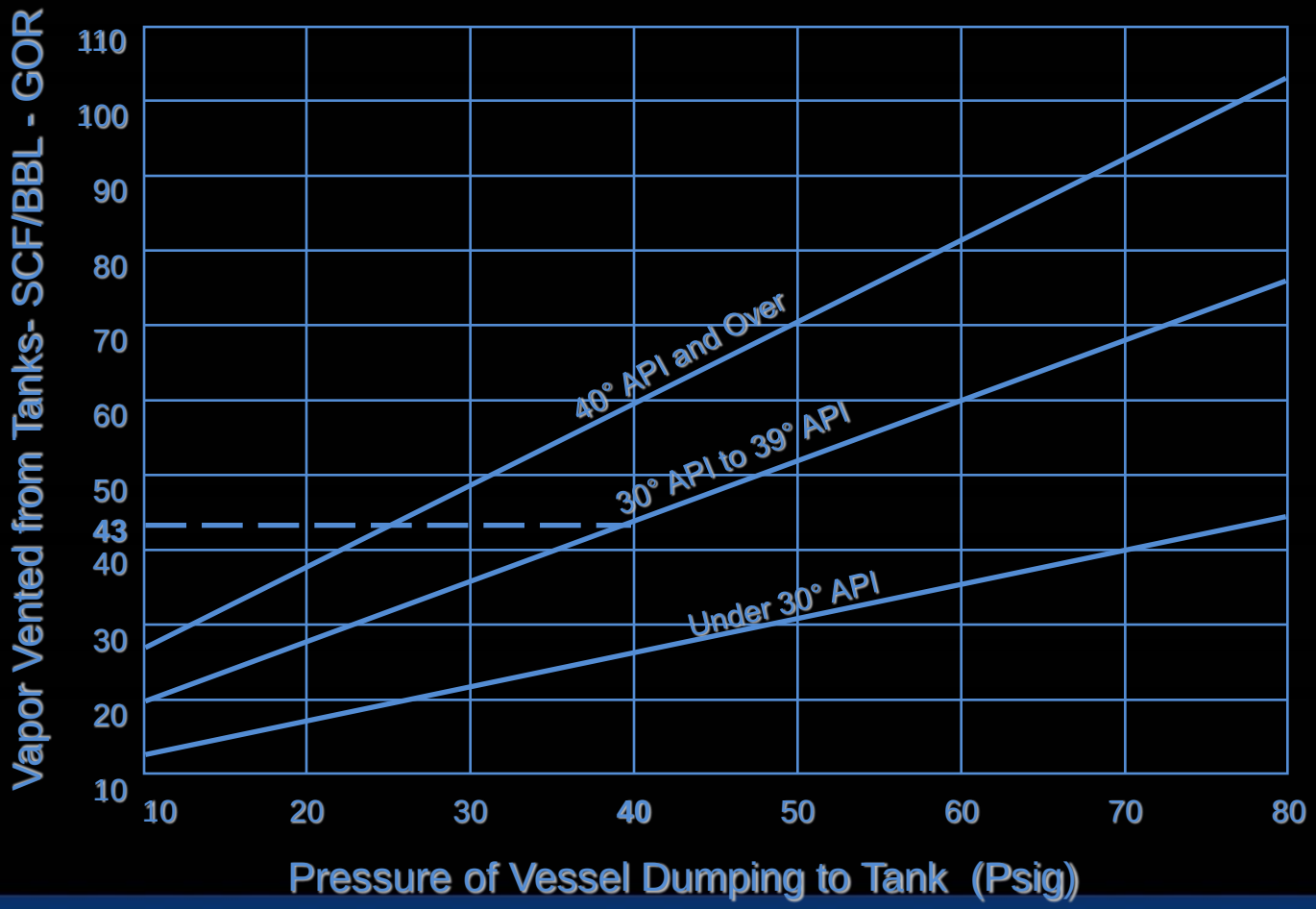
Criteria for VRU Locations

- Steady source and sufficient quantity of losses
  - Available gathering system. 15-20 mcf/d profitable
- Outlet for recovered gas
  - Access to pipeline or on-site fuel use
- Tank batteries that are subject to state/federal air regulations. Flaring restrictions are coming

Quantify Volume of Losses

- Measure losses using orifice well tester and recording manometer
- Estimate losses from chart based on oil characteristics, pressure, and temperature at each location
- Estimate emissions using the *E&P Tank* Model

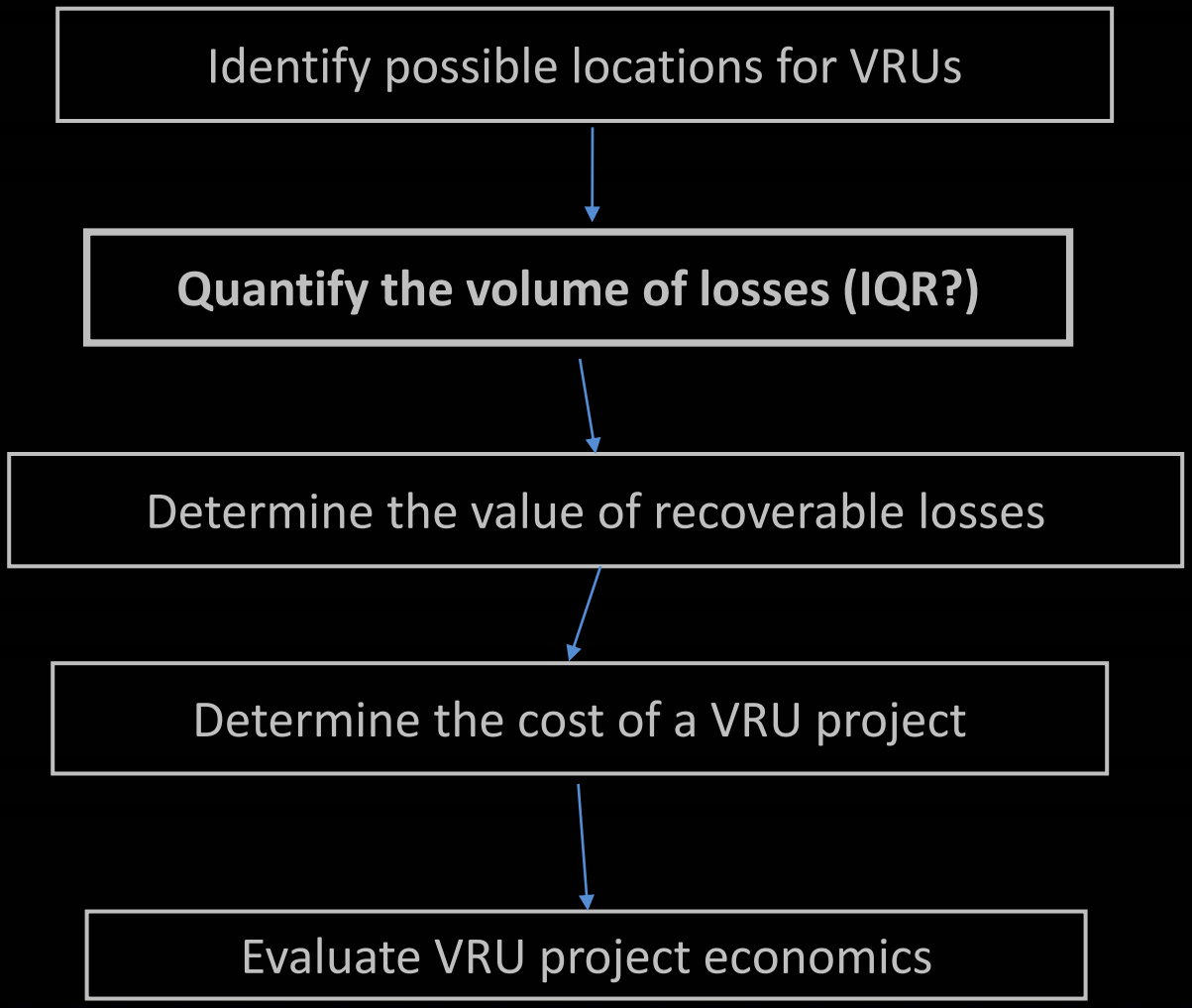
Estimated Volume of Tank Vapors



What is the Recovered Gas Worth?

- Value depends on BTU content of gas
- Value depends on how gas is used
  - On-site fuel - measured in terms of fuel that no longer must be purchased
  - Natural gas pipeline - measured by the higher price for rich (higher BTU) gas (=2.5 X)
  - Gas processing plant - measured by sale of NGLs and methane, which can be separated

VRU Decision Process



VRU Evaluation Checklist

Is the unit on location a vapor recovery unit?

- Does it have a pressure sensing device on the tanks or on the skid?
- Does it have a bypass system to circulate gas between the compressor and the inlet or suction vessel?
- Is the correct type of compressor being utilized?

  (Rotary vane vs. rotary screw vs. scroll vs. reciprocating compressors)
- Does it have a PLC controlling the unit for extremely low pressures

Is the production system properly configured to capture the vent gas?

- Is the piping from the tanks to the compressor sloped downward with no visible liquid traps (U in the piping)?
- Are the tanks manifolded together properly?
- Is a gas blanket being used?
- Are all Enardo valves and tank hatches secure
- Is the pressure sensing device sensing pressure off the top of the tanks?

Why do many VRU projects from tanks fail?

- #1 The package purchased or rented IS NOT a vapor recovery unit – that is, a dry gas type wellhead unit used; resulting in personnel safety hazard AND no gas captured (*but it is cheap*).
- Players involved have no true vapor recovery experience - realistically, there is a 3 to 5 year learning curve in understanding the dynamics of low pressure, low volume, wet gas applications
- After failed project, then end user jumps to refinery spec
- After properly designed package is purchased, the overall design system not designed properly or "closed" to air ingress (holes in tank, thief hatches, etc)

"The Division has determined that improperly secured thief hatches, visible emissions from a flare, and audible emissions from a thief hatch or PRV are violations of Regulation No. 7. The Division has determined that the minimum fine for an open thief hatch, visible emissions from a flare or audible emissions from a thief hatch or PRV will be $15,000 per day. The duration of each such violation will be at least one day, unless evidence gathered by the Division and/or provided by the source proves otherwise." (emphasis in original).

DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT

Air Quality Control Commission; REGULATION NUMBER 7 ; CONTROL OF OZONE VIA OZONE PRECURSORS

VRU Project Keys to Success

- Carpenters Rule – measure twice, cut once
  - *Fully understand your gas volumes, pressures & design options / minimum 24 hours tank tests*
  - *Ensure the players have experience with the application*
  - *Ensure the equipment is suitable for capturing extremely low pressure, low volume, wet gas streams*
- Involve the field in the overall system design, from piping to tank configurations & requirements
- Ensure a system is in place for ongoing monitoring of gas volumes being captured, and a strong preventive maintenance program
- Review incentive programs to insure goals are aligned with desired outcomes

COMPRESSOR SELECTION CRITERIA

HOW DO WE CHOOSE THE APPROPRIATE COMPRESSOR?

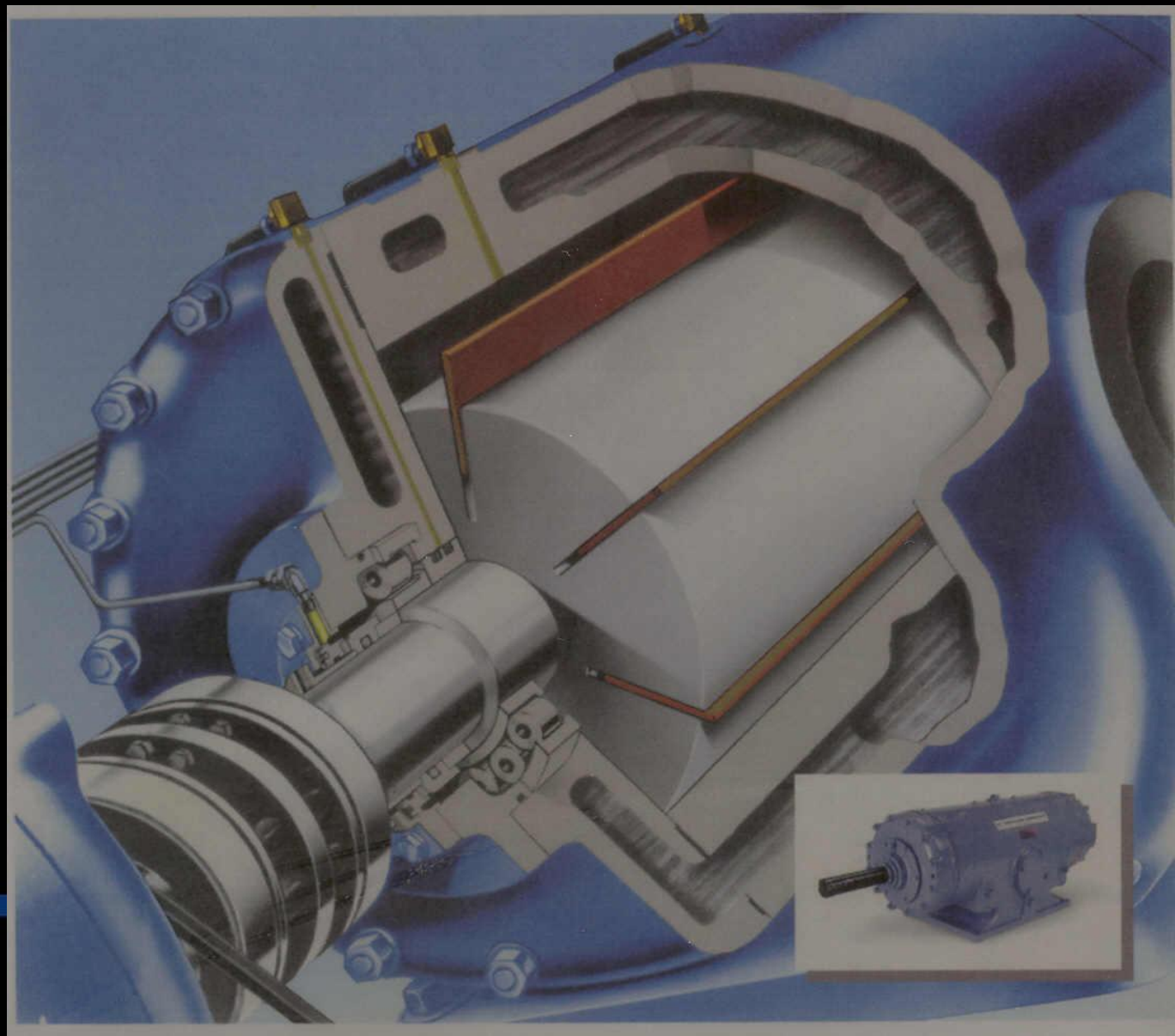
Natural Gas STAR Program recommends limited compressor types for vapor recovery:

- **Rotary vane**
- **Rotary screw**
- **Venturi Jet (Eductors)**

TYPICAL COMPRESSOR TYPES USED IN LOW PRESSURE

Rotary Vane Compressors

- Eccentrically mounted rotor
- Centrifugal force causes vanes to slide in or out
- Gas is forced into decreasing space thereby causing compression
- Jacket water cooling system
- RPM range 400 to 1600



HY-BON Engineering Company, Inc.

Rotary Vanes

Advantages

- Excellent for relatively high volumes and relatively low differential pressures
- Efficient at low pressures
- Can handle wet gas relatively easy
- Comparatively low initial cost and ongoing maintenance

Disadvantages

- Limited as to discharge pressure
- Limited as to suction temperature capabilities
- Free liquid causes blade breakage problems

Applications of Various Compressor Types

Rotary Vane Compressors

- Vapor Recovery
- Low Pressure Gas Boosting
- Digester Gas Recovery
- Landfill Gas Recovery
- Casinghead Pressure Reduction

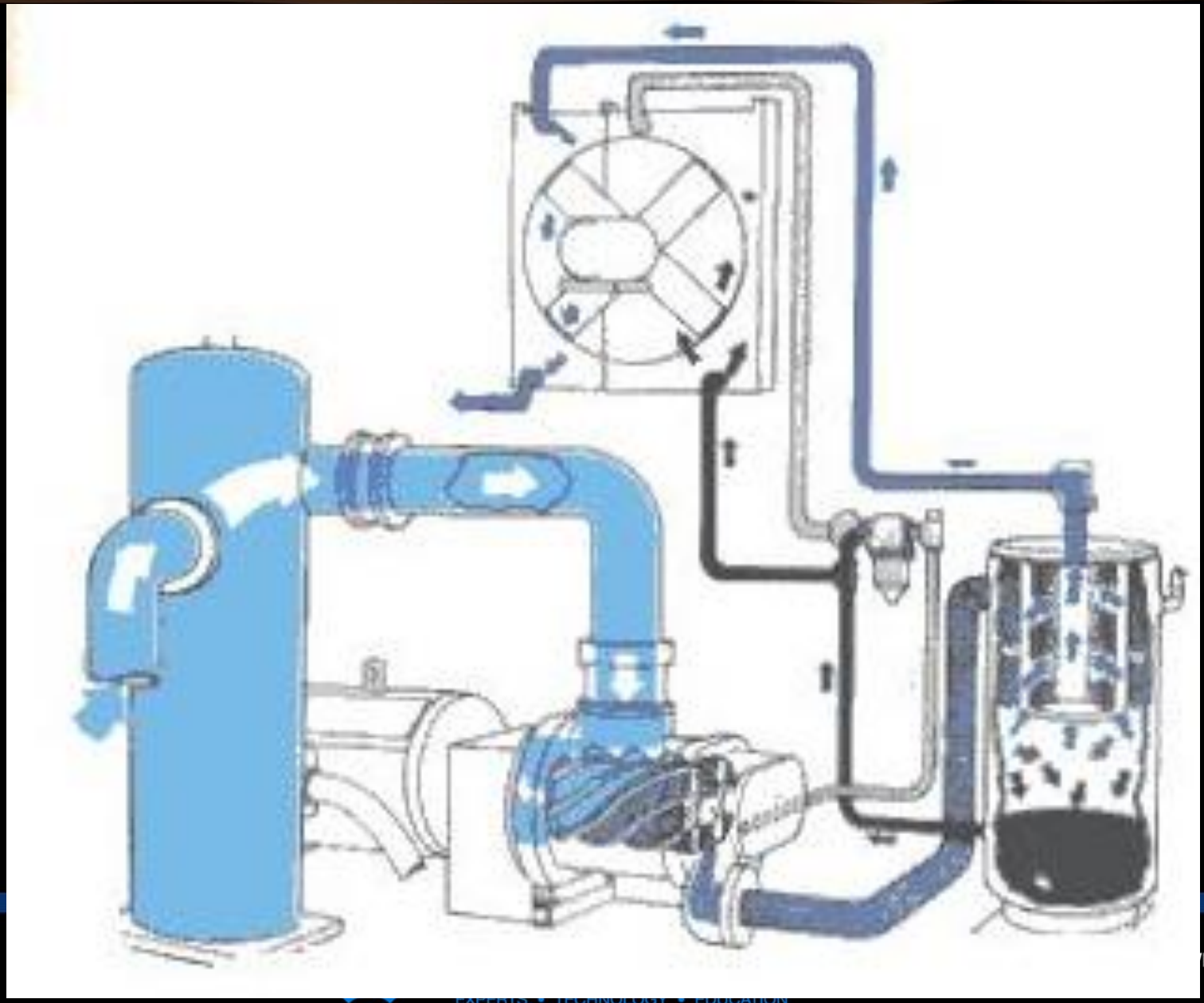
* Where discharge pressure stays below 50 psi

TYPICAL COMPRESSOR TYPES USED IN LOW PRESSURE

Flooded Screw Compressors

- Twin helical rotors
- Oil is both the cooling medium and the compression medium
- Various configurations of gears, internal porting and loader/unloader valves available
- Gas mixed with oil - must be separated after compression

General Principle - Rotary Screws



Oil Flooded Screw Compressor Typical Operating Parameters

- Differential pressure equal to or less than 300 psig (for single-stage models).
- Volume from approximately 20 MSCFD to 2.5 MMSCFD (for single-compressor units).
- Virtually any temperature (< 180° F)

Oil Flooded Screws

Advantages

- Excellent in a large volume/medium differential pressure range
- Can handle wet gas better than rotary vanes
- Excellent temperature control for controlling condensate fallout

Disadvantages

- More sophisticated system with oil/gas separator
- Higher maintenance
- Higher operational expense (oil, filters, etc.)

