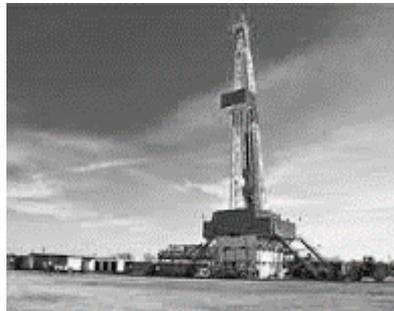




# Complete Solids Management

## Engineered Solutions for Onshore and Offshore Solids Control and Cuttings Handling

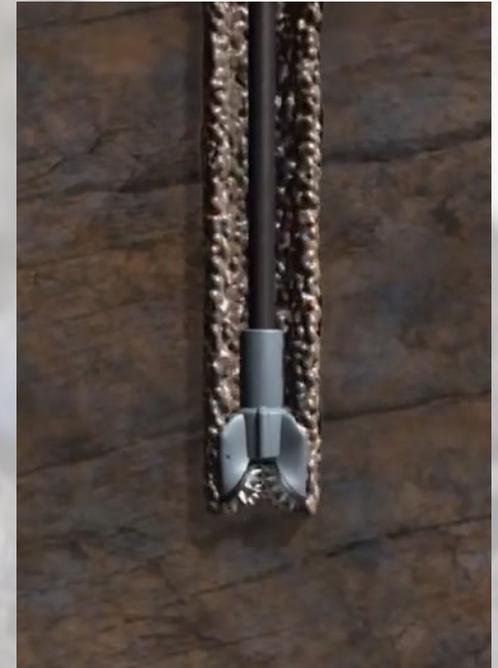


*PMI-Evolving with the new oil and gas industry!*

# Drilled Cuttings Management

aka “Solids Control”

- **Cuttings Conveyance**
- **Skip & Ship**
- **Bulk Cuttings Shipment**
- **Cuttings Dryers**
- **Centrifuges**
- **Cuttings Boxes**
- **Rig Vacs**
- **Zero Discharge/Closed Loop**
- **Rental Equipment-BOP Pans, Rack Back Pans, Pressure Washers, Pumps, misc**
- **Logistical Solutions**





**MUD COMPANY**  
**\$ Sale Products**  
**≈\$200/bbl**



**Control Client Costs**  
**Reclaiming Product**  
**and Reducing**  
**Disposal**

**DISPOSAL COMPANY**  
**\$ High Disposal Costs**  
**≈\$30/bbl**





# Cuttings Management-Planning

- **Well Schematic**
- **Days Vs Depth**
- **Anticipated Rates of Penetration**
- **Mud Program**
- **Besides Conforming with Regulatory Requirements, What Else can we Accomplish**
- **Pre Well Analysis**
- **Agree to KPIs/Client Expectations**
- **Survey Rig if Necessary**
- **Proposal**
  - **Operating Procedures, AutoCAD Layout to Scale on Rig Dwg, Photo Support from Site Survey, Contingencies, Rate Sheet, etc**
- **Daily Reporting-Operating Hrs, Standby, Downtime, Personnel, Charges, %OOC, Mud Recovery, %LGS, Cuttings Box Inventory, JSAs, Stop Work Authority, etc**
- **Post Well Recap**

## Well #123



### Cuttings Dryer & Conveyance Basis of Design



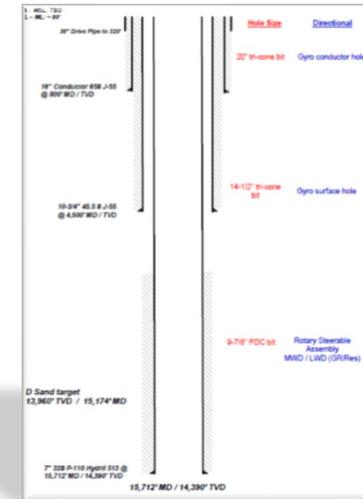
Hole Size	Total Footage Drilled per Section	ROP	Exp Factor 1:1.15	bbbls mud/cuttings Per Section	bbbls Per Hour	Tons Per Section @ 22 lbs/gal	Tons Per Hour @ 22 lbs/gal	GPM	GPH	Yd <sup>3</sup> /Hr	m <sup>3</sup> /Hr
22	2765	275	2.15	2795	278	1291	128	195	4670	23	18
16.5	5080	250	2.15	2889	142	1335	66	100	2388	12	9
14.5	7090	225	2.15	3113	99	1438	46	69	1660	8	6
12.25	959	200	2.15	301	63	139	29	44	1053	5	4
				9098							

### Auger Carrying Capacities

Screw Size	Capacity Ft <sup>3</sup> /Hr @ 1 RPM 30% Loaded	Capacity Ft <sup>3</sup> /Hr @ 1 RPM 45% Loaded	Mat Wt Lbs/Ft <sup>3</sup>	RPMs	TPH @ 30% Loaded	TPH @ 45% Loaded
14"	20.8	31.2	165	82	141	211
12"	12.9	19.4	165	82	87	131
10"	7.57	11.4	165	82	51	77
9"	5.45	8.2	165	82	37	55

