Pipeline Pigging Operation Procedure

Role and Responsibilities

- Pipe line maintenance contractor to upload routine pigging activities on MDLU where applicable
- Preparation and HSE requirements for High Sour H2S pipelines

Additional Safety Precautions when running a pig

- Use Smart Mobile app (MDLU) to confirm the pig speed according to the operating parameters
- Launcher/Receiver Safety Precautions
- Preparation and HSE requirements for High Sour H2S Pipelines

SOP-317 Pigging Debris Collection & Analysis

Pigging authorisation certificate (PAC)

- Pipeline maintenance contractor to update and upload the pigging operation via Mobile App MDLU or CIMS DLU

Prevent or control internal corrosion due to corrosive substances or ions.

- The corrosion engineers of each asset carry out a monthly performance review based on pigging results i.e. type and quantity of debris, and decide the frequency of future pigging required. Update the new frequency in MRP.

- For non-standard pig trap configuration which are not included in GU-1008, a specific method of statement enhanced by risk assessment shall be prepared.

- Prior to the final approval, PDO pipeline maintenance coordinator / supervisors and pipeline maintenance contractor.

- Before the final approval, PDO pipeline maintenance planner to review the plan with respective pipeline maintenance engineer, pipeline maintenance coordinator / supervisors and pipeline maintenance contractor.

- Pipeline maintenance contractor is responsible for the preparation, distribution, and execution of all pigging activities.

- Relevant RA party (from Asset): Approve Risk Assessment

- SPE Senior Pipeline Engineer

- GU-1008 pigging operation guidelines

- SPE to generate method of statement from GU-1008 based on launcher and receiver pig trap configuration for the pipeline to be pigged.

- Two days prior to the launch, the Contractor Pigging Supervisor shall check the pig and refurbish or replace the seal/guide discs, cups, blades, brushes or pig bodies as required. Specifically, the operator(s) will check the pig's transit time and record it in the Pigging Authorization Certificate.

- After retrieving the pig pipeline maintenance contractor to take debris sample according to SOP-317 requirements

- Two days prior to the launch, the Pipeline Maintenance Services responsible contractor and the supervisor area authority shall ensure that the saver pits are empty and remain empty.

- Prior to commencement pigging operation, Pigging Supervisor shall confirm the exact plan to the relevant parties at the launcher and receiver side, and advise the expected travel time and record it in the Pigging Authorization Certificate.

- Permit validation from area authority and shall be on the day of the Line-up, Launching and Retrieving as per approved method of Statement which is inline with GU-1008.
### Key Action Parties