Applications of Various Compressor Types

Oil Flooded Screw Compressors

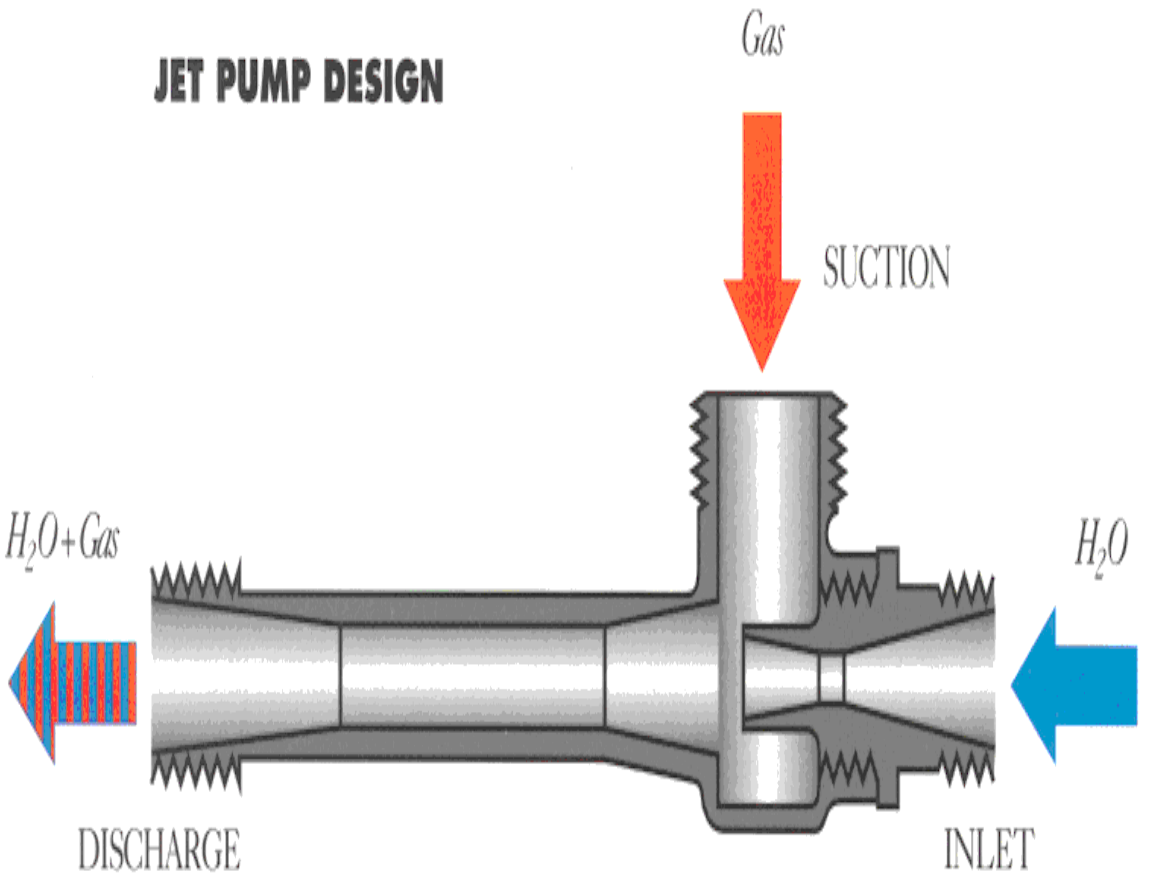
- Vapor Recovery
- Wellhead Compression
- Medium Pressure Gas Boosting
- Casinghead Pressure Reduction

- In wet or dry gas applications
- Up to 300 psig discharge

TYPICAL COMPRESSOR TYPES USED IN LOW PRESSURE

Venturi Type

- Venturi ejector vapor recovery units (EVRU™) or Vapor Jet
  - Use Venturi jet ejectors in place of rotary compressors
  - Do not contain any moving parts
  - Eductor requires source of water
  - Vapor Jet requires high pressure water motive

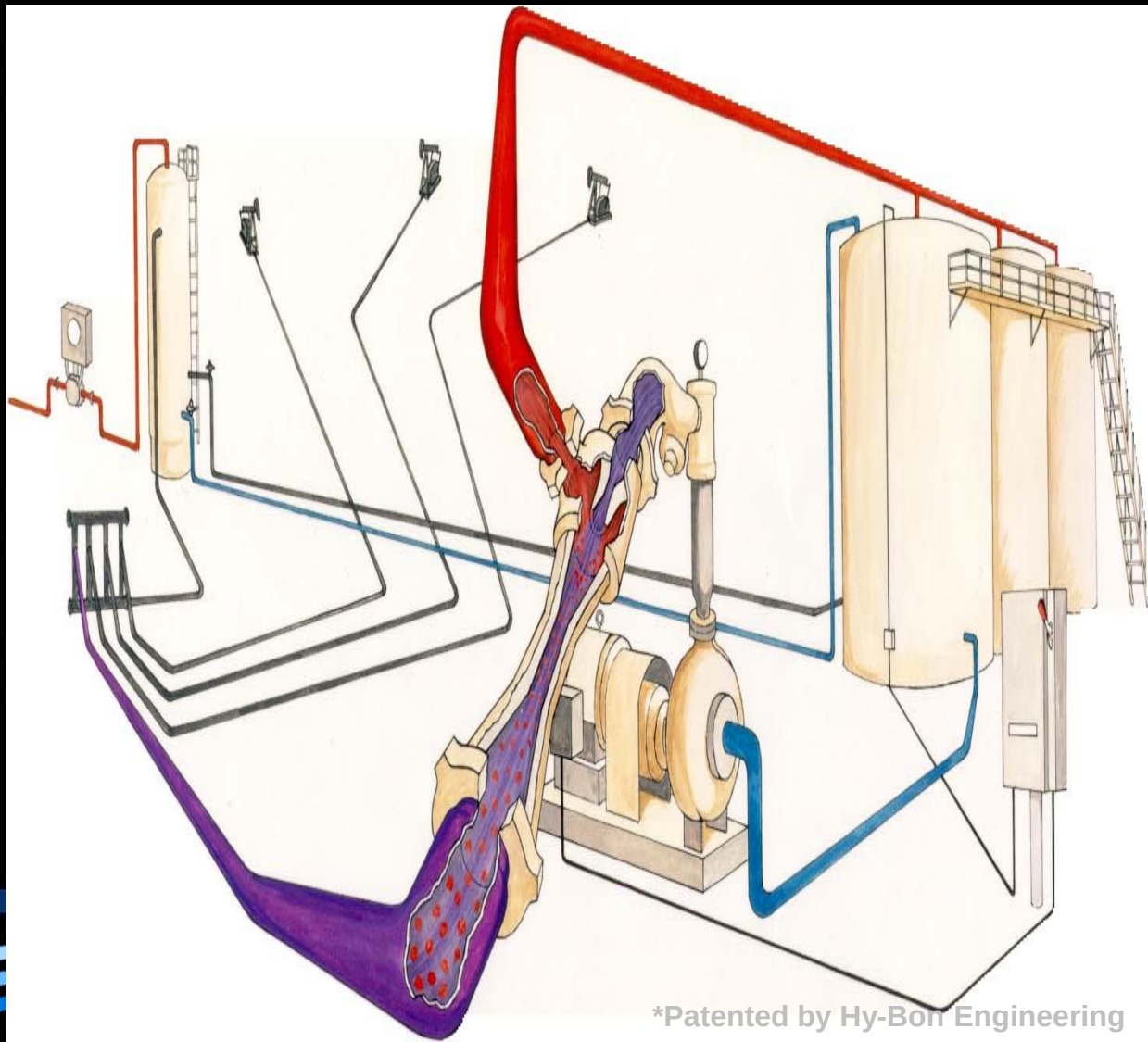


*Patented by Hy-Bon Engineering

Venturi Jet (Eductor)

Typical Operating Parameters

- Differential pressures of up to 40psig
- Handle limited volumes (approx 70mscfd)
- Require an available water source (motive fluid)
- No moving parts on compressor but require water pumps



*Patented by Hy-Bon Engineering

Venturi Jet (Eductor)

Advantages

- No moving parts on “compressor”
- Do not introduce compressor oil into hydrocarbon stream
- Easily handles very wet, heavy gases
- Relatively low maintenance

Disadvantages

- Low differential pressure capability
- Low discharge pressure limit (40psig)
- Low flow rate capability in a single machine

Applications of Various Compressor Types

Venturi Jet (Eductor)

- Vapor Recovery
- Wellhead Compression
- Some low pressure process applications

TYPICAL COMPRESSOR TYPES

Reciprocating Compressors

- Higher pressure services
- Piston/cylinder arrangement
- May be air, water or oil cooled
- Ages old technology
- May be slow speed or high speed

Reciprocating Compressor

Typical Operating Parameters

- Differential pressure in excess of 2000-3000 psig (for multi-stage models).
- Volumes in excess of 20MMSCFD+++ (dependent upon suction pressure).
- Relatively high suction temperatures (< 200° F)