### VCD Operating Capacities

	Model	Feed Rate TPH	G's	Diff RPMs	Lube System	Weight (lbs)	Screen Area	Hp	Hp
Competitors	WSM 01	40	445	15.4	Pump & Motor	8200	11.2	75	75
	WSM 03	25-40	445	15.4	Pump & Motor	4400	7.11	30	30
	WSM 04	40-80	426	12.6	Pump & Motor	7700	13.3	75	75
PMI	WSM D4	40-100	300-450	Variable	Oil Filled	7300	13.3	60	60



Mud Returned after Dryer 50%	4549
Mud Returned after Centrifuge 80%	3639
Mud Cost per bbl	\$200
Savings on Mud Returned	\$727,812

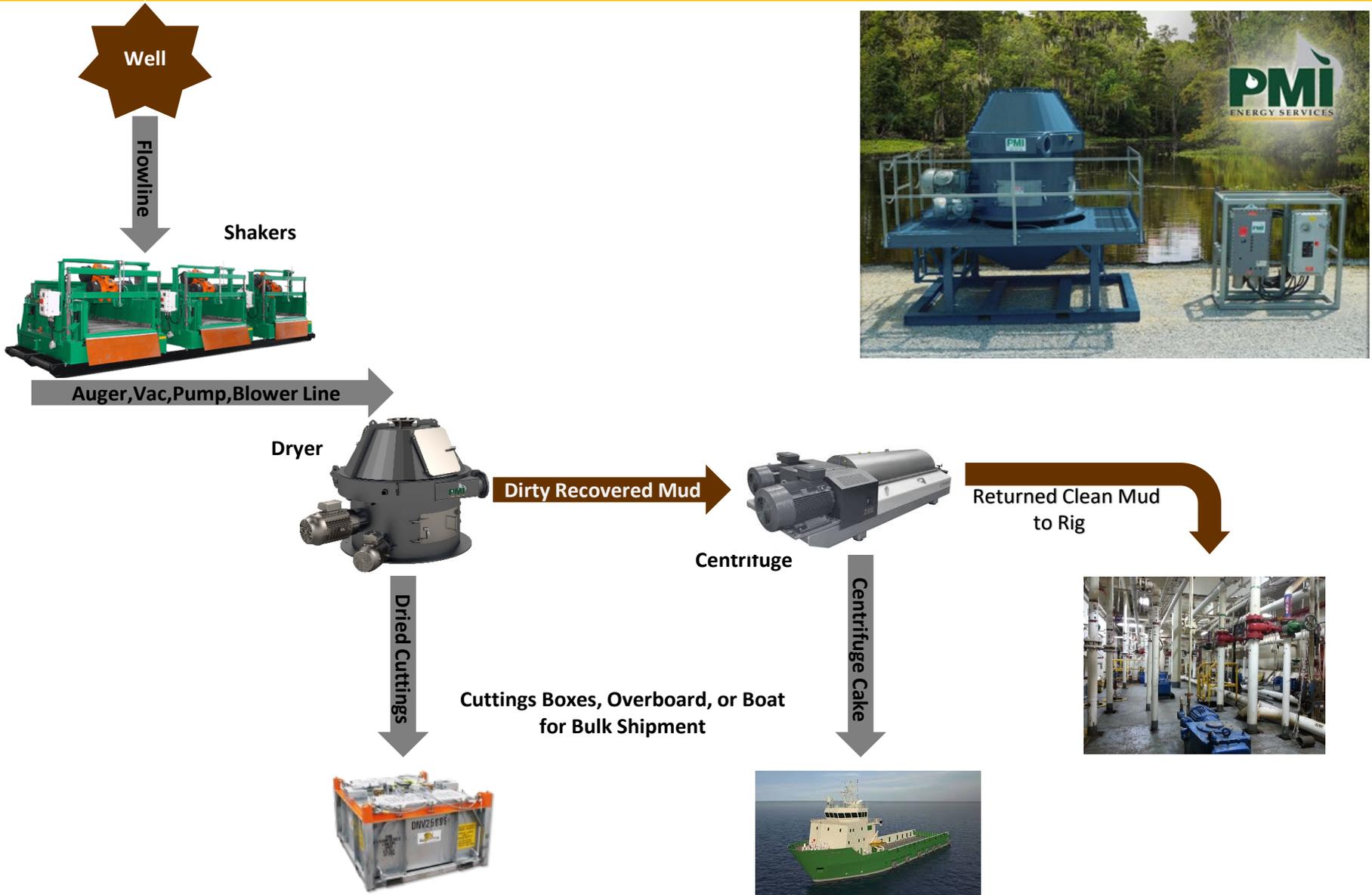
**PMI offers centrifugal cuttings dryers to reclaim and reuse 50% of expensive drilling fluids adhered to drill cuttings typically lost to disposal-Drastically reducing mud, disposal, transport and logistics costs.**



All installations are uniquely designed and engineered to:

- Well Diagram
- Rates of Penetration
- Mud Types
- Days vs Depth
- Location
- Space Restraints
- Rig Specifics
- Built in Contingencies





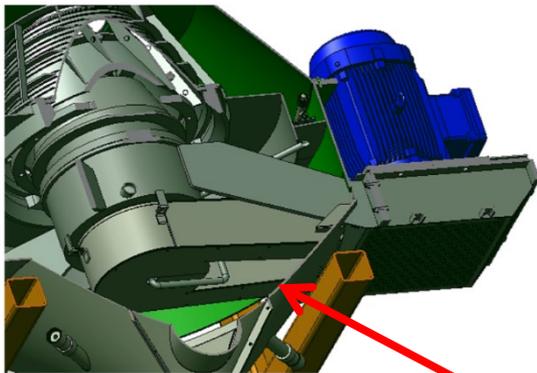


# The Latest in Vertical Cuttings Dryer Technology

Though belt-driven systems are cost effective and relatively easy to implement, at a minimum they have represented a maintenance nuisance, at worst they represent a Class II – Division 1 safety concern (When the dryer is operating at peak performance, a confined cloud of dust and oil mist is generated within the body.)

