

Light, advanced, highly effective and efficient well intervention cleanout technologies

Indonesia – Norway Joint Seminar
Efficiency in the Oil Industry

Jakarta, 6 April 2017

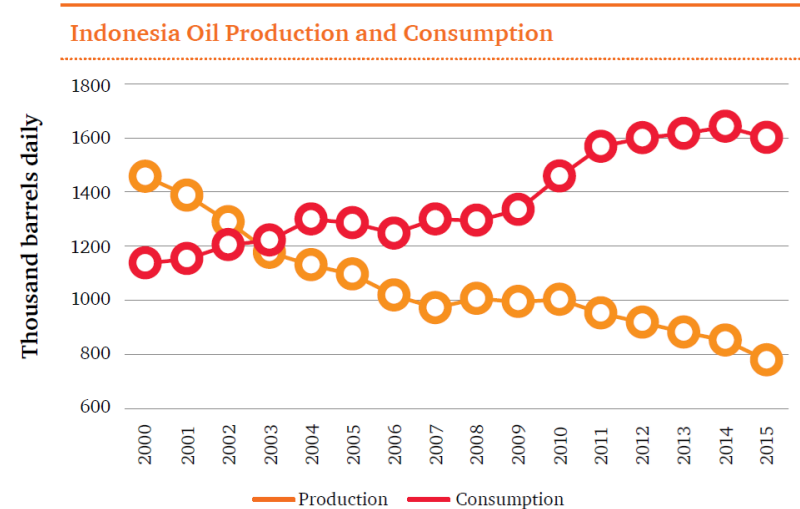


Indonesia E&P macro market overview



- Consistent oil production decline and consumption growth
 - Indonesia a net importer since 2003
- Recent prolonged low oil price
 - Industry CAPEX cuts, minimal drilling
- Significant quantity of low-performing or idle wells

Well intervention to rejuvenate existing viable well stock is a choice option!



Source:
2000 - 2014: BP Statistical Review of Energy 2015
2015: SKK Migas & MoEMR

Well Intervention deployment options

- Traditional intervention Solutions
 - “Heavy” – Rig/Drill Pipe, Coiled Tubing
 - “Light” – Slickline
- A range of e-line deployed powered mechanical application services now available

✓ Wellbore Cleanout

PrecisionBrush



PrecisionHone



PrecisionDebrisMill



PrecisionCollector



✓ Completion Manipulation

PrecisionStroker



Hydraulic Shifting Tool



Impactor



Kickover Tool



PrecisionGS



PrecisionSuction

✓ Access & Recovery

DECT (3rd Party)



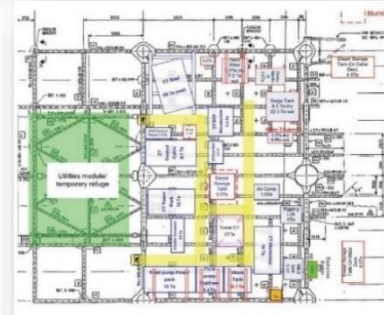
Hole Saw



Advantages of eLine deployed intervention

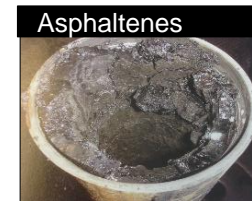
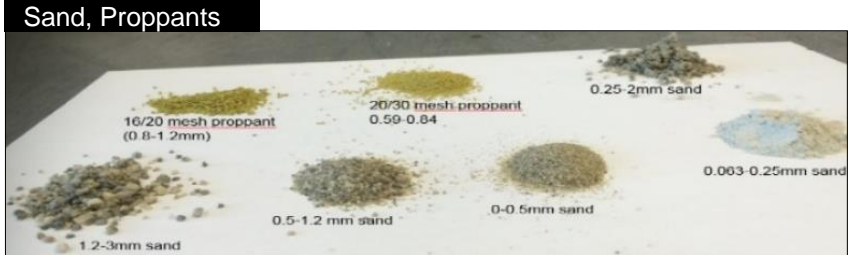
- Particularly relevant for offshore facilities
 - Restricted deck space or loading capability
 - Limited crane capacity
 - Minimal personnel accommodation
 - Narrow economic envelope

- Light but ● effective ● precise ● powerful
 - Uncompromised execution
 - Often a more suitable approach
 - Reduced operational exposure and risk
 - Inherently efficient, less invasive, cost effective



Wellbore Debris

- Varied type and source
 - Produced sand, proppant
 - Scale
 - Wax/Paraffin
 - Asphaltenes
 - Hydrates
- Detrimental to well integrity and production
- Can hinder or prevent well access for remedial workover



