“APPROACH TO PIPELINE PIGGING IN OIL INDIA LIMITED”

PRESENTED BY:
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PS8 Ops
OIL INDIA LIMITED
PIGGING

• Pipe line Inspection Gauge (P.I.G.) is a tool that is sent down in a pipeline and propelled by the pressure of the product in the pipeline.
Why Pigging?

- Internal cleaning of a pipeline.
- Keep operating costs to minimum.
- Physical separation between different liquids being transported in a pipeline.
- Maintain integrity of the Pipeline, e.g. IPS.
- Capturing, recording geometric information relating to pipeline, etc.
If no Pigging...

- Effective pipe annulus reduces.
- Reduction in flow/throughput.
- Efficiency decreases.
- Inaccurate line fill calculations.
- Uncertainty
OIL’S DULIAJAN-BARAUNI PIPELINE
## CRUDE PARAMETERS

<table>
<thead>
<tr>
<th>ASSAM CRUDE</th>
<th>IMPORTED CRUDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>WAX CONTENT=16-17% W/W</td>
<td>WAX CONTENT= NIL</td>
</tr>
<tr>
<td>SPECIFIC GRAVITY=0.880</td>
<td>SPECIFIC GRAVITY=0.850</td>
</tr>
<tr>
<td>VISCOSITY=17-32 cp</td>
<td>VISCOSITY=5cp - 15 cp.</td>
</tr>
<tr>
<td>POUR POINT=18-24 deg C</td>
<td>POUR POINT=(-)6 TO 6 deg C</td>
</tr>
</tbody>
</table>
OBJECTIVES OF PIGGING

- OPERATE AT MAXIMUM CAPACITY
  - REGULAR PIGGING
- MONITOR HEALTH AND INTEGRITY
  - INTELLIGENT PIGGING
GUIDE LINES FOR PIGGING

• OISD-STD-138

• OIL OPERATION MANUAL
OISD-STD-138

- Crude Oil Pipelines - Once in a quarter.

- Frequency in no case, be more than two times as compared to the normal.

- Record of quantity and quality of deposits collected shall be examined to monitor condition of the Pipeline and to determine subsequent frequency of pigging.
OIL OPERARTION MANUAL

• WHEN CAPACITY REDUCES MAXIMUM BY 5%

• QUATERLY ONCE
DETERMINING PIGGING REQUIREMENT FOR A SECTOR

- OBSERVE PARAMETERS - THROUGHPUT AND PUMPING PRESSURE FOR THE SECTOR AS ON DATE.

- COMPARE WITH THE STANDARD LINE CAPACITY FOR THE SECTOR.
• TYPES OF CLEANING PIG USED

- CUP & BRUSH PIG
- BI-DI PIG
CUP AND BRUSH PIG

• GOOD DESCALLING PROPERTY
• UNIDIRECTIONAL OPERATION

BI- DI PIG

• BI DIRECTIONAL OPERATION
• BETTER SCRAPPING PROPERTY
CASE STUDY-1
LENGTH = 39.5 KM
CAPACITY = 5.5 MMTPA
DIAMETER = 16”
MAOP = 88 KG/sqCM

DATE: 17-11-2012
TP = 550 KLPH
DP = 31 kg/sqcm

DATE: 17-11-2012
DP = 13 KG/SQCM
NRL = 450 KLPH
PS4 = 100 KLPH

LAST PIGGING
DATE: 29/8/2012

ON 02-09-2012
AT PS3,
TP = 610 KL/Hr
DP = 30.5 KG/sqCM

AT RS2
DP = 11 KG/sqCM

TO NRL
TO PS4
COMPARED TO 02-09-2012 ON 17-11-2012,

- CALCULATED CAPACITY REDUCTION = 12.24%

IS PIGGING NECESSARY?  YES
PIG RUN ON 21-11-2012

WAX COLLECTION = 200 KG

AFTER PIGGING

DATE: 22-11-2012
TP = 570 KLPH
DP = 27.4 kg/sqcm

WAX(KG) | BEFORE PIGGING | AFTER PIGGING | CAPACITY IMPROVEMENT (%AGE)
--- | --- | --- | ---
200 (21/11) | 550/31 | 570/27.4 | 8.13
CASE STUDY-2
DATE: 15-11-2012
TP = 325 KL/PH
DP = 47 kg/sqcm