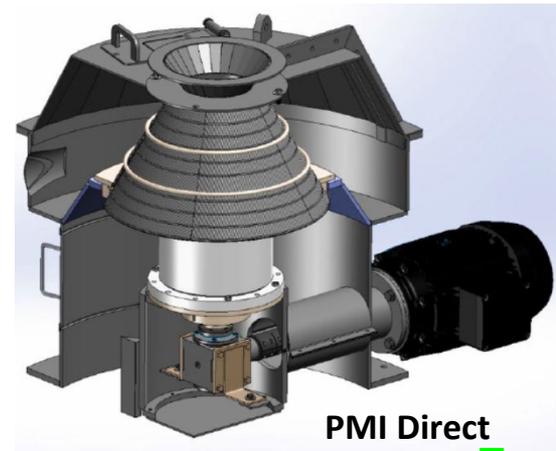
Unlike belt driven dryers, PMI's D4 incorporates a proprietary enclosed gear drive assembly providing a guaranteed Class I – Division 1 and Class I – Division 2 drive system compliance. No other dryer available in the market can make those same claims.

For more Class II – Division 1 compliance details, please feel free to ask for a copy of manufacturer's recently published white paper, "Understanding the Potential Class II – Division 1 Safety Hazards Present When Operating Vertical Cuttings Dryers."



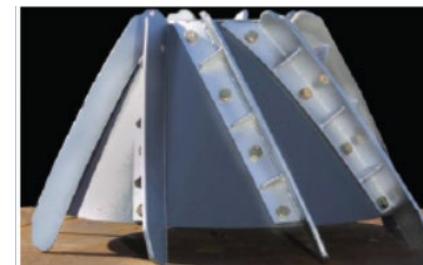
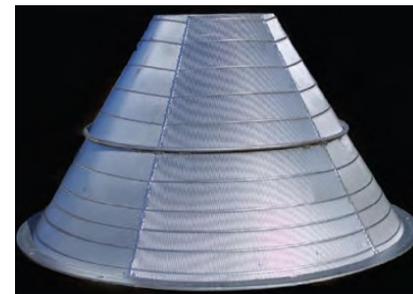
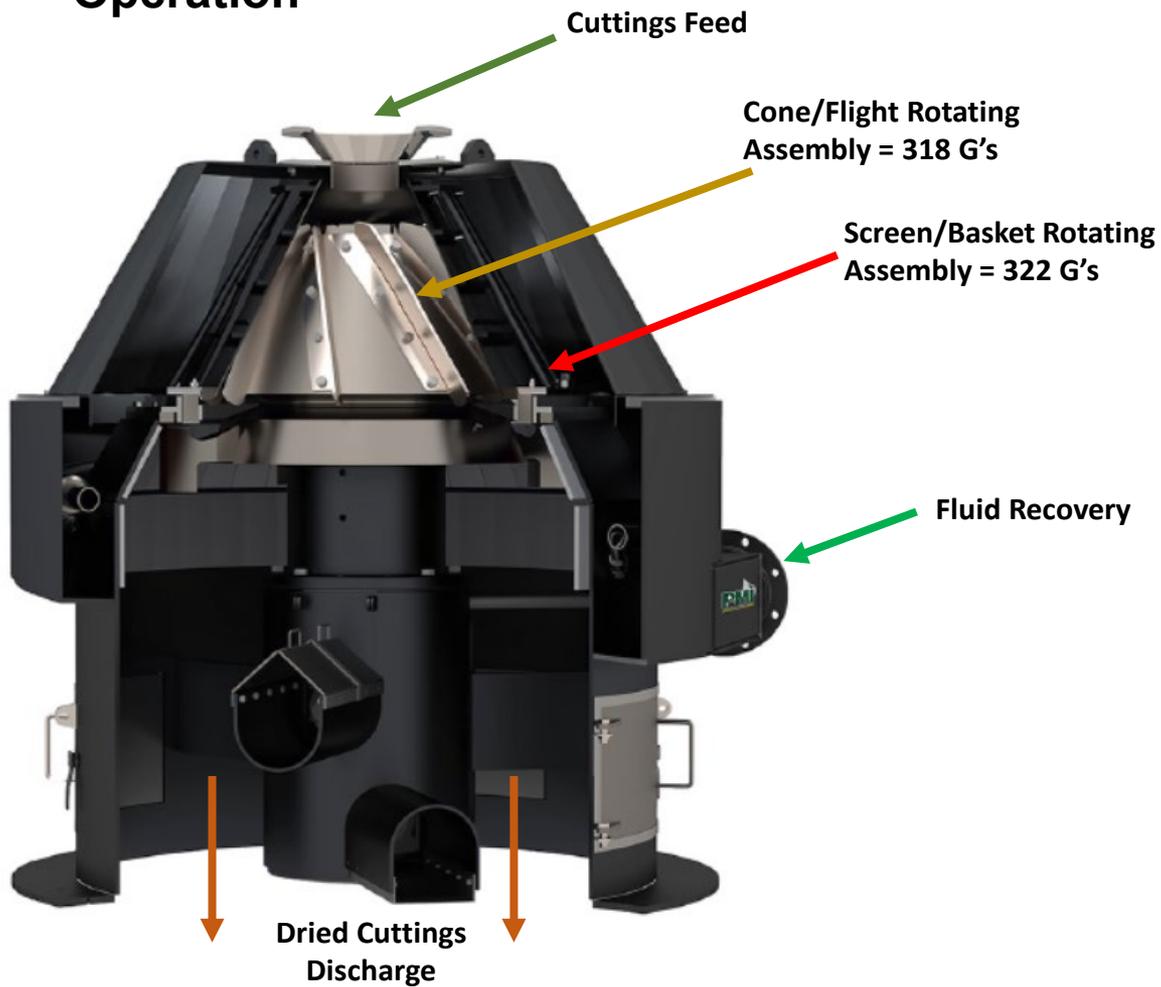
Competitors Belt Driven WSM-04