Reciprocating Compressors

Advantages

- High volume/high pressure
- Able to handle spikes in pressure
- Relatively low maintenance

Disadvantages

- Low suction pressure results in large first stage cylinder size
- Inefficient at low pressures
- Rings and valves fail in wet gas applications
- Control is difficult at atmospheric pressures

Applications of Various Compressor Types

Reciprocating

- Wellhead Compression
- Gas Boosting (medium to high pressures)
- CNG
- Casinghead Pressure Reduction
- Gas Gathering
- Process applications

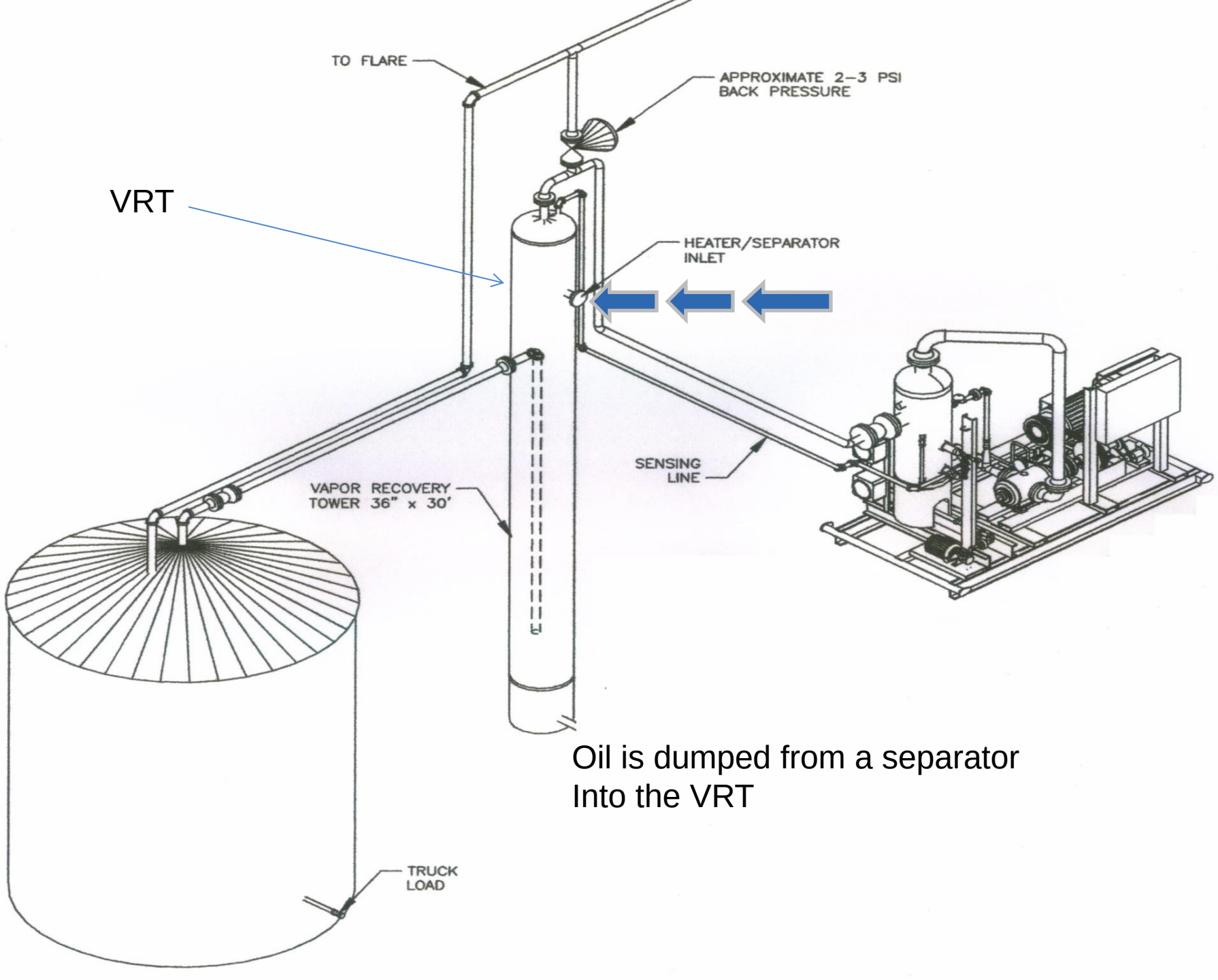
**** Best in dry gas applications***

Vapor Recovery Towers (VRT's)

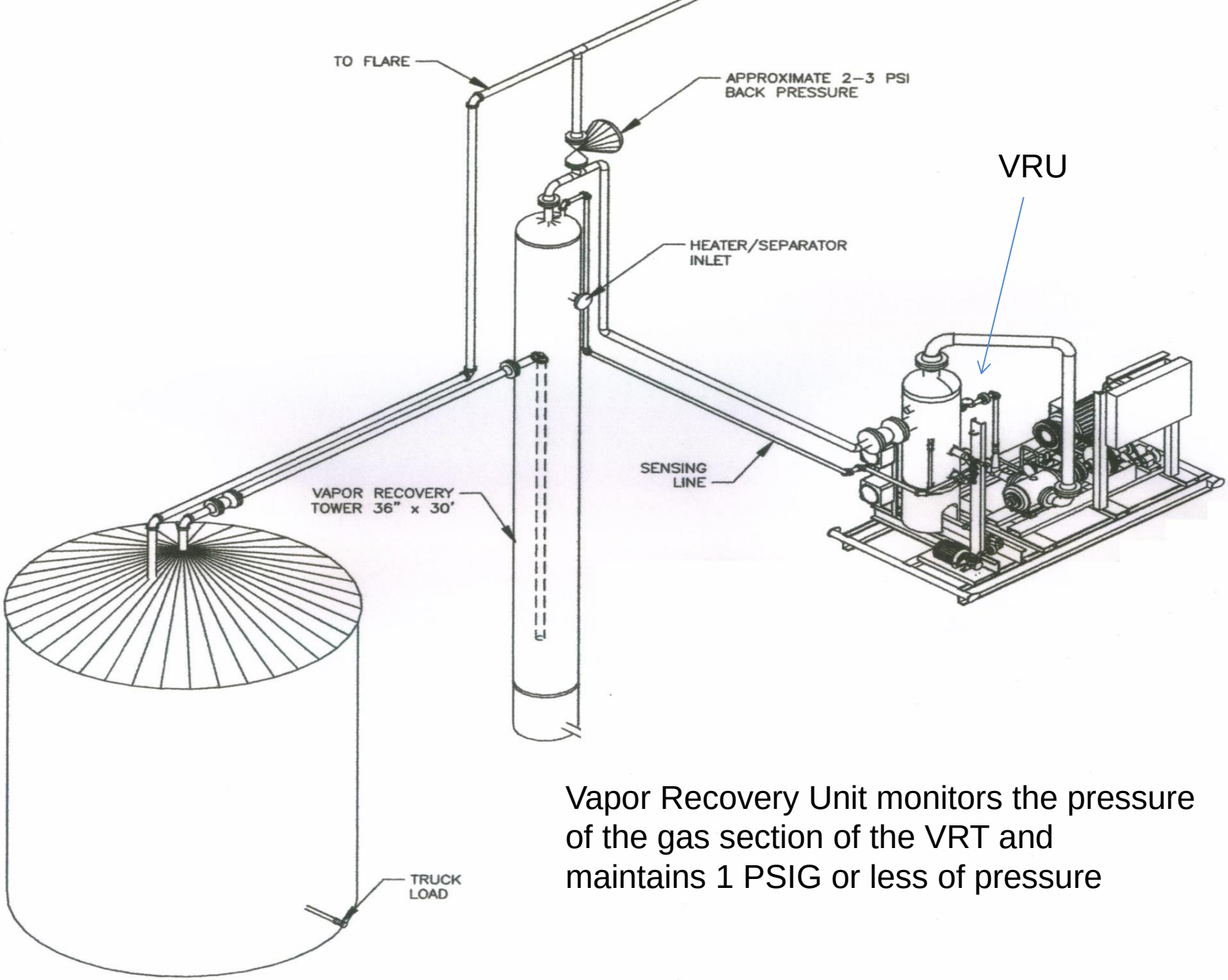
Vapor Recovery Tower (VRT)

Benefits:

