



SCOPE OF WORK
Pigging of Pipelines
99-EC-990001-404

REV	ISSUE DATE	COMMENTS

	NAME	SIGNATURE	DATE
Originator	S Zungu		
Reviewer	R Murdoch		
Checked	S Prince		

1 DEFINITIONS

- 1.1 “Pigging Contractor” shall mean the contractor appointed by PetroSA to perform the Work, see 3.1 below.
- 1.2 “Company” shall mean PetroSA (SOC) Ltd
- 1.3 “Confidential Information” shall mean all proprietary inventions, methods, processes, designs, secrets and other know-how and information at any one time disclosed by PetroSA in connection with the Work, whether or not in writing, in drawing or in any other way, to the extent that such Confidential Information at the time of disclosure is not in the free possession of Pigging Contractor or part of the public knowledge or literature.
- 1.4 “Mobilization” shall mean the preparation, packing and transportation of the Instrument and Equipment and personnel from the Pigging Contractor’s Home Office to the Applicable PetroSA Site (Onsite Tank Farm & Voorbaai Tank Farm) applicable
- 1.5 “Demobilization” shall mean the repackaging, refurbishing and transportation of the Instrument and the equipment and personnel from the PetroSA Mossel Bay site to Pigging Contractor’s base office
- 1.6 “Equipment” shall mean all the equipment, including the In Line Inspection Tool required for the carrying out the corrosion (and other) survey on a Pipeline.
- 1.7 “Pipelines” shall mean the pipelines as described in Paragraph 4.
- 1.8 “Survey” shall mean the corrosion and other flaw detection survey providing the necessary information as defined in Paragraph 3.
- 1.9 “Work” shall mean all work to be done by the Pigging Contractor necessary for obtaining information as specified for in Paragraph 3.

2 LOCATION OF WORK

PetroSA operate the F-A Platform in the Bredasdorp Basin, approximately 90km off the southern coast of South Africa. Several gas and condensate producing wells are tied to the platform where a mixture of gas and condensate and other production fluids are separated. Gas and condensate is then sent to onshore Gas-to-Liquid refinery in Mossel

Bay via 8" export pipelines respectively. Below is an overall picture of PetroSA gas and condensate production facility offshore

3 SCOPE OF WORK

- 3.1 Except as otherwise expressly provided for in the contract, the Pigging Contractor shall supply all supervision, materials, equipment, tools, testing devices, transport as well as every item of expense necessary for the supply and delivery to the launching point, of tools, materials and equipment necessary for the supervision, control and performance of the entire operation of pigging the following pipeline from FA to GTL refinery Mossel Bay:

a) Pipeline between FA and GTL refinery Mossel Bay:

Table 1

Pipeline No.	Fluid Transported	Route	Pipeline Diameter [inch]	Pipeline Length [km]	Last Intelligent Pigging date
99	Condensate	FA - GTL refinery	8"	90	20/07/2020