<table>
<thead>
<tr>
<th>Action Parties</th>
<th>Roles and Responsibilities</th>
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</thead>
</table>
| 1. Functional Corrosion Control Engineer (UEC3X)   | • Based on the corrosion type and rate UEC3X to advise on the type and design of the cleaning pigs to be used for each pipeline as per PR-2383 & SOP-315.  
• To provide inputs for any pig modifications if required.  
• The functional corrosion control engineer (UEC3X) shall be responsible for setting and reviewing frequencies, submit the annual MRP.  
• To Optimize routine pigging frequencies based on flow conditions and fluid corrosivity for each pipeline based on SOP-320.  
• Check the report uploaded by contractor to CIMS DLU or E-DLU Smart Tap to take the required actions.  
• Pigging debris review, analysis and to give a recommendation, if required, or any further action as part of corrosion management strategy.  
• Reviewing and acknowledging pipeline pigging barrier deviation requests in FSR.  
• Participate in RCA/ investigations of damaged pig or incidents relating to pigging operation. |
| 2. Functional Pipeline Integrity Engineer (UEC5X)    | • Integrity Management and Fitness for Purpose for all pig traps integrity conditions and advise on remedial actions for safe operation.  
• To notify pipeline asset team/maintenance team in case of pig trap derating, anomalies and action required for risk assessment and safe operation.                                                                                                                                                                                                                                                                                                                                                   |
| 3. Asset Pipeline Support Engineers (ONO6X, OSGO6X, OSGO6X, GGO6X & UIPT6X) | • Coordination and alignment with production site team to resolve pipeline operational obstacles.  
• Manage the interfaces between pigging contractor and other supporting contractors, i.e. chemical batching, mechanical construction, N2 suppliers.  
• To provide budgets for Routine pigging operation.  
• Support pipeline maintenance team on Documentations and handover process for new pipelines asset or modification project if documents not found in PDO portal.  
• Integrity modifications, repairs, and replacement of pipeline pig Launcher/Receiver and associated piping and valves.  
• Managing the deviation of pigging operation through FSR, with valid justifications (i.e. operational restrictions, launcher/Receiver deficiencies).  
• To follow the process for pig trap derating and pigging suspension through PDO MOC system.                                                                                                                                                                                                                                                                                                                                                                                 |
| 4. Asset Corrosion Control Engineer (ACCCs; ONO69/UIPT69) | • Check the report uploaded by contractor into CIMS DLU or E-DLU Smart Tap to take the required actions, review pig condition, debris, pigging time, pig launch vs batch injection time, etc.  
• Follow up and review of solid characterization results from pig debris. If required, give recommendation based on review with UEC3X.  
• Engage with UEC3X for optimization opportunities and continuous improvement.                                                                                                                                                                                                                                                                                                                                                     |
| 5. PDO Pipeline Maintenance Planner Engineers       | • To check the quality of the data submitted on MRP.  
• To agree with contractor on MRP pigging routine and approve the plan.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 6. Pipeline Maintenance Contractor (Planning Coordinator/engineer) | • Review and set the pigging schedule and frequency as per MRP.  
• Share 90/30/14 days plan to all respective parties involved in pigging operation.  
• Update daily pipeline pigging progress report.  
• Update PM WO for routine pigging operation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 7. Production Supervisor/Responsible supervisor (ONO1X, OSGO1X, GGO1X & UIPT1X) | • To confirm the operating parameters are within the pipeline design envelop and pipelines readiness for the pigging.  
• Approval of pigging Authorisation Form.  
• Verification and confirmation for SIMOPS activities on the pipelines.  
• Compliance to the Procedure.  
• Flange management i.e. removal/reinstatement of blind flange, rotation of spectacle blind.  
• For High Sour services ensure permanent and functional N2 purging facilities.                                                                                                                                                                                                                                                                                                                                                           |
### Key Action Parties

<table>
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| **8** Area Authority/station operator (ONO1X, OSG1X, GGO1X & UIPT3X) | - Compliance to this Procedure.  
- To provide the required operating parameters to pigging supervisor, i.e. flow.  
- To ensure the risk involved during pigging operation.  
- Compliance to vehicle access plan.  
- Gas testing.  
- Check and confirm the condition of the sever pit for the close drain system, and for Gas pipelines check vent header and flare system.  
- Validate pigging authorization form/e-PTW.  
- To ensure that no abnormalities on pig trap and valves status as per the approved method of statement for each pig trap configuration during the pigging operation line up, launching and receiving. |
| **9** Pipeline Maintenance Coordinator (UIPT45&46) / Pipeline Maintenance Supervisor (UIPT45X & UIPT46X) | - Release SAP PM routine pigging operation plan.  
- Ensure pigging activities in 14 days plan.  
- Provide support and align with area production team to confirm the pigging operation readiness.  
- Confirm and check pig Refurbishment and resources readiness for the pigging.  
- Authorisation/ counter sign of Pigging Authorisation Form/e-PTW.  
- Follow up with contractor on daily pipeline pigging progress execution and check the pigging completion report.  
- Coordinate between the required parties for sampling collection and results.  
- On annual bases, contractor’s method statement shall be site verified by the pipeline maintenance supervisor. |
| **10** Pipeline maintenance contractor Senior Pipeline Engineer (SPE) | - Confirm and ensure the execution of pigging schedules. Work distribution as per the 14 days plan schedule.  
- Verification of pig traps operationally readiness for pigging operations and initiate communication with production supervisor, pipeline maintenance coordinator & supervisor.  
- Raising/applying of the Pigging Authorisation Certificate/e-PTW.  
- To ensure Maintenance of pigs, pig signaller, trap doors and tracking equipment are done before commencing any pigging operation.  
- To generate the applicable pigging method of statement from GU-1008 appendix-1 based on launcher and receiver pig trap configuration for the pipeline to be pigged.  
- Ensure pigging supervisor is in full understanding of pigging method statements for respective pigging activities under his supervision  
- To develop a specific method of statement and RA for any conditional pigging operation.  
- Sampling of debris using E-SAR form and handover to PDO labs for Measurement of HC/H2S at regular intervals.  
- Ensure this procedure Compliance.  
- Verifying all pigging reports and report any deficiencies to CSR.  
- Verifying and approving Data technically in CIMS / E-DLU (Smart Mobile Tap).  
- Perform/document annual pigging supervisor competency review.  
- Proposing improvements and provide feedbacks on pigging operation. |
### Pipeline Pigging Operation Procedure