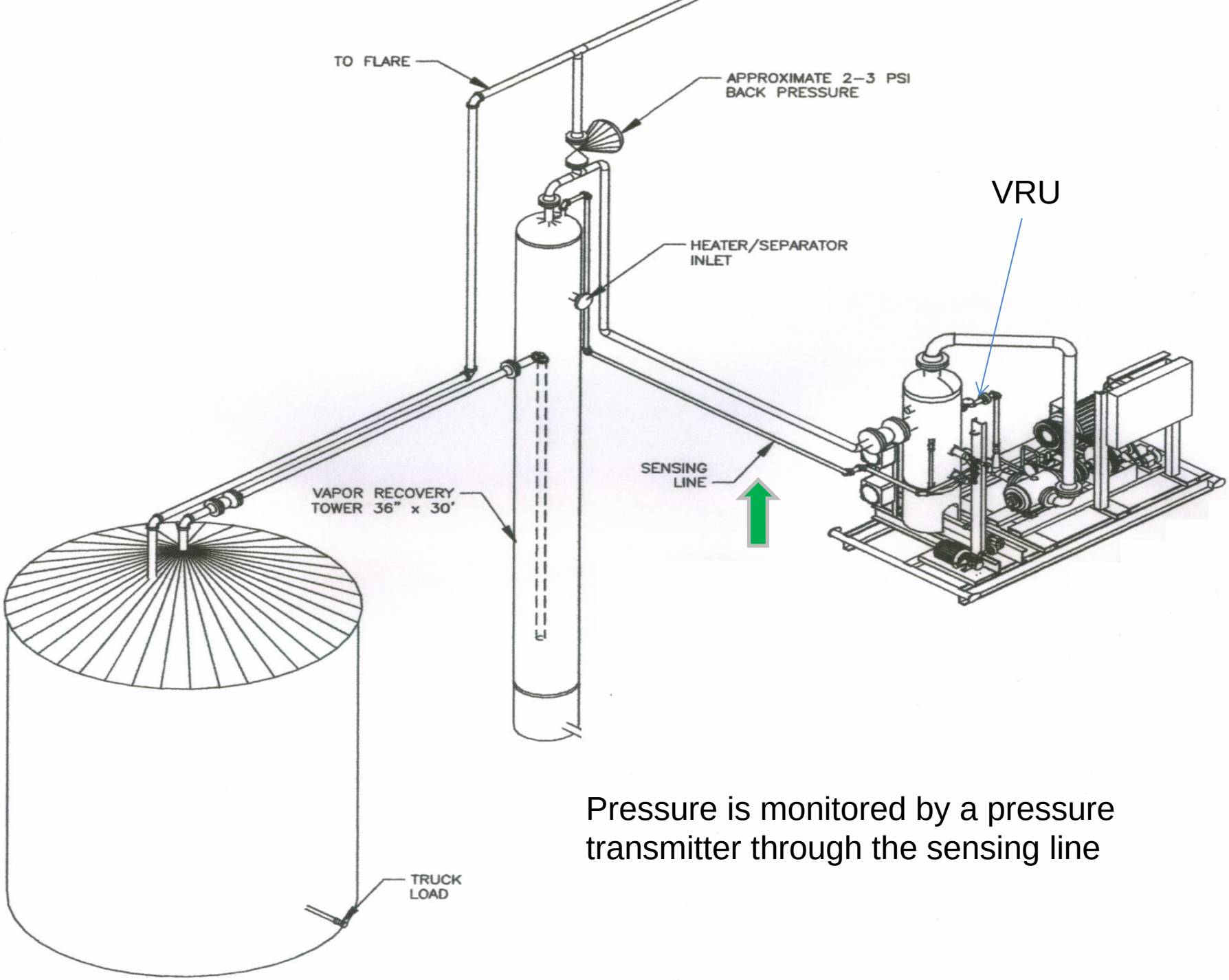
- Captures flash vapors without contaminating the captured gas with air.
- Opportunity to maximize vapor capture, while reducing flash in storage tanks.
- Vapor Recovery Tower could potentially remove storage tanks from regulatory reporting.



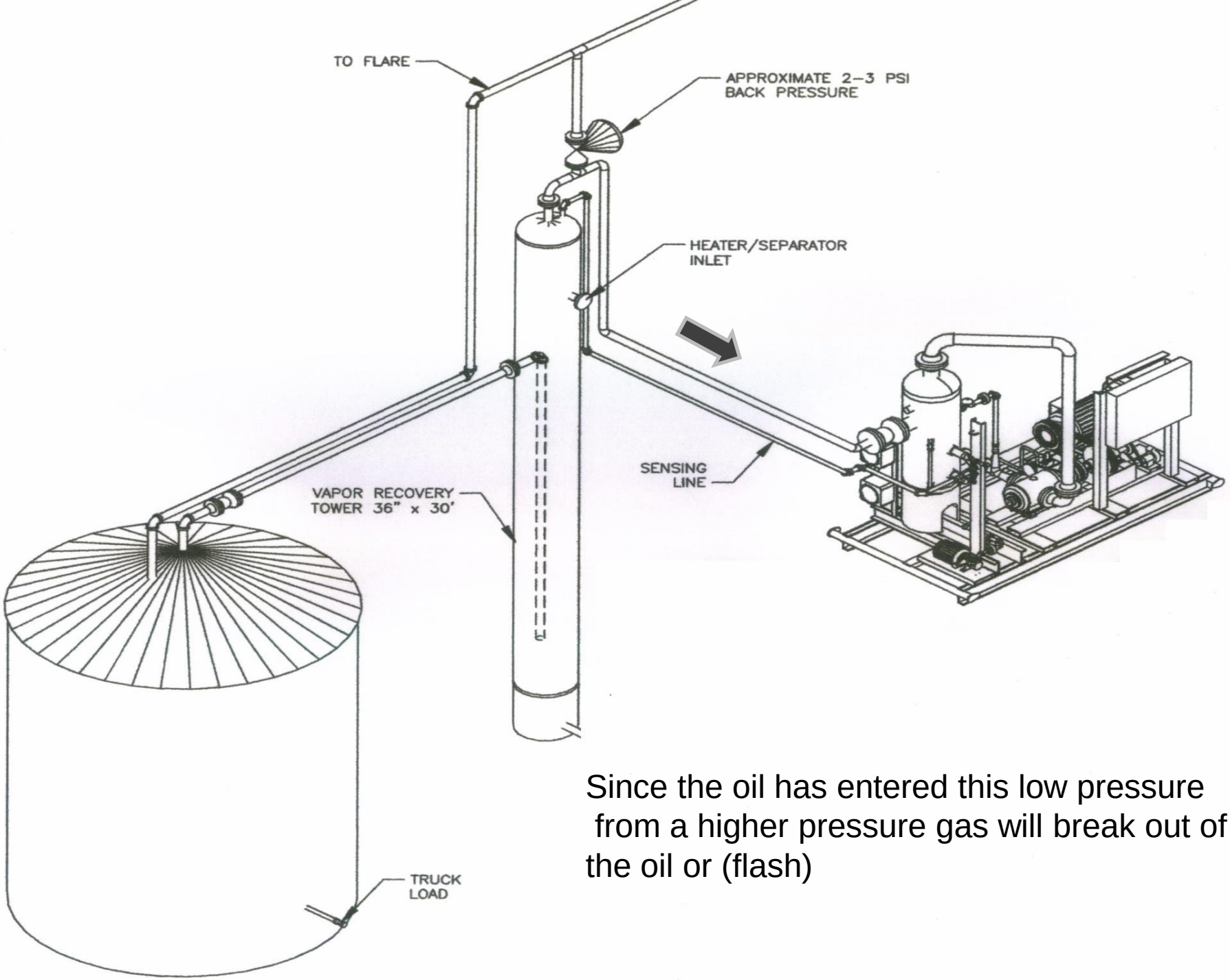
Oil is dumped from a separator
Into the VRT



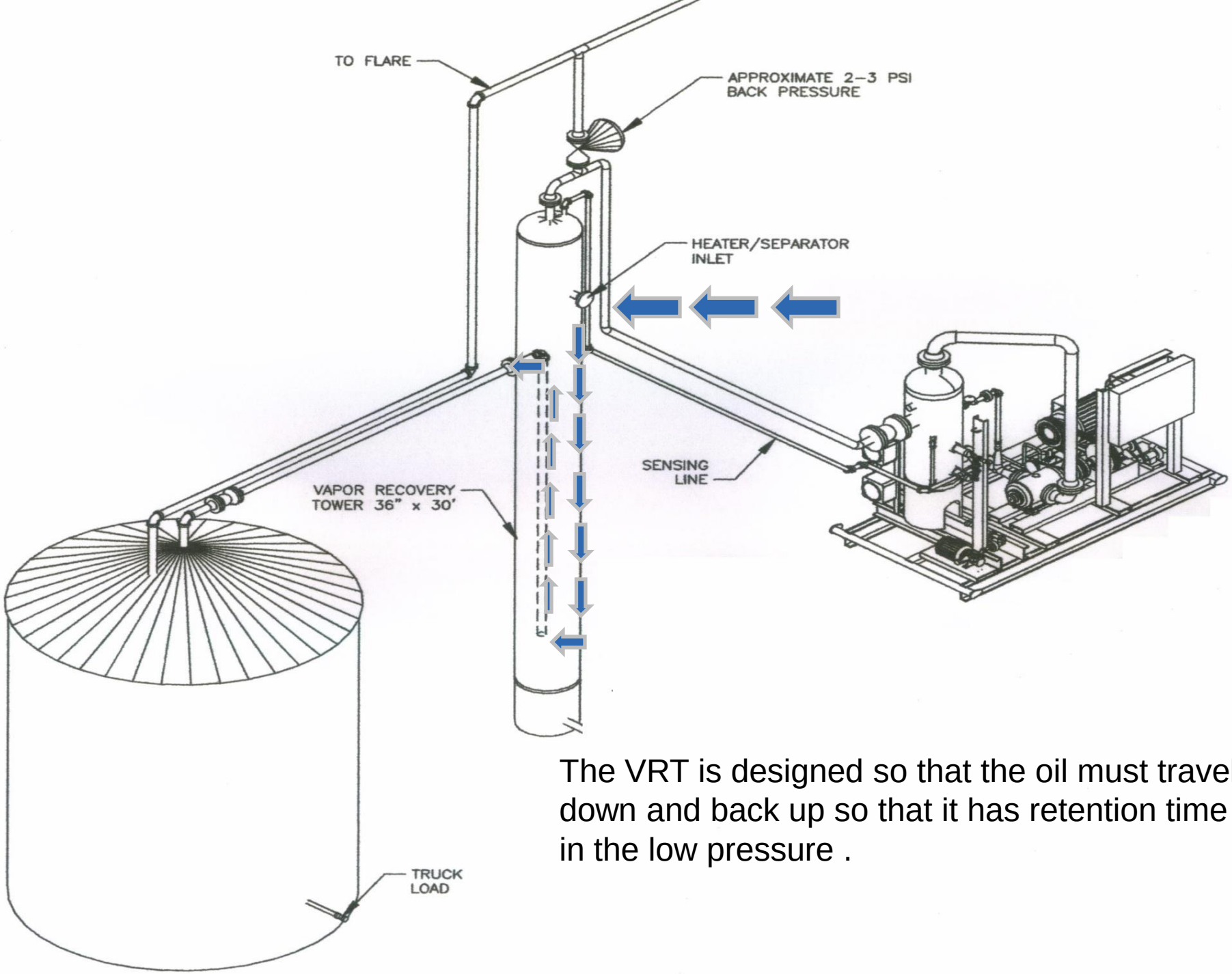
Vapor Recovery Unit monitors the pressure of the gas section of the VRT and maintains 1 PSIG or less of pressure