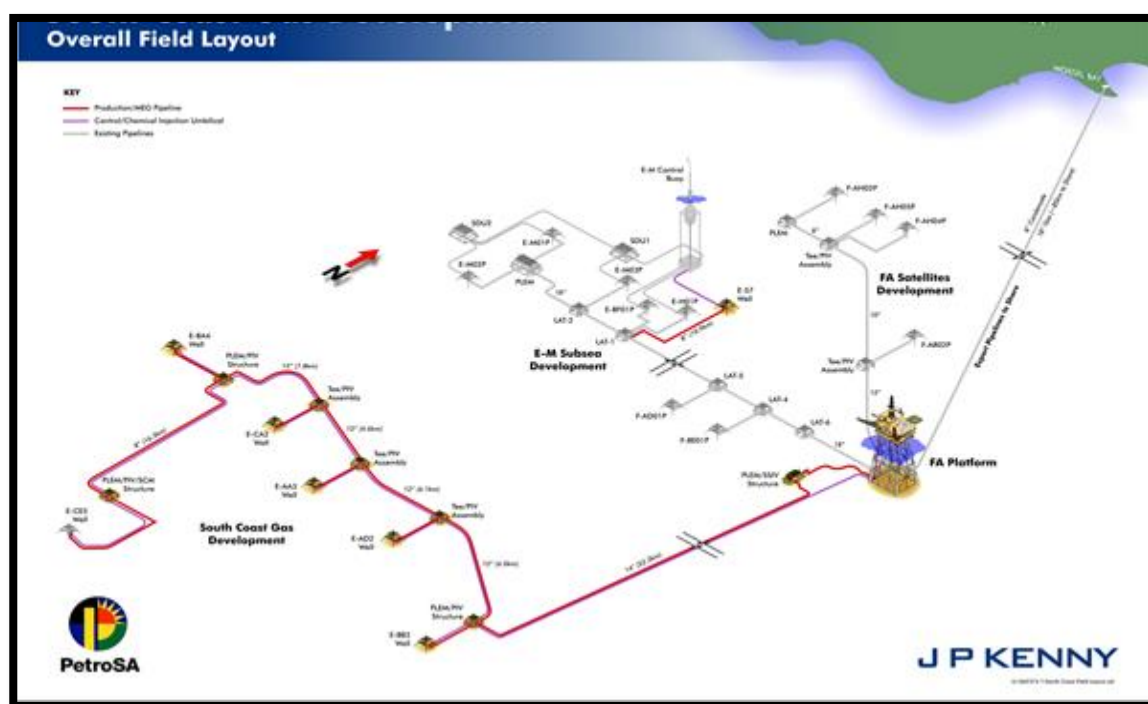


Table 2

Line Design Conditions	
Nominal Diameter	8 inch
Type of Pipe	Seamless
Pipe Grade	API 5L X65
Nominal Wall Thickness	9.50 mm – 12.50 mm
Maximum Allowable Operating Pressure (MAOP)	9.30 MPa
Design Pressure	12.80 MPa
Specified Minimum Yield Strength (SMYS)	448 MPa
Specified Ultimate Tensile Strength (SUTS)	530 MPa
Minimum Bend Radius	5D
Date Built	1990
Last Inspected	Rosen June 2020

Table 3

Condensate Line Process Conditions						
Option	Scenario	Fluid Transported	Driving Medium	Flow Rate in m ³ /h or (m/s)	Operating Pressure (Pig Launcher)	Comments
1	FA Platform on line	Water / Condensate mix	Nitrogen	25 - 30m ³ /h (0.24 - 0.28m/s)	4500 kPa at the export line.	Condensate line will be liquid filled (condensate/ water). Pig will be pushed by +- 20m ³ production liquids which will then be driven by Nitrogen Pressure with liquid column ahead of the pig and a liquid slug behind. Operation will be based on 2020 pigging exercise.
2	FA Platform off line	Nitrogen	Nitrogen	(0.71m/s max)	4500 kPa at the export line.	Condensate line will be deinventoried of liquid prior to metering pigging. Pig will be in Nitrogen and driven by Nitrogen Gas (i.e. no/min liquids in the line). The Cleaning pig runs to be used to deinventory liquids from the line, using Nitrogen as driving medium. All subsequent pigs (Gauging & MFL) will be with Nitrogen Gas, pig velocity will depend on pressure differential. Pressure at export and receiving ends to be tightly controlled. Pigging contractor to advise desirable pressures accross the pig.

3.2 The scope will be:

- 3.2.1 One cleaning run
- 3.2.2 One gauge plate run
- 3.2.3 One axial field MFL run(Intelligent pigging)
- 3.2.4 Optional: UT Corrosion Map run (C-Scan for pitting corrosion)

- 3.3 The Pigging Contractor shall carry out the Work as described in Paragraph 3.2 for the purpose of providing PetroSA the information about the pipelines concerning the location and extent of internal and external corrosion, any other recordable flaws by carrying out a Survey with the Instrument and analyzing and interpreting the recorded data. The information will be provided as described in Paragraph 10. In addition, the vendor shall compare the acquired data with historical data and provide trending information on defects. Vendor to confirm capability to access historic data from multiple vendors. Vendor personnel who will be required to work on the FA platform during the pigging operations must comply to PetroSA's **"GENERAL REQUIREMENTS FOR SUPPLIERS WORKING ON THE FA PLATFORM"** attached to the tender.
- 3.4 The Pigging Contractor should note that the pigging operation will be done with Nitrogen as the driving media as referenced in Table 3 above. Vendor to advise required pressure differential across the pigs and the min/max flowrates in their pigging proposal /procedures.
- 3.5 PetroSA shall provide all facilities necessary for the launching and recovery of the equipment. Subsea pig recovery services will be performed by PetroSA using an experienced diving contractor.
- 3.6 PetroSA shall, under advice to be given by the Pigging Contractor, launch, propel and recover the cleaning pig, gauge pig and intelligent pig. The Pigging Contractor will be responsible for placing the Instrument in the launcher. The Pigging Contractor shall also advise PetroSA on the method of removal / recovery of the Instrument.
- 3.7 The Pigging Contractor shall evaluate and accept the cleanliness of the Pipelines prior to the pigging activity. The Contractor shall issue a line cleanliness report as per Paragraph 10.2. The Contractor shall be responsible for the supply of the cleaning pigs.
- 3.8 PetroSA cannot guarantee a free passage of the Pigs through the pipelines. The Pigging Contractor shall be responsible for running a gauge pig to ensure that the pigs will be able to pass through the line unhindered, and without any damage. PetroSA shall take no responsibility for any damage to the Instrument once the Pigging Contractor has decided that the line is "piggable".