VCD Under Carriage Area of Concern for Potential of Combustible Dust



PMI Direct Drive WSM-D4

## Dryer Operation



## Disposal Reduction & Fluid Reclamation



**BEFORE** off of Rig  
Shakers

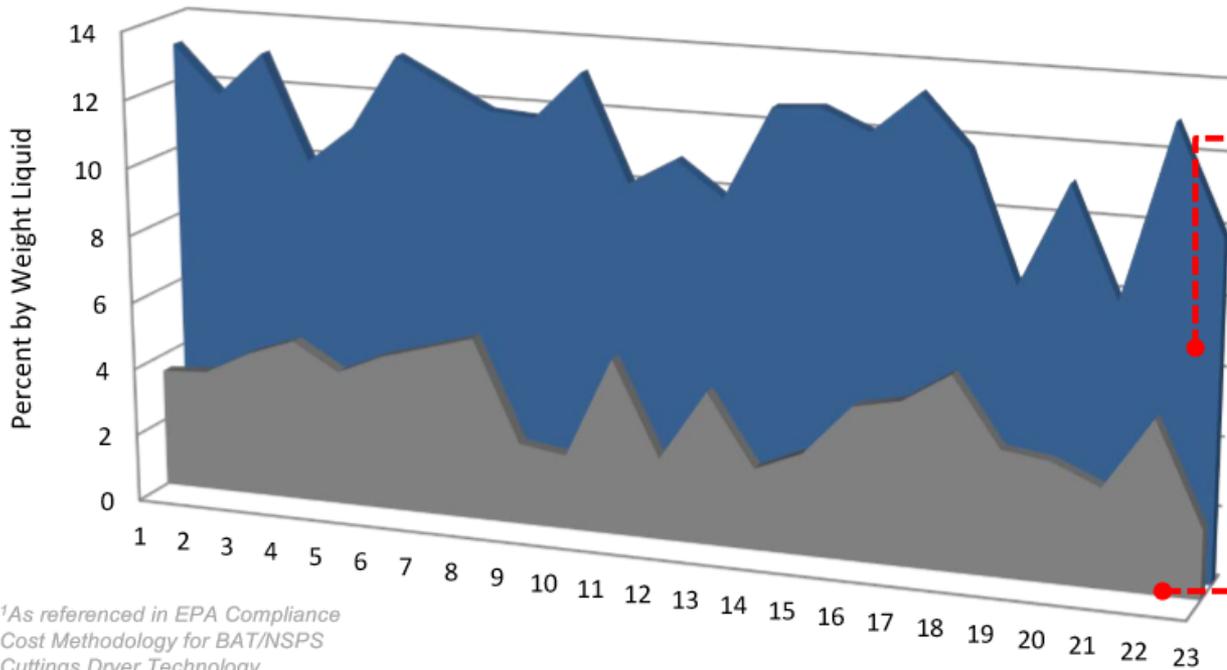
18.4% Oil on Cuttings



**AFTER**

2.8% Oil on Cuttings

# Operating Performance



<sup>1</sup>As referenced in EPA Compliance Cost Methodology for BAT/NSPS Cuttings Dryer Technology, performance data from 23 wells revealed that the Synthetic On Cuttings (SOC) was reduced from 11.7% to 4.15% by weight after being processed.

- Standard VCD Discharge Liquid Content (% Weight)
- Shaker Discharge Liquid Content (% Weight)



**BEFORE** – Drill cuttings prior to feeding through a VCD.



**AFTER** – Drill cuttings after being processed by a VCD.

# Cuttings Dryer Comparison

## VCD Operating Capacities

	Model	Feed Rate TPH	G's	Diff RPMs	Lube System	Weight (lbs)	Screen Area	Hp
Competitors	<del>WSM 01</del>	40	445	15.4	Pump & Motor	8200	11.2	75
	<del>WSM 03</del>	25-40	445	15.4	Pump & Motor	4400	7.11	30
	<del>WSM 04</del>	40-80	426	12.6	Pump & Motor	7700	13.3	75
PMI	WSM D4	40-100	300-450	Variable	Oil Filled	7300	13.3	60