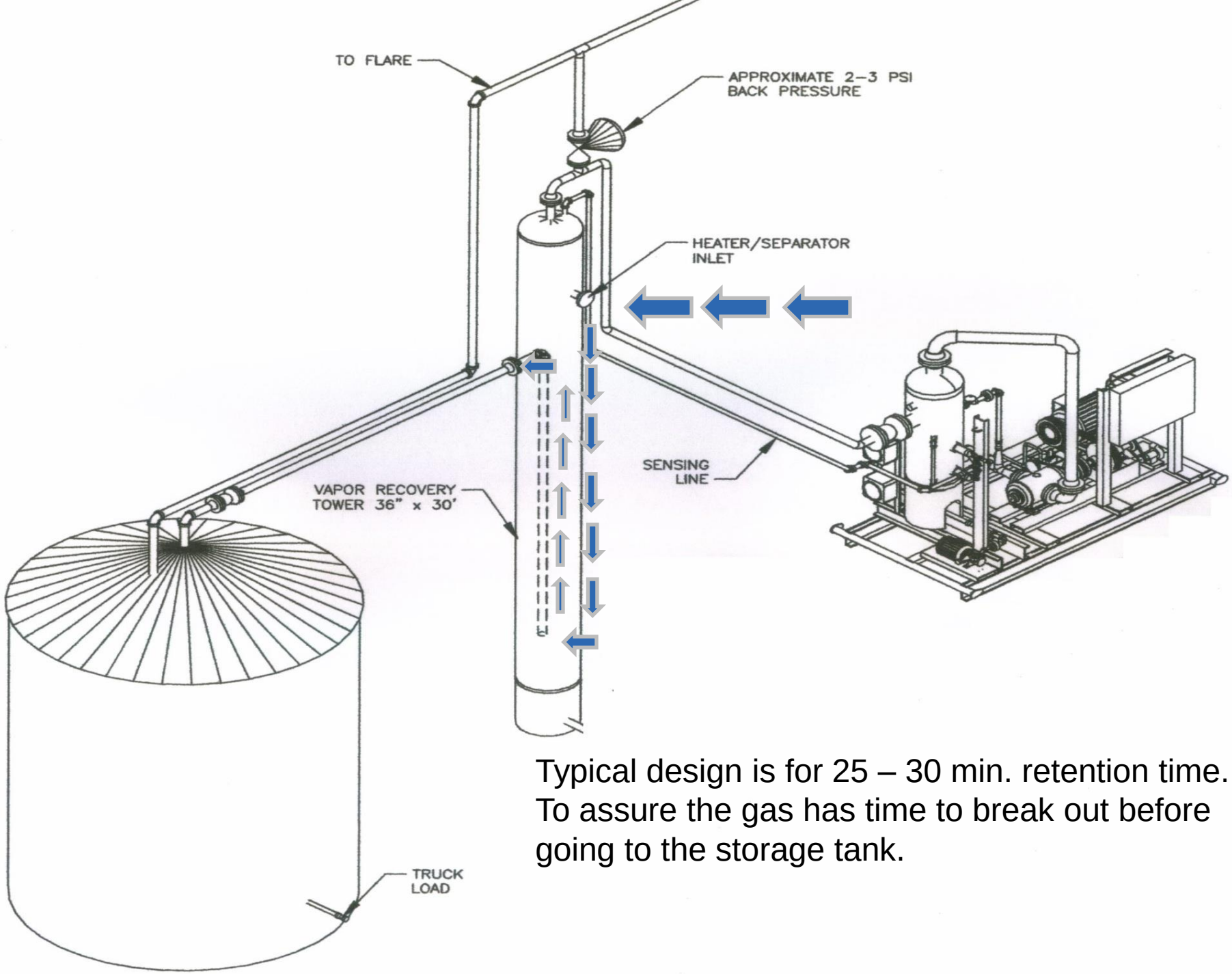
Pressure is monitored by a pressure transmitter through the sensing line



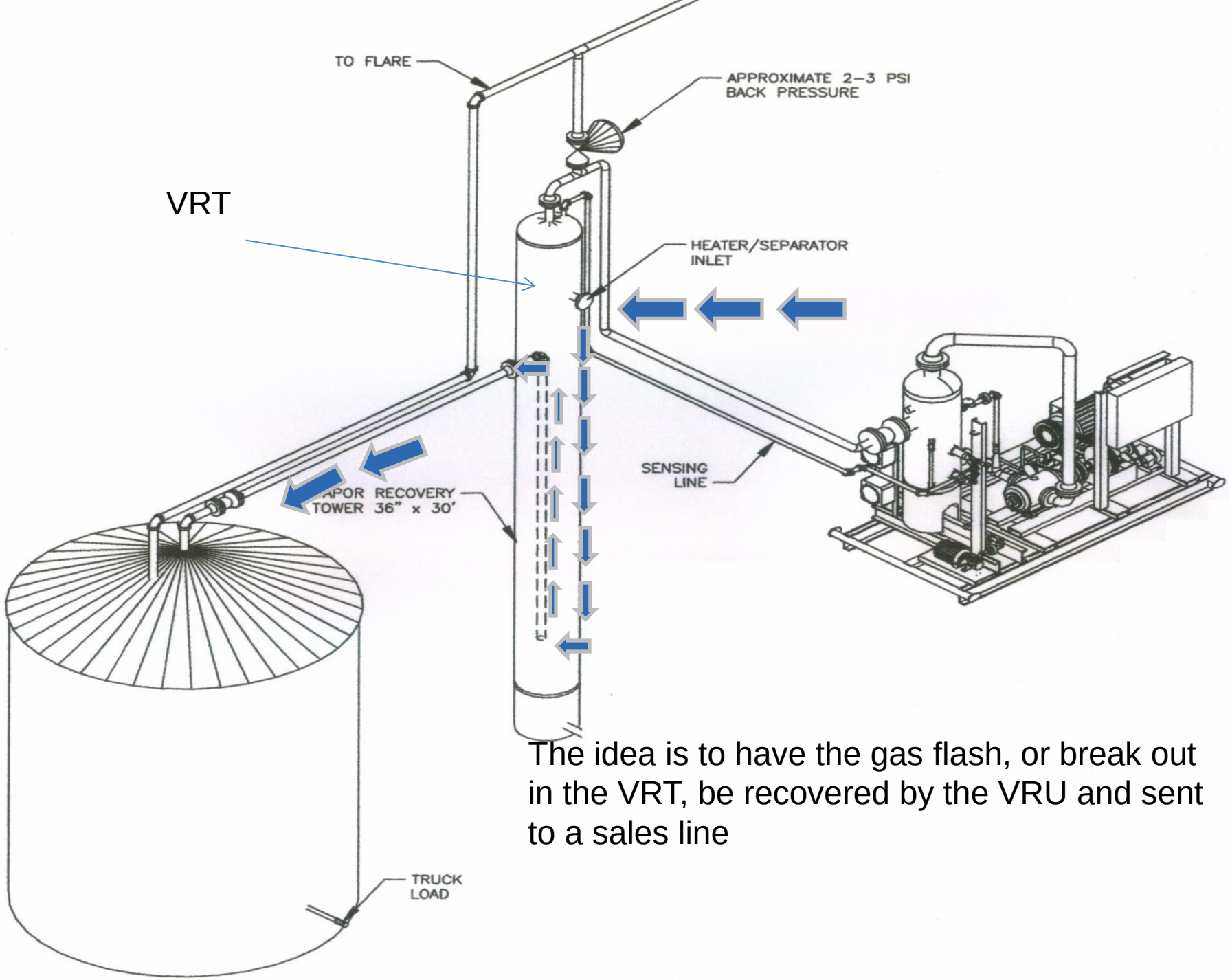
Since the oil has entered this low pressure from a higher pressure gas will break out of the oil or (flash)



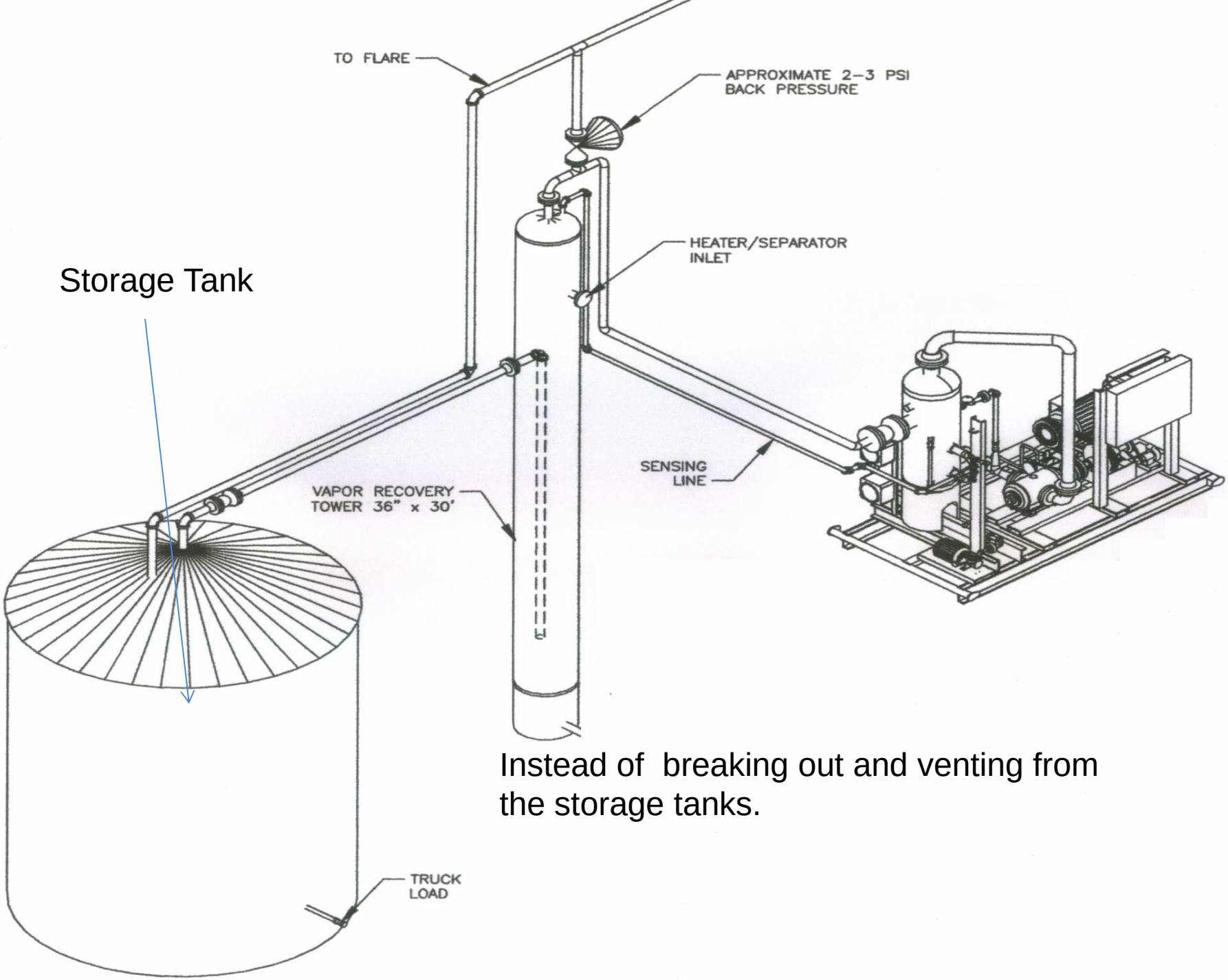
The VRT is designed so that the oil must travel down and back up so that it has retention time in the low pressure .