- 3.9 PetroSA shall not provide any pigging equipment except for the pig launcher and receiver. The Pigging Contractor shall advise PetroSA 4 (four) weeks prior to commencement of pigging operation of utility requirements, equipment, infrastructure etc. that would be required by the Pigging Contractor, to enable the Work to be done at the specified location in an efficient manner. Pig launcher drawings will be supplied by PetroSA.
- 3.10 All Work shall be done in accordance with acceptable professional engineering practices and shall be performed with the utmost diligence and efficiency. Pigging contractor may be required to supply at least two magnets, for identification of specific reference points along the line length.
- 3.11 The Pigging Contractor shall provide a schedule detailing:
- 3.10.1 Availability to perform the Work
 - 3.10.2 Mobilization; site activities & demobilization.
 - 3.10.3 Off-site work activities, i.e. data analysis, preliminary report issue, final report etc.
- 3.12 The Pigging Services shall be provided in-line with the requirements of API 1163, NACE SP0102, Pipeline Operators Forum (POF-100) Specifications, ASME B31G and ANSI/ASNT-LIL-PQ. Key personnel shall meet the minimum qualification requirements of ASNT-ILI-PQ, with:
- Team leader during ILI field activities qualified to Level II Tool Operator for the applicable technology
 - Data analysis and reporting Lead qualified to Level II Data Analyst for the applicable technology
 - Reviewer of Final Report qualified to Level III Data Analyst for the applicable technology. The review should include (but not limited to) e.g. a quality check of data analysis and reported results.
- An overview of personnel that will be deployed for the ILI tool run, data analysis and final report review shall be submitted to PetroSA, together with copies of their qualifications/certification.

4 PREPARATION OF THE PIPELINE PRIOR TO PIGGING (PetroSA SCOPE)

Contractor shall detail any specific requirements for this activity in their proposal.

5 PIGGING PROCEDURE / TECHNIQUE OF INSPECTION

Contractor shall provide a detailed pigging procedure in the proposal including QCP for the pigging activities and reports. The technique shall be axial field magnetic flux leakage tool

6 POST PIGGING - OPERATION

Contractor shall detail requirements for this activity in the proposal.

7 GENERAL NOTES

- 7.1 PetroSA will ensure that the cathodic protection facilities are de-energized and re-energized prior to and after each pigging operation and that they are in good working condition.
- 7.2 PetroSA shall have the right to examine the work at any stage during its performance.
- 7.3 The in-line Inspection tool should be equipped with a location transmitter to enable location of the Instrument should it become lodged within the pipeline and an accelerometer to ensure velocity is sufficient for recording high quality of MFL data.

8 TEMPORARY OPERATION FACILITIES TO BE FURNISHED:

PetroSA shall supply or cause to be supplied the following operation facilities and utilities to the Pigging contractor without cost to the Pigging Contractor, for or in connection with the performance of the Work.

- 8.1 Area of site establishment at the onshore site for the Pigging Contractor's container.
- 8.2 Sanitary facilities at a nearby-designated onshore area.
- 8.3 Medical and first aid facilities at central points.
- 8.4 Potable water at central points.
- 8.5 Office accommodation
- 8.6 PetroSA network access for Internet access to download and send data

9 PROJECT SCHEDULE

- 9.1 PetroSA shall give final notice regarding mobilization at least 4 weeks prior to commencement of work.
- 9.2 The Contractor shall provide a level 2 schedule of operations to be performed, per pipeline and sequence in which the respective pipelines are to be pigged.