LENGTH = 69.6 KM
DIAMETER = 14”
MAOP = 101 KG/sqCM
CAPACITY = 3.0 MMTPA

DATE: 15-11-2012
DP = 21 KG/SQCM

LAST PIGGING
DATE: 06/02/2012

ON 09-02-2012
AT PS8,
TP = 325 KL/Hr
DP = 43 KG/sqCM

AT RS13
DP = 19 KG/sqCM

6/2/2012
15/11/2012
9/2/2012
COMPARED TO 09-02-2012 AS ON 15-11-2012,

- CALCULATED CAPACITY REDUCTION = 10%

IS PIGGING NECESSARY?  YES
PIG RUN ON 20-11-2012

WAX/SLUDGE COLLECTION = 10 KG

DATE: 23-11-2012
TP = 320 KLPH
DP = 44 kg/sqcm

DP = 20 KG/SQCM

<table>
<thead>
<tr>
<th>WAX/SLUDGE (KG)</th>
<th>BEFORE PIGGING</th>
<th>AFTER PIGGING</th>
<th>CAPACITY IMPROVEMENT (%AGE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 (20/11)</td>
<td>325/47</td>
<td>320/44</td>
<td>7%</td>
</tr>
</tbody>
</table>
### North East Crude Sector (Approx.)

<table>
<thead>
<tr>
<th>SECTOR</th>
<th>FY 2011-12</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WAX (KG)</td>
<td>NO. OF PIGGING</td>
<td>AVG. QTTY PER PIGGING (KG)</td>
</tr>
<tr>
<td>PS1-PS2</td>
<td>3436</td>
<td>20</td>
<td>172</td>
</tr>
<tr>
<td>PS2-RS1</td>
<td>2140</td>
<td>17</td>
<td>126</td>
</tr>
<tr>
<td>RS1-PS3</td>
<td>2485</td>
<td>16</td>
<td>155</td>
</tr>
<tr>
<td>PS3-RS2</td>
<td>1440</td>
<td>13</td>
<td>111</td>
</tr>
<tr>
<td>RS2-NT</td>
<td>710</td>
<td>4</td>
<td>178</td>
</tr>
<tr>
<td>RS2-RS3</td>
<td>1760</td>
<td>5</td>
<td>352</td>
</tr>
<tr>
<td>RS3-PS4</td>
<td>2850</td>
<td>5</td>
<td>570</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>14821</strong></td>
<td><strong>80</strong></td>
<td><strong>185</strong></td>
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</table>

### Imported Crude Sector

<table>
<thead>
<tr>
<th>SECTOR</th>
<th>FY 2011-12</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WAX (KG)</td>
<td>NO. OF PIGGING</td>
<td>AVG. WAX. QTTY PER PIGGING (KG)</td>
</tr>
<tr>
<td>PS10-RS17</td>
<td>140</td>
<td>2</td>
<td>70</td>
</tr>
<tr>
<td>RS17-RS16</td>
<td>65</td>
<td>2</td>
<td>32.5</td>
</tr>
<tr>
<td>RS16-PS9</td>
<td>10</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>PS9-RS15</td>
<td>15</td>
<td>2</td>
<td>7.5</td>
</tr>
<tr>
<td>RS15-RS14</td>
<td>10</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>RS14-PS8</td>
<td>55</td>
<td>2</td>
<td>27.5</td>
</tr>
<tr>
<td>PS8-RS13</td>
<td>60</td>
<td>2</td>
<td>30</td>
</tr>
<tr>
<td>RS13-RS12</td>
<td>55</td>
<td>2</td>
<td>27.5</td>
</tr>
<tr>
<td>RS12-PS7</td>
<td>15</td>
<td>2</td>
<td>7.5</td>
</tr>
<tr>
<td>PS7-RS11</td>
<td>20</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>RS11-RS10</td>
<td>70</td>
<td>1</td>
<td>70</td>
</tr>
<tr>
<td>RS10-PS6</td>
<td>20</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>535</strong></td>
<td><strong>20</strong></td>
<td><strong>26.75</strong></td>
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SECTOR WISE PIGGING FREQUENCY

- PS1-RS2-NT: FORTNIGHTLY
- RS2-PS4: MONTHLY
- PS4-PS6: QUATERLY
- PS10-PS6: QUATERLY
DISCUSSIONS

- NEED TO HAVE FLOW METER SPECIFICALLY FOR MEASURING PUMPING UNITS FUEL CONSUMPTION.
CONCLUSION:

• FREQUENCY OF PIGGING DEPENDS ON QUALITY OF CRUDE.

• DEPENDING ON THE QUALITY OF CRUDE
  ➢ THE REQUIRED FREQUENCY MAY BE MORE THAN OISD NORMS.
  ➢ IT MAY ALSO BE LESS THAN OISD NORMS
THANK YOU