<table>
<thead>
<tr>
<th>Key Action Parties</th>
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<tbody>
<tr>
<td>Pigging Supervisor</td>
<td>• Supervision of all activities associated with the pigging operations as per this procedure and the associated method statement in GU-1008 Appendix 1.</td>
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<tr>
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<td>• Ensure this procedure Compliance, and pipeline specific method of statement and ITP.</td>
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<td></td>
<td>• Verify / confirm with station operation, the pipeline operating envelop is within the pigging allowable operation envelop before starting pigging activities.</td>
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<td></td>
<td>• Pig refurbishment and check the pig configuration and dimensions before any pigging operation.</td>
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<td></td>
<td>• Checking the integrity of pigs and tracking equipment before launching the pig.</td>
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<td></td>
<td>• Holding the permit.</td>
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<tr>
<td></td>
<td>• Update Pigging log sheet pre and post pigging operation.</td>
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<td></td>
<td>• Communicate with CCR/station operator before launching the pig and after pig retrieval.</td>
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<tr>
<td></td>
<td>• Conduct Tool Box Talks and 4CAAP.</td>
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<td></td>
<td>• Verify Launcher and Receiver safety check and filling the form / update Smart Mobile Tap.</td>
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<tr>
<td></td>
<td>• Gas testing.</td>
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<tr>
<td></td>
<td>• Emptying of saver pits in remote areas and liquid disposal.</td>
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<tr>
<td></td>
<td>• Emptying of door pits and liquid disposal.</td>
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<tr>
<td></td>
<td>• Ensure the equipment and tools are in working condition and using the proper tools.</td>
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<tr>
<td></td>
<td>• Inspect pig for damage after retrieval and report any major concerns to CSR.</td>
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<tr>
<td></td>
<td>• Monitoring the pig trap condition after line-up, launching and retrieval for any sign of leak.</td>
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<tr>
<td></td>
<td>• Safe Handling and reporting of all types of debris recovered from pigging.</td>
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<tr>
<td></td>
<td>• Ensure compliance to PDO procedures when handling NORM and other hazardous substances.</td>
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<tr>
<td></td>
<td>• Uploading pigging data in E-DLU (Smart Mobile Tap) if applicable.</td>
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<tr>
<td></td>
<td>• Prepare the reports/complete the checklists and get it approved by CSR.</td>
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<td></td>
<td>• Reinstate the valves status as per approved pipeline specific method of statement.</td>
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</table>
Pigging Schedule

Agreed pigging schedules shall be prepared as per MRP in accordance with the 90/30/14 Days Plan. The distribution is as follows:

- Area Programmers
- Production Supervisors
- Contract Holder for the Pipeline Maintenance Contract
- Corrosion Control Area Engineers
- Area Pipeline Maintenance Coordinator
- Company Site Representatives (CSR’s) for the Pipeline Maintenance Contract.
Pigging Authorisation Certificate (PAC)

The Pigging Authorisation Certificate, will be used in place of the PTW/e-PTW when undertaking pigging operations. The certificate is maintained electronically in LiveLink on the UOP Team Page.