10 REPORTING REQUIREMENTS

- 10.1 The Pigging Contractor shall submit a report at the end of the work to the PetroSA Project Engineer having recorded information on but not limited to the following: -
- Start and stop dates and times of the cleaning operation.
 - Start and stop times of each type of pig.
 - Any problems encountered
 - The visual results after each pigging operation.
- 10.2 The Pigging Contractor is to provide a report covering the cleaning of the pipeline. The report is to be submitted to the Company within 24 hours of the completion of the cleaning, and is to give details of the type of debris removed, the nature of the debris, an estimate of the total volume of debris removed, a register of the pigging runs that were conducted, and any other relevant data.
- 10.3 The Pigging Contractor is to provide a report on the gauge pig runs that were conducted. The report shall be submitted within 24 hours of the completion of the runs, and shall provide, but not limited to, the following information: -
- Condition of the gauge tool
 - Amount of debris removed
 - Recommendation as to whether the Intelligent tool should be run through the Pipeline
- 10.4 The Pigging Contractor shall provide an Initial Report on the operation of the intelligent pig within 24 hours of the inspection run. The report shall indicate whether all features of the tool functioned correctly, whether the quality of data is sufficient for analysis and whether or not a

rerun is to be performed. The report shall include the velocity profile, and any velocity excursions that occurred during the run.

- 10.5 The Pigging Contractor is to provide a Preliminary Report within 7 working days after receipt of the field data (per pipeline) at the Pigging Contractor's premises. The report shall include, but not be limited to, details of any defects/anomalies that affect the Maximum Allowable Operating Pressure of the Pipeline as per the latest revision of ASME B31G.
- 10.6 The Pigging Contractor is to supply the final inspection report within 20 working days of receiving the data at the Pigging Contractor's premises. It shall contain, but not be limited to: -
 - 10.6.1 Introductory Pipeline data such as the diameter, pipeline length, year built, nominal wall thickness, external & internal coating, MAOP, previous run history, throughput and pressure at time of Survey, areas where the Instrument did not meet specifications, cleanliness of line etc.
 - 10.6.2 Identification, location and sizing data of all significant internal and external features greater than 60% wall loss.
 - 10.6.3 Comparison of significant internal and external features with previous inspection data shall be performed to identify any significant changes that has occurred. Previous inspection data will be in multiple supplier formats.
 - 10.6.4 Differentiation shall be made between internal and external significant defects, mill, defects, dents gouges, magnetic anomalies.
 - 10.6.5 Identification of all joint numbers which contain a significant feature, giving the distance from the nearest above ground reference point to the upstream girth weld of the pipe joint to an accuracy of 1 meter.
 - 10.6.6 Distance of each significant defect to the nearest reference weld to an accuracy of 20mm, and the orientation, looking upstream, to the nearest o'clock position.
 - 10.6.7 Length of pipe joint containing a significant feature to an accuracy of 30mm.

10.6.8 Identification and location of all pipeline fixtures and attachments including, but not limited to: -

- Cathodic protection posts
- Seam welds
- Take offs
- Nominal wall thickness deviations
- Clamps
- Sleeve
- Magnets
- Valves, etc.

10.7 The Pigging Contractor is to provide two hard copies of the report, two CD's copies of the report together with feature lists Microsoft Excel or Word format per pipeline. A detailed comparison table shall be provided in Microsoft Excel which provides a comparison between historic feature sizes with the current feature details and calculated corrosion rates per feature. Any propriety report formats must be supplied together with a copy of the applicable software that allows PetroSA to ready the proprietary reports as well as extract data to Microsoft Word or Excel or PDF formats.

10.8 The Pigging Contractor is to provide enhanced feature reports for all defects with a wall loss greater than 60%. Additionally, enhanced feature reports shall be provided for all defects that affect the Maximum Allowable Operating Pressure (MAOP) of the Pipeline in line with ASME B31G. PetroSA will select any other features over and above those that affect MAOP (e.g. any defects between 40% and 60% with high growth rates), after presentation of the preliminary report. The enhanced feature report shall contain detailed defect/feature data and dig-up sheets, if applicable. Graphical Scale reports should be every 100/m or as agreed with PetroSA

10.9 The Pigging Contractor shall provide a Fitness for Purpose / Service (FFP/S) and Corrosion Growth Assessment based on the requirements of ASME B31.G and other industry standards and norms (i.e. Pipeline Operator Forum specifications for intelligent pigging of pipelines). This FFP/S report must include a comparison of defects / features to the past inspection history, to determine if there is an increase in the number of defects / features as well as an assessment of changes to previously reported defects / features to ultimately determine an estimated corrosion growth rate. The final FFP/S report must provide a schedule for possible future repairs based on the calculated corrosion growth rate over a 5 year operating period.