- The only direct-variable speed vertical cuttings dryer
- Only guaranteed Class I, Div I and Class I, Div II VCD
- Exceeds cuttings discharge regulations
- Reclaims 50% of fluid lost to drill cuttings for reuse
- Designed for all drilling fluid applications (WBM, SBM, OBM)
- Processing capacity >80 TPH

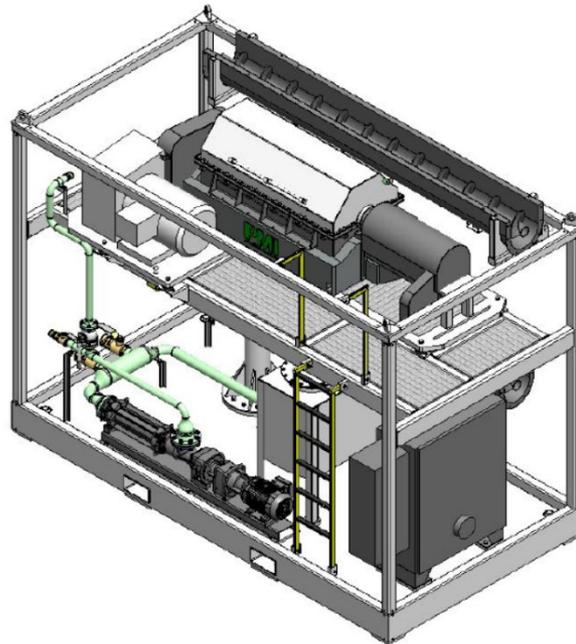
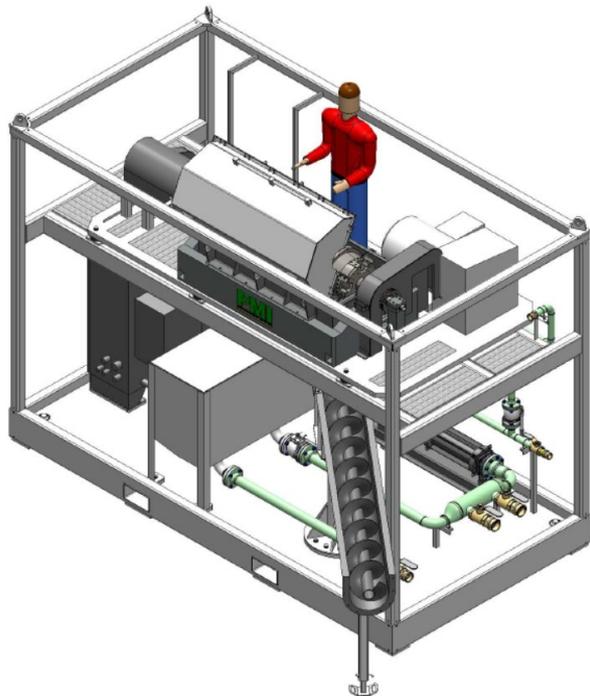