Typical design is for 25 – 30 min. retention time. To assure the gas has time to break out before going to the storage tank.



The idea is to have the gas flash, or break out in the VRT, be recovered by the VRU and sent to a sales line



Instead of breaking out and venting from the storage tanks.

Not always the Answer
IF YOU CAN MAKE MONEY

Vapor Combustor Unit (VCU)

Benefits:

- 99% DRE (Destruction Removal Efficiency)
- Stainless steel design
- Completely Enclosed Combustion
- Eliminate Pilot Gas operates on Process Gas ONLY


EDI
HY-BON
Engineering Company, Inc.

Vapor Combustor Unit (VCU)

- AB-20 rated for 20MCFD (based on a BTU value of 2200)
- AB-100 rated for 100MCFD (based on BTU value of 2200)
- Custom designs for higher flow rates (Emergency Combustors etc.)
- Electric or Solar Powered
- Electronic ignition
- Data logging

When Odor and Visibility are an issue, 99.+% Destruction Removal Efficiency

EDI

HY-BON

Engineering Company, Inc.

Bio-Filters for Oil Production Tanks and Waste Water Storage Tanks

The Bio-Filter works on the absorption principle using a dry, glycol based media.

These filters are filled with this media to reduce VOC's and GHG Emissions

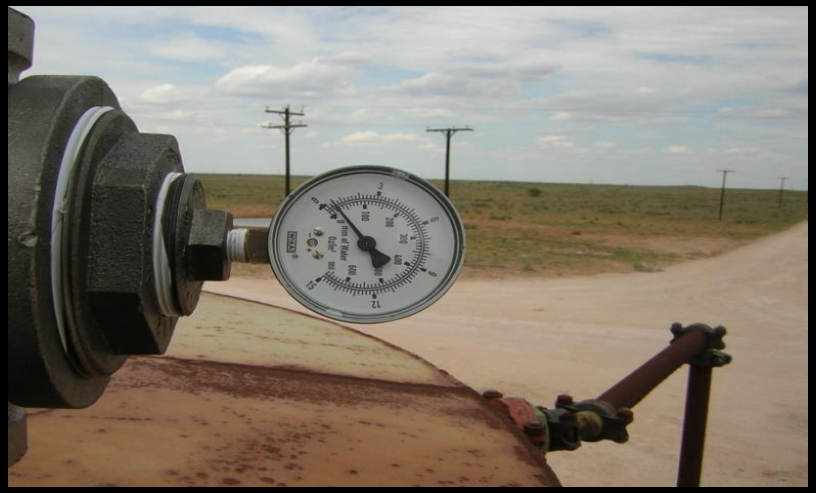
Bio-Filters for Oil Production Tanks and Waste Water Storage Tanks

CONNECTION

The Bio-Filter canister can be a 4 inch thread connection, victaulic or flanged connection. Filter is generally installed by or under the supervision of HY-BON personnel.

SAFETY

The Bio-Filter installed as shown here does not compromise the integrity or safety of the storage tanks.



Vent gas will follow the least path of resistance and we are using this theory to flow the gas through the Bio-Filter.

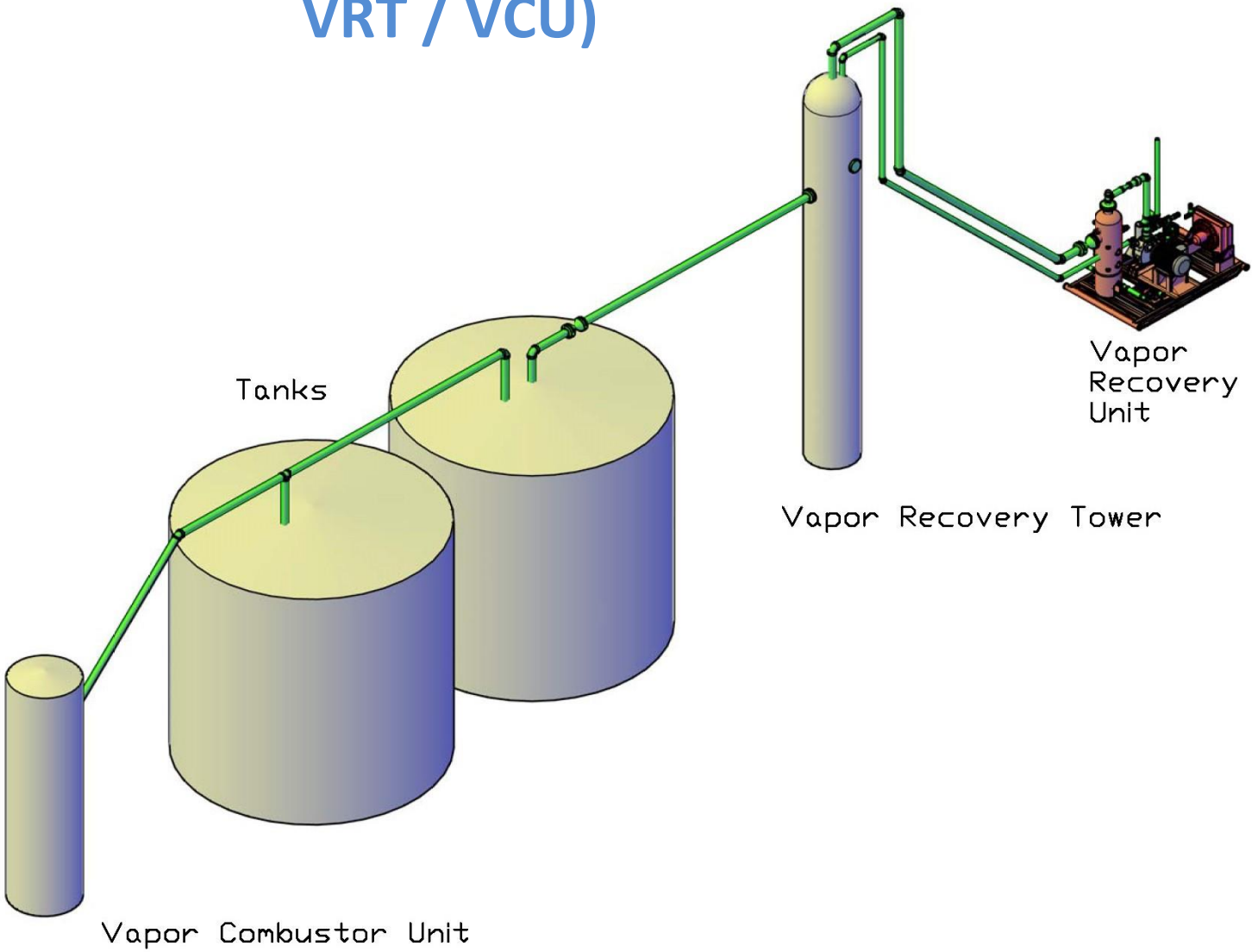
STATE CONCURENCE

Based on the data provided and discussions from the meeting we have agreed to allow tanks in low flow service where conditions are acceptable to the installation and operation of the Tank Gas Conservation Filter a baseline collection of 80%. If a company wishes to authorize a higher collection efficiency then direct measurement of the tank emissions with the filter in place is necessary. The measurement results would need to be submitted with the application registration for any claims over 80%.