Wellbore Debris Type & Source Categorization



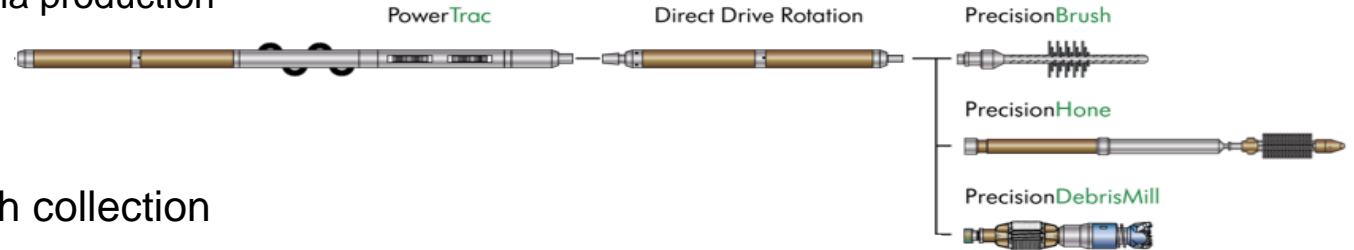
Solids		Slurries Gunk (Viscous Liquids)		Junk/Risks	
Type	Source	Type	Source	Type	Source
Various sediments	Silt from production Sand from production	Pipe dope	Installation of completions	Seals / elastomeric materials	BOP stack / DHSV seals / plug seals
Barite	Mud settlement	Viscous muds	Milling fluid / synthetic muds Gelled oil-based mud after mixing with water	Cement plugs / float equipment	After drillout
Cement cuttings	Poor hole cleaning	Asphaltenes / Black Sticky Stuff	Production fluids (highly well specific)	Perforation debris	Perforation charges
Milled scale rust	Poorly prepared tubulars			Accidentally introduced material	Dropped objects
Proppants	Introduced in to the well			Swarf	Milling operations
Salt	Brine, Formation				
Scale	Water formation				

Types of debris typically found in oil and gas wells, classified into the Wellbore Debris Characterization Matrix.

eLine cleanout options

- eLine cleanout without collection

- Debris left in well (rathole)
- Debris removed via production



- eLine cleanout with collection

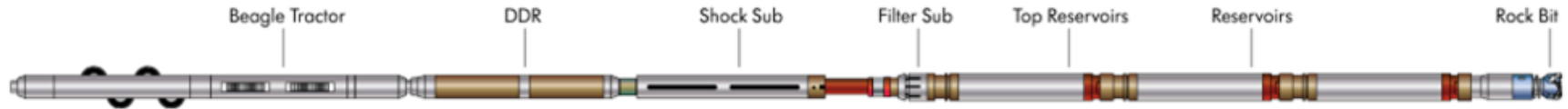
- Suction tool or mechanical collector devices
- Reservoir chambers for debris capture / removal



PrecisionCollector – mechanical collector device



- Full system approach
 - Dislodge (roller-cone bit)
 - Collection (auger)
 - Retention (valve)
 - Transportation (stackable chambers)
- Superior cleanout success
 - Mechanical auger, no suction
 - Not dependant of filtration of solids from fluids
 - Fills bottom up, retains higher volumes
 - Handles viscous / sticky materials



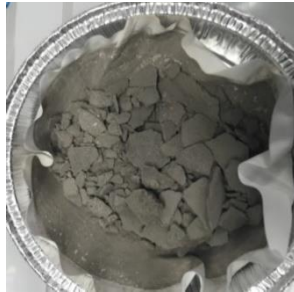
PrecisionCollector – Wellsite Washout System



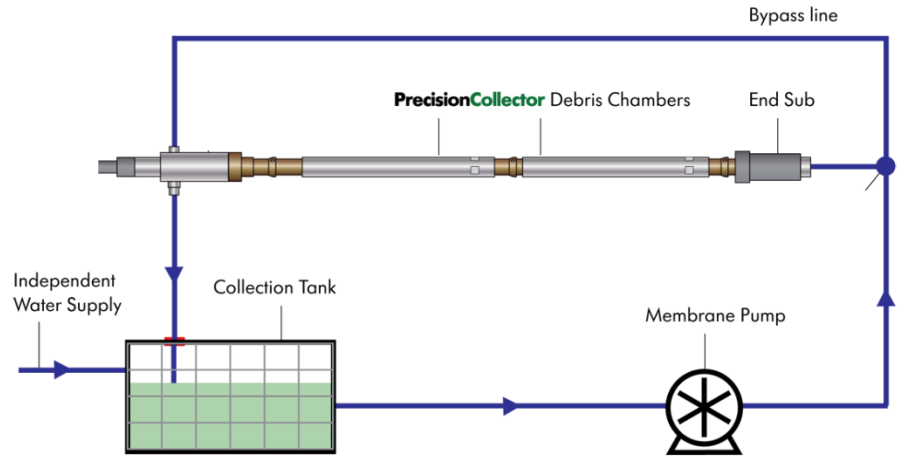
- Efficient, closed system debris handling at surface
 - Minimal exposure to personnel
 - NORM scale containment
 - Quick chambers turn around for multi-run operations
 - Handles compact and sticky debris



BaSO4 in Collection Chamber



Sample post analysis



PrecisionCollector – job planning & design

- Construction or relevant characteristics
 - Debris type, grain size
 - Completion dimensions
 - Deviation
 - Well fluids
- Range and magnitude of key parameters determined
 - Torque, RPM, ROP
- Toolstring configuration and components optimized
- Report generated



eLine deployed Well Intervention options



- Light, viable, fit for purpose and cost effective well intervention solutions available
- Applications include
 - Wellbore Cleanout
 - Completion Manipulation
 - Access & Recovery

Well intervention to rejuvenate existing viable well stock, delivering production gain and enabling subsequent intervention access



Powerful and Agile

- **Technical Papers**
 - **SPE 179102 MS:** Removing Settled Barites From a Wellbore Using an Electrically Powered Cleanout System
 - **SPE 184758 MS:** Electric-Line Deployed Lightweight Intervention Technology for The Effective Removal of Barium Sulphate Scale Obstructions from Small Diameter Wellbores