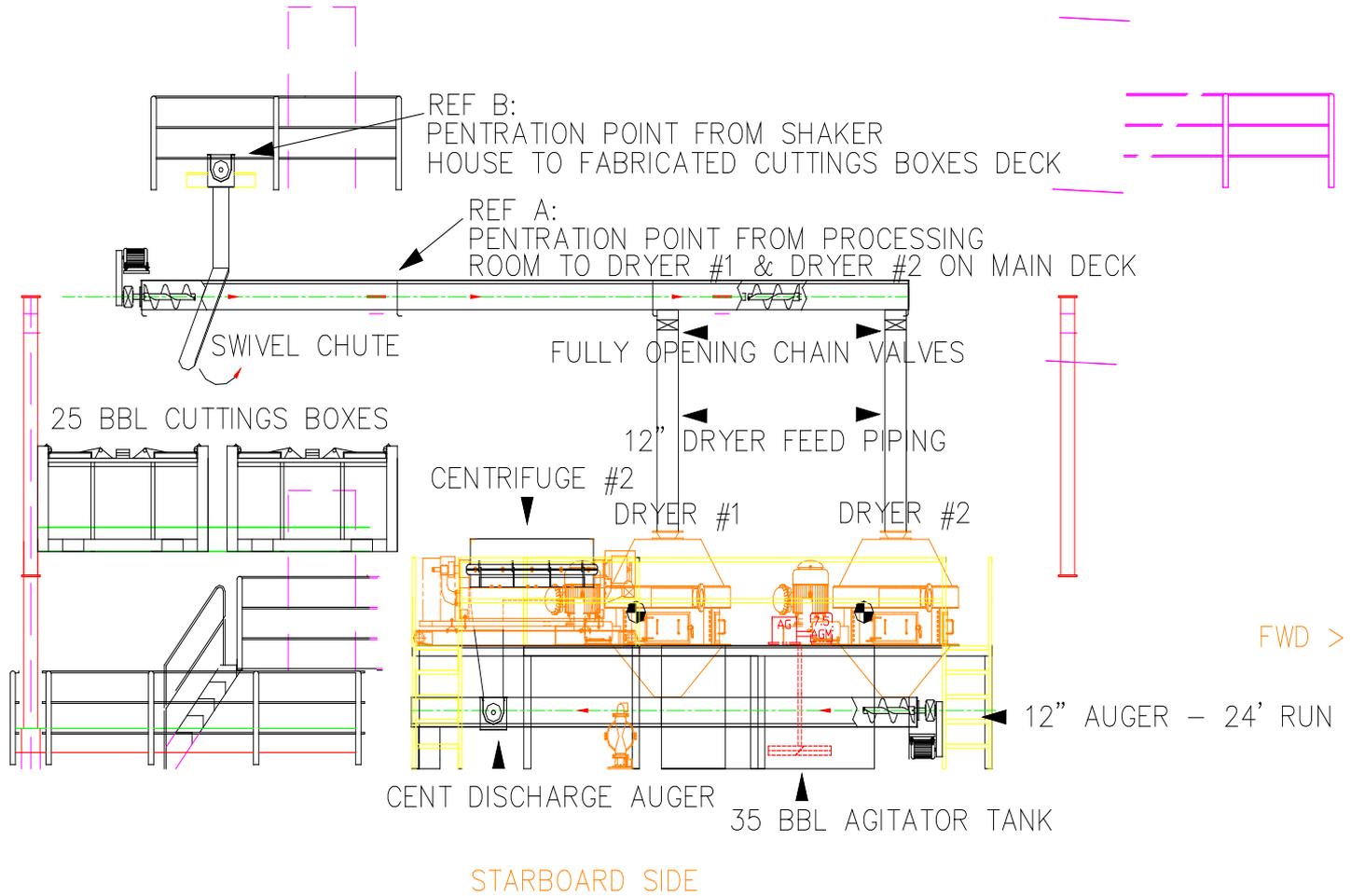
# One Lift/DNV Fluid Processing Plant

## Effluent Processing Plant

- One Lift DNV EZ Install (Centrifuge, Auger, Effluent Tank, VFD Control Panel, Pump, Hard Piping)
- HH5500 Slimline VFD Conversion
- Seepex Progressive Cavity Pump

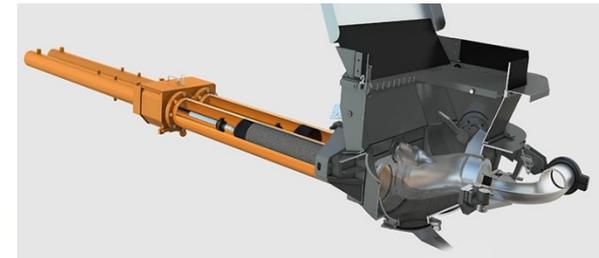


# Always Designed with Multiple Contingencies



# Cuttings Transfer Options

- Vacuum Systems
- Screw Conveyors
- Drill Cuttings Pumps
- Blowers
- Bulk Shipment



## Benefits of PMI Annular Feed Inlet

-  Uses Standard Cuttings Box Relief Hatch. Opening and Closing Cuttings Box Lids Eliminated
-  No Moving Aluminum False Lids
-  Less HSE Issues. Improves HSE Performance of Handling Boxes
-  Reduces Risks of Accidents & Consequential Delays with Lid Handling
-  Faster Box Swap Overs
-  Prevents Drilling from Slowing Down due To Handling Issues
-  No Hoses on Deck for Impact Wrenches
-  No Moving/Repositioning Slings Saving Time
-  Reduction in Cuttings Box Leading to:
  -  Less Trucking
  -  Less Disposal Charges
  -  Less Final Box Cleanout Charges
  -  Less Overhead Lifts
-  Reduced Manpower
-  More Efficient Use of Rig Deck Space



## Cuttings Boxes – Lids/Handling

- Trapping Injuries
- Pinch Points
- Back Strains
- Pulled Muscles
- Slips, Trips, & Falls
- Tight Working Environments
- Heavy Lid Lifts
- Creates Significant HSE Issues