The Certificate will be filled by the Pipeline Maintenance Contract personnel under the supervision of the Contract Pigging Supervisor. One day prior to launching the pig the certificate will be submitted to the Responsible Supervisor for authorisation and signature. On the day of the launch and retrieval the certificate will be submitted to the Area Authority (ONO1X1/OSO1X1, GGO1X1, OSGO1X1 and UIPTX) for approval to proceed.

The Certificate has provision for recording the hydrocarbon and H₂S gas tests to be carried out.

The Certificate will be retained by the Pipeline Maintenance Services Contractor for record and audit. The Pipeline maintenance supervisor should counter sign Pigging Authorisation Certificate before the authorisation by production supervisor / Responsible Supervisor. The pigging supervisors and area authority at the respective launch / receive points will make ready their launch/receive facilities.
1 **Conditional Pigging (special pigging case).**

1.1 **Pigging with special operational conditions**

Any conditional Pigging operation which required flow reduction, flow increase, pigging without Lining-up the receiver or Off-Line, method statement / configuration not covered in GU-1008 appendix-1, specific method statement and RA to be prepared agreed with pipeline asset team and approved by respective technical authority.

1.2 **Pigging of Nonstandard Pig trap**

In the event of pigging activities are required on a line not equipped with permanent pig launching / receiving facilities special procedure with RA to be developed, in addition the following requirements and precautions shall apply.

- Temporary launching/receiving facilities shall be constructed specifically for the project, which will assure safe performance of the pigging activity.
- Sufficient isolation valves shall be provided to assure safe isolation of the trap from the pipeline, and pressure gauges shall be installed in order to allow personnel involved in the pigging activity to confirm the pressure in the barrel.
- A procedure for the non-routine pigging activity shall be prepared. The procedure shall be reviewed and approved by the appropriate pipeline support personnel (TA3/TA2) prior to commencement of work. As a minimum, the non-routine procedure shall include the necessary steps and related valve movements (open/close) to assure safe launching and / or receiving of the pig.
- Sketches of all pertinent facilities shall be provided.
- Special attention shall be paid to any flexible hoses used to ensure that they are adequately anchored and pressure rated.

1.3 **Pigging non-metallic pipeline (GRE, PE)**

Any maintenance pigging activity in non-metallic pipelines shall require approval from Material and Corrosion function. Special attention should be paid to the requirement to maintain a minimum internal diameter and bending radius for the whole length of the pipeline.

Special procedure to be developed for each case as per the pipeline requirements and approval from respective Pipeline TA & from material & corrosion TA.

Material and corrosion TA to check and verify the piggability and type of pig that will be compatible for the pigging. Pipeline respective TA to approve the overall pigging operation.

1.4 **Chemical Batching Pigging Operation.**

Any maintenance pigging activity for chemical batching shall require approval from Material and Corrosion function. Special attention should be paid to the requirement of sending batch pigs (pig train) with special procedure and RA to be approved by respective TA from corrosion & material function and from pipeline for execution part according to GU-1008 appendix-1 pigging method of statement for common pig trap configuration.
1 Launcher/Receiver Safety Precautions

1.1 General Precautions and Safety Concerns

1.1.1 Drain System
In the case of closed drain systems, it is essential that the appropriate and correct methods are used to ensure total displacement of the various gases or fluids before proceeding to the next activity in this procedure. Pigging supervisor to check with area authority there is no back pressure from the station. CAUTION: Do NOT pump oil from the saver pit back into the pipeline without desludging and treatment in designated facilities.

Blockages of drain and vent valves due to pig cups or large quantities of debris are possible which required sometimes for de-chocking/flushing and specific method of statement has to be prepared to de-chock and unblock the drain and vent supported by RA is required.

