Evaluation of a New High-Performance 8-in. Hydrocyclone

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Fluid Systems, Inc.
INTRODUCTION
INTRODUCTION

FEATURES & BENEFITS

- Separate solids > 15 micron
- High capacity [1500 GPM]
- No moving parts
- Abrasion-resistant
- Simple operation
- Low operating & maintenance costs
INTRODUCTION
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DESANDERS

D$_{50}$ CUT POINT

REFERENCE: ASME Shale Shaker Committee, Drilling Fluids Processing Handbook, 2005
DESILTERS

D_{50} CUT POINT

REFERENCE: ASME Shale Shaker Committee, Drilling Fluids Processing Handbook, 2005
## HYDROCYCLONES

### PROCESSING CAPACITIES

<table>
<thead>
<tr>
<th>Designation</th>
<th>Cone Diameter (in)</th>
<th>Capacity (GPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Desilter</td>
<td>2</td>
<td>10 – 30</td>
</tr>
<tr>
<td>Desilter</td>
<td>4</td>
<td>50 – 65</td>
</tr>
<tr>
<td>Desilter</td>
<td>5</td>
<td>75 – 85</td>
</tr>
<tr>
<td>Desander</td>
<td>6</td>
<td>100 – 120</td>
</tr>
<tr>
<td>Desander</td>
<td>8</td>
<td>200 – 240</td>
</tr>
<tr>
<td>Desander</td>
<td>10</td>
<td>400 – 500</td>
</tr>
</tbody>
</table>

REFERENCE: ASME Shale Shaker Committee, Drilling Fluids Processing Handbook, 2005
HYDROCYCLONES

OPERATING PARAMETERS

\[ G = 2 \frac{\nu_t^2}{D_c g} \]

\[ Re = \frac{D \nu_t \rho}{\mu} \]

\[ Eu = 2 \frac{\Delta P}{\rho \nu_t^2} \]
HYDROCYPCLONES

DESIGN

Vortex Finder
Inlet Nozzle
Cylindrical Section
Cyclone Diameter
Conical Section
Apex
HP 10” HYDROCYCLONE

DESIGN

\[ G = 2 \frac{v_t^2}{D_c g} \]

\[ Re = \frac{D v_t \rho}{\mu} \]
HP 10” HYDROCYCLONE

FIELD RESULTS

DRILLING CONDITIONS

Bit Diameter: 26”
Depth: 919 – 1,558 ft
Formation: Sand & silt
Circ. Rate: 900 GPM
Mud: Water base
Mud weight: 9.8 – 10 lb/gal
Temperature: 140 °F (60 °C)
Shakers: 4 (API 80/100)
## HP 10” HYDROCYCLONE

### FIELD RESULTS

<table>
<thead>
<tr>
<th>Sample</th>
<th>$D_{50}$ in Drilling Fluid</th>
<th>%Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HP 10”</td>
<td>Standard 10”[1]</td>
</tr>
<tr>
<td>1</td>
<td>79</td>
<td>200</td>
</tr>
<tr>
<td>2</td>
<td>80</td>
<td>200</td>
</tr>
<tr>
<td>3</td>
<td>107</td>
<td>200</td>
</tr>
<tr>
<td>4</td>
<td>94</td>
<td>200</td>
</tr>
<tr>
<td>5</td>
<td>102</td>
<td>200</td>
</tr>
<tr>
<td>6</td>
<td>89</td>
<td>200</td>
</tr>
<tr>
<td>Average</td>
<td>92 ±11</td>
<td>200</td>
</tr>
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## HP 10” HYDROCYCLONE

### FIELD RESULTS

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<tbody>
<tr>
<td></td>
<td>HP 10”</td>
<td>Standard 4”[1]</td>
</tr>
<tr>
<td>1</td>
<td>79</td>
<td>70</td>
</tr>
<tr>
<td>2</td>
<td>80</td>
<td>70</td>
</tr>
<tr>
<td>3</td>
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HP 8” HYDROCYCLONE

DESIGN

\[ G = 2 \frac{v_t^2}{D_C g} \]
HP 8” HYDROCYCLONE

RESULTS

[Graph showing the fraction of size sent to underflow for HP 8-in Hydrocyclone and Conventional 4-in Desilter versus size in microns.]
CONCLUSIONS

- Test results show that the HP 8” hydrocyclone is capable to make a $D_{50}$ cut point between 37 and 67 microns processing up to 350 GPM.

- The use of HP 8” hydrocyclones will reduce the quantity of units in operation. This enhancement minimizes operating and maintenance costs.

- Hydrocyclones are undergoing a transformation from low to high technology equipment and this process will continue in the future.