Best,

Joe Shine
Team Leader, Rule Registrations Section
Air Permits Division
joe.shine@tceq.texas.gov
(512) 239-6595

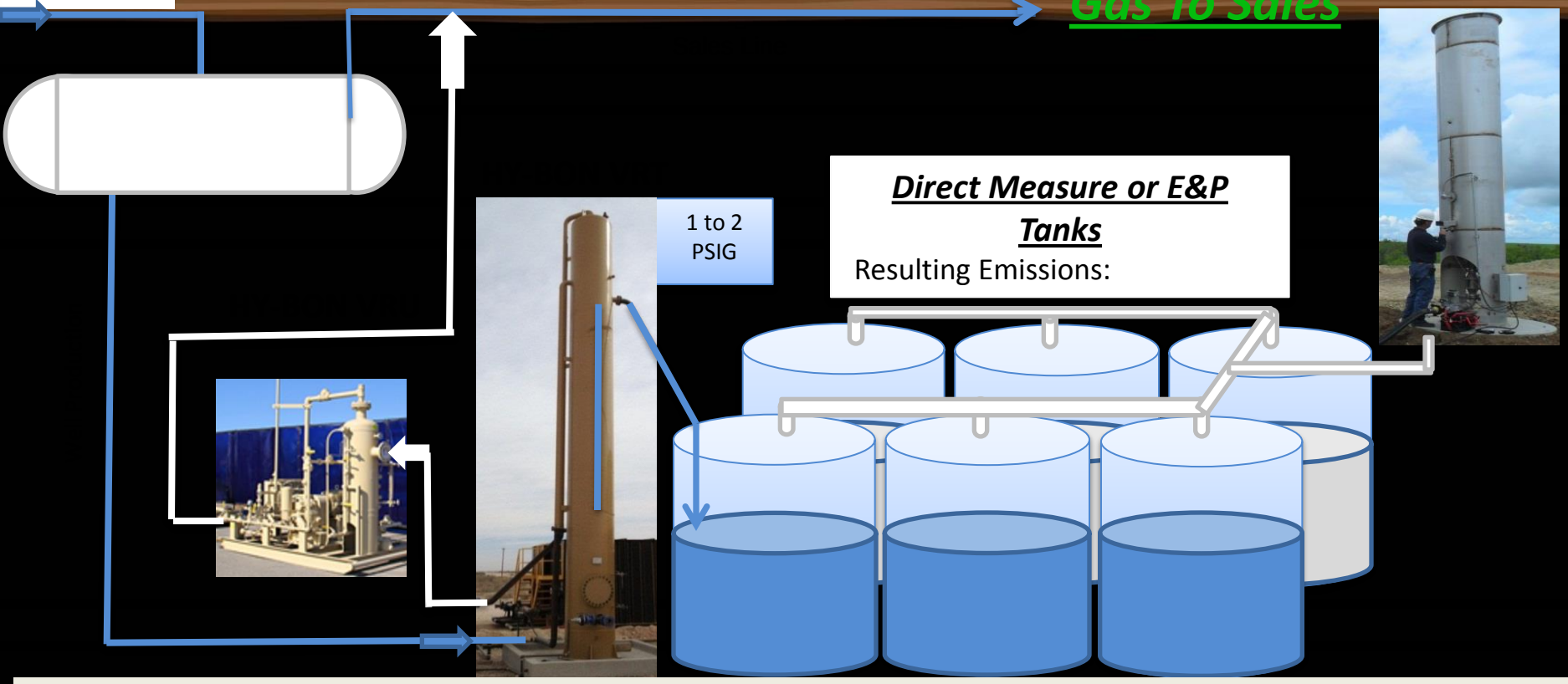
Vapor Recovery System (VRU / VRT / VCU)



- GOLD Standard Solution

HY-BON IQR Survey Services

Gas To Sales



Economic Payback

6.65 Months

Operational Data		Qty	Project Installed Cost			$145,400.00
Flow Volume MSCFD	100		IQR Field Survey Cost			$1,600
Operating Days	350		***UNIT SELECTION***	***Op Range***	***PSI***	
BTU of GAS	2100	1	HB-NK100-40-36D	60-120	200	41,900
Gas Price	$3.57	1	HY-BON(VRT)	5 - 75	1 - 2	20,500
		1	HY-BON Combustor (SM)	.7MTF	4 oz	9,500
Annualized Revenue	**$262,395.00**	0	NONE	0	0	0
		Install Cost %	100%	Installation Cost		71,900

Vapor Recovery Project Examples

Vapor Recovery Projects

Standardized packages – with rotary screw or rotary vane compressors - provide a cost effective, highly reliable and flexible solution to vent gas issues.

Vapor Recovery Projects

Engine drive packages to 75HP – with a controller configuration that emulates the same level of control as an electric motor with a VFD.

VAPOR RECOVERY

Stock tank vapor recovery in West Texas.

Note that the control panel is mounted off-skid outside of the hazardous area classification zone.

Oil / condensate tanks are manifolded together and piped to the Vapor Recovery Unit (VRU) – eliminating the vent gas.

Gas Measurement (HY-BON IQR)

HY-BON's IQR Service is based on three simple points in the process of defining the needs of a vapor recovery project:

- **IDENTIFY (I)** the emission sources with the best available technology
- **QUANTIFY (Q)** the volumes of gas escaping from the system tanks and define the gas content (gas analysis) of the emissions
- **RECTIFY (R)** emission levels via the best technical alternatives available in the industry for capturing each source and adding to the revenue stream

IDENTIFY

- primarily done by filming the site with FLIR GasFindIR® Infrared Cameras

- these versatile tools provide the ability to see sources of emissions we may not know exist

- many sources of emissions only require simple repairs to address

QUANTIFY

- using a breadth of different measurement tools, we can develop a full profile of the gas venting from the system

- profile needs to include high flow and low flow cases to ensure the selected equipment can operate throughout the full range of conditions

- using tools like turbine meters mounted on the top of a tank to complete a 24 hour (or longer) flow sample of the system

QUANTIFY (continued)

- taking pressurized samples of the gas and analyzing the constituents allows us to better collect design information and correctly select the compressor type / trim and package requirements for the application

- level of heavier constituents (C2, C3 +) and H2S/CO2 can greatly impact the size of coolers, piping, vessels and can be key in selecting the types of materials for design

Physical Constants per GPA 2145-09
Calculations per GPA 2172-86
@ 14.65 psia & 60.0 Deg. F.

	MOL %	GPM (Ideal)	BTU (Ideal Dry)
Nitrogen	6.587	0.000	0.0
Methane	36.942	0.000	373.1
CO2	2.919	0.000	0.0
Ethane	16.292	4.346	288.3
H2S	0.000	0.000	0.0
Propane	15.118	4.154	380.4
Iso-Butane	4.150	1.355	135.0
N-Butane	8.485	2.668	276.8
Iso-Pentane	3.278	1.196	131.1
N-Pentane	3.343	1.209	134.0
2,2-DMB	0.000	0.000	0.0
2-Me-C5	0.000	0.000	0.0
3-Me-C5	0.000	0.000	0.0
Hexanes +	2.886	1.277	152.4
TOTALS	100.000	16.204	1865.2

GROSS HEATING VALUE @ 14.65 PSIA

Dry	Wet	
1885	**1854**	**BTU/Real Cu.Ft.**
1.2385	**1.2289**	**Specific Gravity (Real)**
1865	1833	BTU/Ideal Cu.Ft.
1.2261	1.2155	Specific Gravity (Ideal)

Z Factor : 0.9896

GASOLINE CONTENT (GPM/Real)

Ethane & Heavier	16.374
Propane & Heavier ...	11.982
Butane & Heavier	7.784
Pentane & Heavier ...	3.720

QUANTIFY (continued)

- detailed reports provide a concise way to see what data was measured as compared to the know site data and how much gas loss is taking place

- these types of reports can be used as part of the required submittals to the regulating authorities

Field Test Information

Separator Temperature	N/A	DEG F
Separator Pressure	30	PSI
Sales Line Pressure	225	PSI
Wind Speed	0-5	MPH
Ambient Temp.	100	DEG F

	1H	2H	
Produtcion of Oil	53	65	bbls
Production of Water	138	151	bbls
Production of Gas	983	1223	mcf

Tank Volume Measurement

Inst. Flow Volume	500-2000	CFH	Total Flow Volume	26.5	MCFD
Test Start Time	1:15		Test Duration	24	

FLIR GasFindIR Survey

GasFindIR Camera Evaluation Comments

Video ID		Picture ID	2677	Description	Location Overview
Video ID	0	Picture ID	2678	Description	Overview Video
Video ID	1	Picture ID	2679	Description	Hatch West Tank
Video ID	2	Picture ID	2680	Description	Vent Valve
Video ID	3	Picture ID	2681	Description	Meter In place
Video ID		Picture ID		Description	
Video ID		Picture ID		Description	
Video ID		Picture ID		Description	
Video ID		Picture ID		Description	
Video ID		Picture ID		Description	
Video ID		Picture ID		Description	
Video ID		Picture ID		Description	
Video ID		Picture ID		Description	
Video ID		Picture ID		Description	

RECTIFY

- once the flow is measured, the gas is analyzed and the point to send the gas is identified, you can design and define the solution

- in cases where an equipment solution is warranted, one can select from a purchased unit from standard equipment line or a project specific engineered solution

- in some cases, a standard rental solution may be suitable

- in some cases (depending on emission levels), simple repairs can be sufficient

Working with reliable, hard data and experienced providers, you can arrive at solutions to RECTIFY almost any venting situation.

HY-BON EXPERIENCE

In the past HY-BON has been awarded and built major vapor recovery and flare reduction projects in:

Angola	Argentina	Algeria	Bolivia
Canada	China	Colombia	India
Indonesia	Kuwait	Libya	Malaysia
Mexico	Russia	Venezuela	Yemen

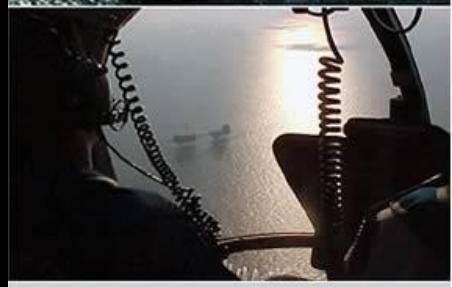
In the U.S. market, projects installed in:

Alabama	Alaska	California	Colorado
Illinois	Kansas	Louisiana	Montana
New Mexico	N. Dakota	Ohio	Oklahoma
Pennsylvania	Texas	Utah	W. Virginia
	Wyoming	Gulf of Mexico	

The HY-BON Difference

Machine Shop

Worldwide Field Service



Spare parts inventory

HY-BON ENGINEERING COMPANY, INC.

Setting a New Standard