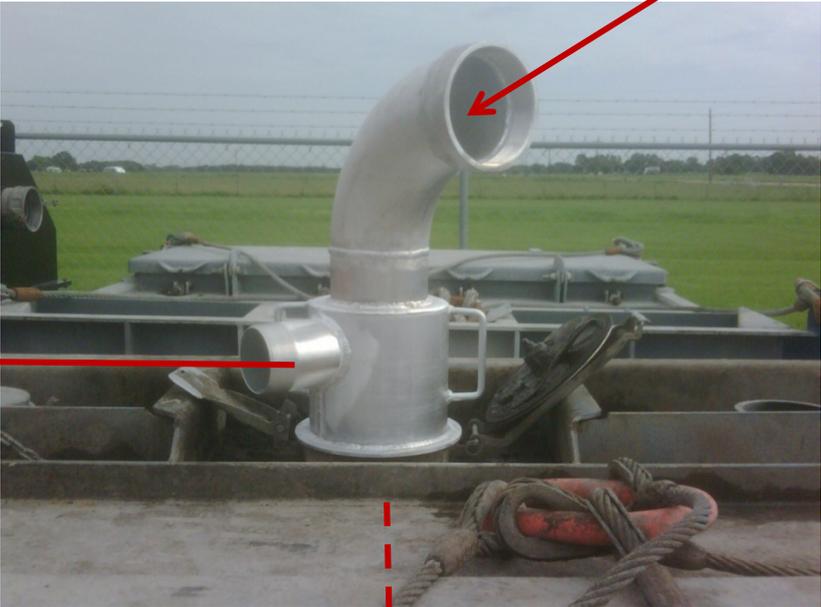




# The Solution: Closed Cuttings Box Feed Inlet

Cuttings In from Shaker Ditch

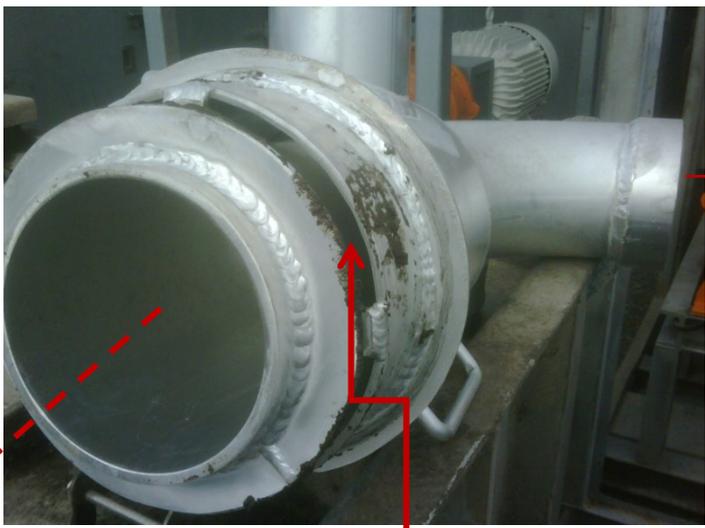
Air Out to Vac



Cuttings Out to 25 bbl



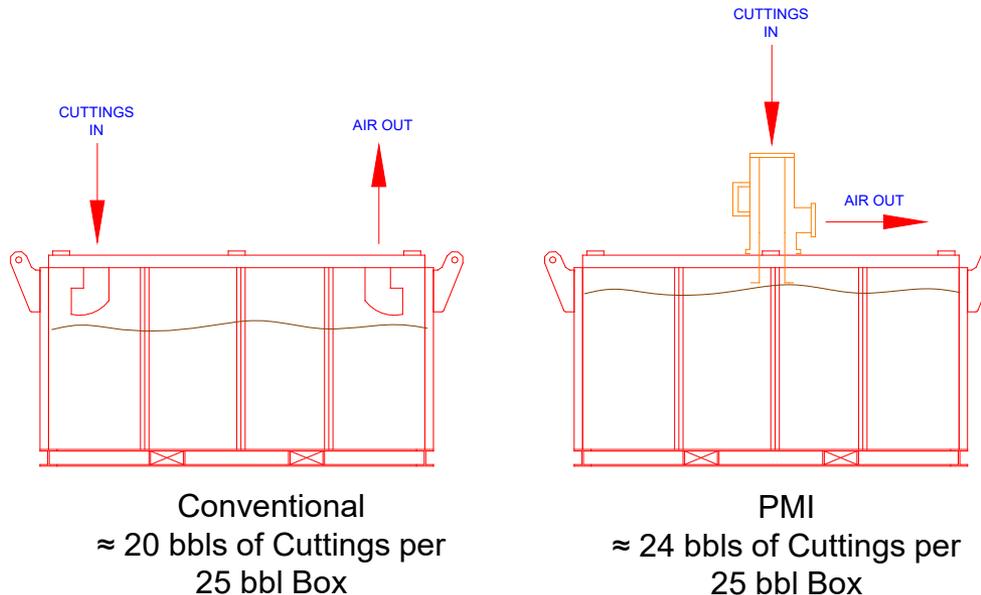
Cuttings Out to 25 bbl



Air Out to Vac

Annular Airflow

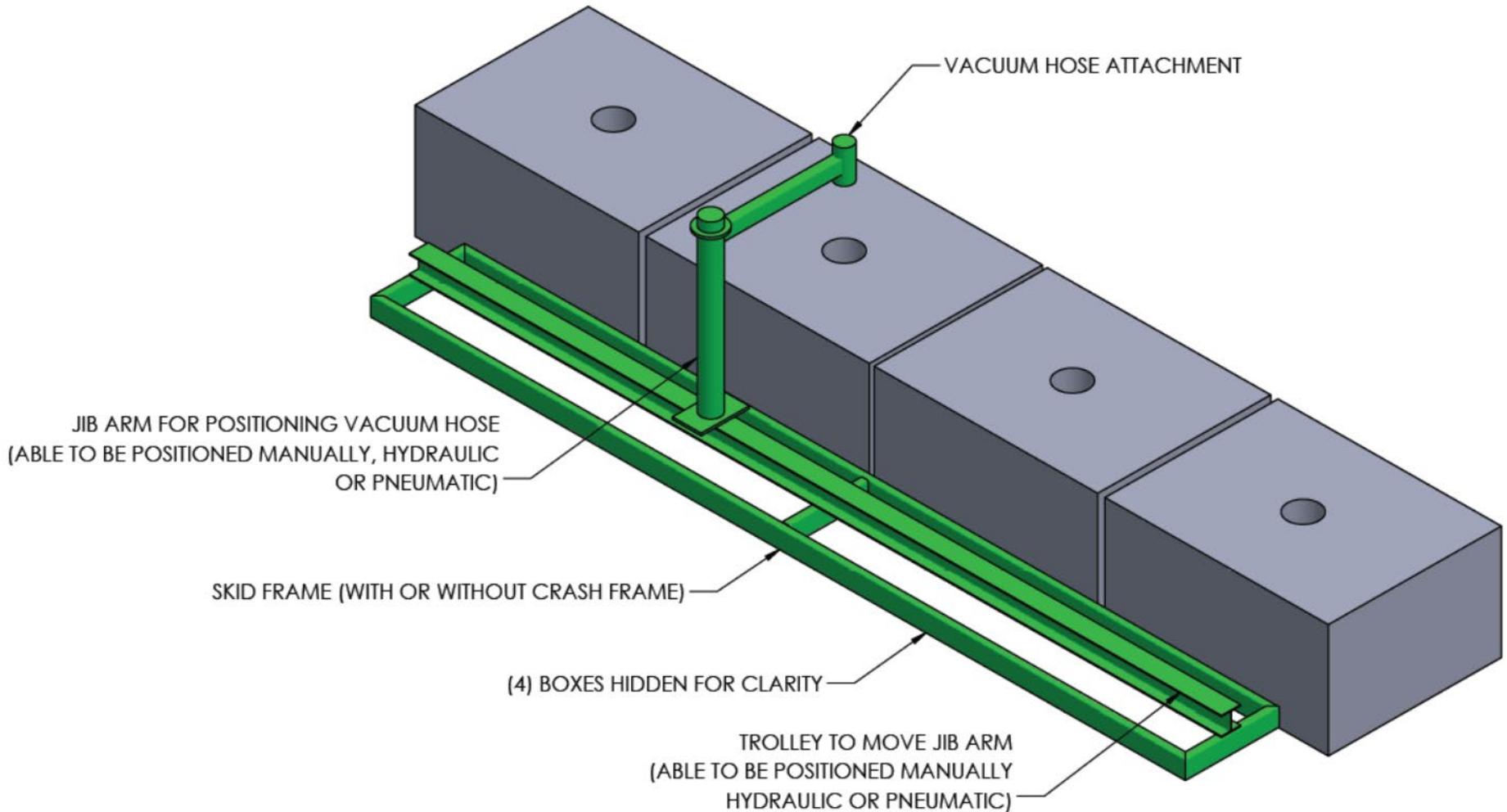
# Cuttings Box Volume Comparison



By utilizing the PMI annular feed inlet the volume that can be collected in a 25 bbl box will increase approximately 17-15%, resulting in savings of the same for the following:

- Reduced disposal costs
- Reduced cuttings box rental
- Reduced cuttings box transportation
- Reduced overhead lifts

# Semi Automated Feed Technology (SAFE-T)

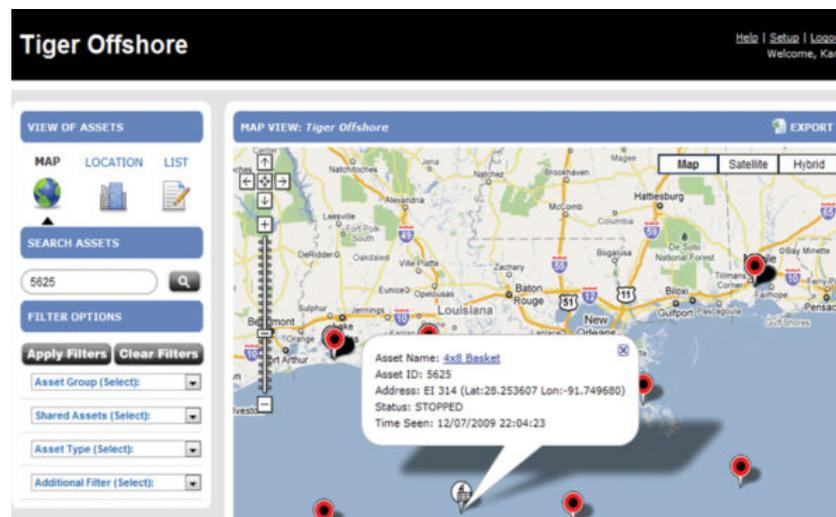
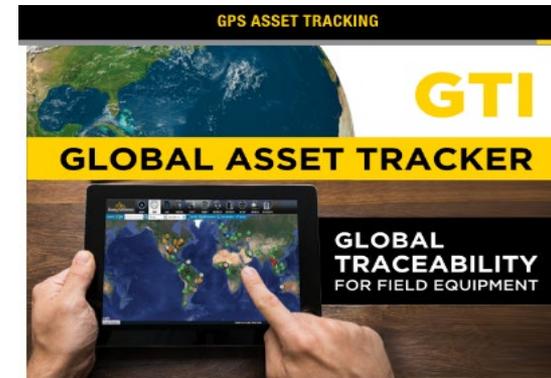


**Map** - Locate items by name / description / serial number or group, view onshore & offshore locations, includes offshore blocks and platforms, customize locations, zoom in / out, measure distances, create geofence and landmarks.

**Reports** - Query item history by date or date range for locations and customers. Reports are exportable to Excel and include a column to input charge codes for allocation purposes.

**Alerts** - Send e-mail notification when a GPS unit moves in or out of a predetermined geofence area.

**Application** - Software designed, developed and hosted by a 3rd party vendor.





Visit us at  
[www.pmi.net](http://www.pmi.net)

All Information Herein to be Considered Confidential & Proprietary  
Information; Property of Production Management Incorporate; Energy  
Services

**PMI Energy Services**  
1204 Youngs Road  
Morgan City, LA 70381  
T: (985) 631-3837  
[www.pmi.net](http://www.pmi.net)