1. **INTRODUCTION**

This objective of this study is to pinpoint any potential sources of product loss/diversion from piping/ pipeline downstream the Export meter resulting in higher shore figures when compared to ship figures.

**2.0 METHODOLOGY**

The following steps were applied in carrying out this Study

1. Identification of potential areas where loss can occur after the Export meters using the PEFS
2. Identification of potential areas where diversion can occur using PEFS and photographs taken from sections of the Export pipeline
3. Ascertain if there leak from Export piping and Pipeline using Export data from Jan 2019 – Jun 2019 and Shell Leak & Integrity Monitoring (SLIM) system

**3.0 DETAILS OF THE EXISITING EXPORT PIPELINE.**

The details of the existing export pipeline were taken from the Crude Loading Platform PEFS, Emergency Pipeline Repair System (EPRS) Plan and Profile of the Bonny 48” Export pipeline, FEED report by MEG titled “Existing Offshore Export Pipeline Appraisal”

The onshore section of the Export pipeline is approximately 6.92Km, it travels through a light bushy area which is flooded. Most of the Piping diameter is 42 inches

The offshore section is approximately 29km (distance to the crude loading platform). It is coated with concrete of various thickness and has an average burial depth of 0.2m

The section of the Export pipeline from CLP to SPM 1 and 2 is approximately 1.7km respectively and coated with concrete.

**PRINCIPAL COMPONENTS OF THE ONSHORE SECTION OF THE CRUDE EXPORT PIPELINE**

|  |  |
| --- | --- |
| Description of Pipeline components | Quantity |
| 3/4” ball Valve connection on the 42” Export pipeline | 1 |
| 42” X 36” reducer | 1 |
| 36” X 42” expander | 1 |
| 42” Gate Valve | 2 |
| 36” Gate valve (21MOV-130 – Seal line Valve) | 1 |
| 36” pipeline spool piece | 1 |
| 6” flange and 6” tap off piping | 1 |
| 1/2” piping and 1/2” gate valve for pressure gauge installation | 1 |
| 1/2” piping,1/2” gate valve and blind flange for future chemical injection | 1 |
| 1” Ball Valve and 1 “Drain line | 1 |
| 42” pipeline spool piece | 4 |
| 2” piping spool piece and 2” gate valve with blind flange | 1 |
| 42” Flange insulating set | 1 |
| 42” x 600# mating flange for hot tapping | 1 |
| 42” X 48” Expander | 1 |

This section of the export pipeline is above ground and passes through light bush area which is flooded.



**PRINCIPAL COMPONENTS OF THE OFFSHORE SECTION OF THE CRUDE EXPORT LINE**

|  |  |
| --- | --- |
| Description of Pipeline components | Quantity |
| 48” pipeline with 1” concrete coating @ 1401b/ft3 | 1 |
| 48” pipeline with 4.25” concrete coating @ 2001b/ft3 | NA |
| 48” pipeline with 4.10” concrete coating @ 2001b/ft3 | NA |
| 48” x 42” Reducer | 1 |

This section is buried and travels all the way to the Crude loading Platform



**PRINICPAL COMPONENTS OF THE OFFSHORE SECTION OF THE CRUDE EXPORT LINE AT THE CLP**

|  |  |
| --- | --- |
| Description of Pipeline components | Quantity |
| 42” Riser Pipeline with 1” concrete coating @ 100lb/ft3 and Splashtron coating | NA |
| 42” pipeline spool piece | NA |
| 42” x 36” reducer | 1 |
| 36” X 42” expander | 1 |
| 36” spool piece | 2 |
| 36” ball valve (SPM 1 and 2 Valves) | 2 |
| 2” spool piece and 2” ball valve for installation of pressure gauges and transmitters | 4 |
| 2” spool piece and 2” ball valve with blind flange | 3 |
| 1” spool piece and 1” ball valve for installation of pressure gauges and transmitters | 2 |
| 42” blind flange | 1 |
| 42” insulated flange | 3 |

This section is above ground at the Crude loading platform

**PRINICPAL COMPONENTS FROM CLP TO SPM 1 and 2**

|  |  |
| --- | --- |
| Description of Pipeline components | Quantity |
| 48” X 42” reducer | NA |
| 48” pipeline with 3.50” concrete coating @ 200lb/ft3 | NA |

This section is buried and travels to the SPM

**4.0 POTENTIAL SOURCES FOR PRODUCT LOSS/DIVERSION**

|  |  |  |  |
| --- | --- | --- | --- |
| S/N | Description of Pipeline | Loss/Diversion | COMMENT |
| 1 | 2” Spool piece and 2” gate valve along the onshore section of the export pipeline. | Diversion | Area within BOGT Boundary fence  *Include in the comment the type of diversion whether illegal to surface or back to process.what was your observation?* |
| 2 | 2” spool piece and 2” ball valve with blind flange at the Crude loading Platform | Diversion | CLP is within the exclusion zone, no unauthorized boat/vessel is allowed within a radius of 3 nautical miles, hence illegal bunkering in this area is unlikely. |
| 3 | 1” spool piece and 1” Ball Valve along the onshore section of the export pipeline. | Diversion | Area within BOGT Boundary fence |
| 4 | 36” Ball valve from SPM 1 and 2 common header to SPM 2 (22MOV- 002) passing | Loss | There is no consistent trend in Ship/Shore difference and no reported leak offshore or from SPM-2, hence product loss from this section is unlikely. |
| 5 | Leaking Flanges of the Two 42” gate valve along the onshore section of the Export pipeline. | Loss | There is no consistent trend in Ship/Shore difference and no reported leak onshore, hence product loss from this section is unlikely. |
| 6 | Leaks from the seven flange joints along the 48” offshore export line. | Loss | There is no consistent trend in Ship/Shore difference and no reported leak offshore, hence product loss from this section is unlikely. |
| 7. | Leaking flanges on the 48” Export line from CLP to SPM 2. | Loss | There is no consistent trend in Ship/Shore difference and no reported leak offshore, hence product loss from this section is unlikely. |
| 8 | Section of the 42” Export line outside BOGT Boundary fence that is not buried. | Diversion | Security Surveillance is required to eliminate this source. |

**NB:** Loss means potential area for Crude oil leak

Diversion means potential area for illegal bunkering operations.

**5.0 CONCLUSION**

Using Export data from between Jan -Jun 2019 and Shell Leak and Integrity Monitoring system (SLIM), product loss from defective sections of piping/pipeline downstream the meters is not likely due to the following reasons:

1. There is no consistent excursion outside the limit for Ship/Shore difference.
2. Shell Leak and Integrity Monitoring (SLIM) system is functional and no leak was detected during the period when there was high Ship/Shore difference.
3. There have been no reported leaks on Land or Offshore during the past 6 months.

Also, the possibility of illegal bunkering activities is unlikely due to the presence of security vessels around the Crude loading Platform. However, Security surveillance of the 42” onshore section of the export line outside BOGT boundary fence is required to confirm that there is no diversion source.