11 SURVEY ACCEPTANCE CRITERIA

- 11.1 PetroSA reserves the right to reject any survey record, in part or in whole, which does not comply in total with paragraph herein.

The Pigging Contractor shall be able to demonstrate to the PetroSA representative that the Instrument has functioned within its stated capabilities and parameters throughout the entire pipeline section surveyed in-line with the requirements of API 1163 and NACE SP0102.

- 11.2 Should the Pigging Contractor be unable to comply with paragraph above, then PetroSA reserves the right to either request the Pigging Contractor to rerun the Instrument at no charge to PetroSA or to provide a pro-rata discount to the original survey price.

12 PERSONNEL

- 12.1 The Pigging Contractor shall appoint such qualified personnel as will be necessary for the safe and efficient performance of the Work.
- 12.2 Personnel performing data analysis shall be certified to at least Level two (RSA 2 or equivalent in the Contractors Home Country) in the applicable inspection method.
- 12.3 The Contractor shall have available a person certified as a Level 3 in the applicable inspection method, should PetroSA require detailed feature clarification or dispute any reportable features that impact on MAOP of the pipeline.
- 12.4 PetroSA will instruct Pigging Contractor's personnel in regard to safety regulations and other matters related to the performance of the Work and Pigging Contractor's personnel will at all times adhere to these regulations and instructions.
- 12.5 The Pigging Contractor shall at its own cost remove any Pigging Contractor personnel that, in PetroSA's reasonable opinion, failed to adhere to any of such instructions and regulations, and the Pigging Contractor shall, at its own cost,

immediately provide a suitable replacement of any such Pigging Contractor personnel.

- 12.6 The Pigging Contractor shall be responsible for providing Transportation, Accommodation and Meals to his personnel engaged during the Work.
- 12.7 The Pigging Contractor shall ensure that all his personnel are provided with the minimum safety equipment / apparel as required by PetroSA for the safe execution of the Work.

13 PRICING

Pigging Contractor to provide price breakdown and payment schedule for the following items: -

- Mobilization and Demobilization
- Cost for each type of pigging run
- Standing time rates
- Rerun charges for Instrument
- PetroSA will only make final payment once final reports and documentation received and reviewed.
- PetroSA will review and comment on all draft documentation submitted within 5 working days of receipt thereof

14 ADDITIONAL INFORMATION REQUIRED

The Pigging Contractor is to submit the following information with the tender:

- Detection capability and sizing accuracy.
- Work procedure/program for the complete pigging operation.
- Confirmation that product and pigging medium specification is compatible with Instrument.
- Request for any additional information that the Pigging Contractor may feel is necessary for the successful implementation of the project.
- List any exclusions or additional requirements that may be required.

Other

- Contractor to be aware to undergo Medical, Induction and Covid training before commencement of work and this should be included as part of time onsite.
- Contractor can undergo Medical at his own medical facility at his own cost and submit medical reports to PetroSA for the various examinations, these should be in the English Language and will be reviewed by the PetroSA OMP. If accepted, this may reduce the time required for medicals at the PetroSA site.
- Draft QCP, SHE Plans, and Risk assessments to be submitted with tenders.
- Final Schedule, QCPs, SHE Plans, Risk assessments, Safety File/Plans will be discussed and agreed during the kickoff meeting
- PetroSA Site is classified as a National Key point and thus strict entry control is managed by PetroSA security. Permits will be required for all cellphones, laptops and cameras as well vehicle entry.
- Recognized Offshore Survival training will be required for any personnel that would be required to work on the FA offshore platform.

15.0 DRAWINGS, DOCUMENTS, SPECIFICATIONS & PROCEDURES

Document Type	Document Number	Comments	Revision
15.1. DRAWINGS & DATA SHEETS			
FA Export condensate pig launcher	DS-MC-VD-1009	Attached	
Condensate pig receiver onshore	DS-MC-VD-9902	Attached	
Condensate pig launcher PID		Attached	
Condensate pig receiver PID		Attached	
FA working conditions			
15.3 PROCEDURES			
CONTRACTOR QUALITY ASSURANCE REQUIREMENTS	ISM/PR/AIA/003	Attached	01
ENGINEERING CONTRACTOR DRAWING SUPPLY	END/PR/DRW/001	Attached	01
PERMIT TO WORK	SAF/PR/OPS/002	Attached	01

General Note:

The contractor may require additional drawings, specifications or other documentation deemed necessary for performing the Work. Those requirements should be communicated to the PetroSA procurement department not later than five working days before date of tender closure. Every effort will be made to supply documentation as reasonably needed.