In remote area, the pigging contractor shall be responsible to drain the sever pit and make it empty prior any pigging operation.

The pigging supervisor to ensure the right position of the sceptical blind before attending any pigging operation. For non-critical sour the sweet system the spectacle blind shall be in open position and for high sour, and for the critical sour shall be kept in close position and the rotation of spectacle blind (close/open) shall be attended by area respective mechanical contractor under full authority of area production team.

1.1.2 Pressure Gauge
At least two pressure gauges shall be fitted to the barrel of the launcher/receiver to guard against this event. One pressure gauge should be mounted as close as possible to the main isolation valve to allow verification of pressure equalisation across the pig. If only one gauge is fitted, a report shall be submitted to the Asset custodian with a request to rectify the deficiency immediately. If both Pressure gauges are defected the pigging operation activity will be stopped postponed until the new calibrated pressure gauges installed.

CAUTION: Confirm that pressure is zero on both ends of the receiver (via major barrel and minor barrel Pressure gauges). If the pressure is not equal, the balance line may be blocked and the pig could fly out of the trap at high velocity once the door is opened.

If there is any doubt that the barrel is not at zero pressure, stop the activity and report to area authority, SPE and CSR.

1.1.3 Passing Valves
If any pig launcher/Receiver associated Valves (MIV, kicker valves, pressurising valves, drain valves, vent valves and balancing valves) are passing, passing must be stopped completely by sealant injection or other maintenance techniques before any pigging operation.

For passing valve the PR-2391 pipeline valve maintenance procedure shall be followed to quantify the passing rate.

Note 1: If the valve is passing and not equipped with lubrication facilities stop pigging operation until the defective valve is repaired or replaced by respective asset/project team.

Note 2: Minor passing is the passing in which pressure build up was not noticed within 30 Minutes.
1 Launcher/Receiver Safety Precautions

1.1 General Precautions and Safety Concerns

1.1.4 End Closure and Line of Fire
Before opening the door of a launcher or a receiver vents and drain must be in open position. Before remove the trap bleed screw it should be loosen up to the built-in safety groove is visible. If no pressure observed, then bleed screw can be removed fully. NEVER stand in front of the door or at the side where the hinge is fitted. Ensure that nobody stands directly in line with the door or the launcher/receiver barrel.

Figure 1: Safe zone while opening End Door Closer
CAUTION: no valves shall be opened or closed when the end door closure is in open or loose condition.
IMPORTANT NOTE: If the door is to be opened when standing at the hinge side, then make sure that the person is standing outside of the swing path of the door by using a rope or extension handle when opening the door. There are also risks of the pig being propelled from the receiver due to trapped pressure.
CAUTION: Do NOT remove the door seal unless it is damaged or badly contaminated.

1.1.5 Lifting, Loading and Unloading of pigs

Loading and offloading the pig to pig tray or lifting it from the pig tray must be done after confirming the LEL% level and Gas testing according to PR-1073 are safe before opening the launcher / receiver door.
Use the appropriate lifting equipment for loading and unloading of pigs during launching and retrieving the pig using pig tray. Lifting plan for loading / unloading pigs in accordance with PR-1709 - Lifting and Hoisting Procedure Lift Planning Execution.

1.1.6 Duration Between Line-up, Launching and Retrieving the pig

The receiver shall always be lined up before launching a pig in oil and gas lines. The period of time that the receiver facilities are left pressurized should be minimised and shall not exceed one day prior to the launch. In accordance to this procedure the launcher facilities will be depressurised on completion of the launch.
If any leak is observed during receiver line up postponed the pigging operation and reinstate the receiver to normal condition. Leaks detected on launcher / receiver facilities shall be reported to area authority, SPE & CSR and rectified immediately or before the facilities are used again.

NOTE: In the case of low flow in liquid Pipelines, there is also a risk of the pig stopping across the by-pass tee. If the space between the end closure and the kicker line is sufficient to accommodate the full length of the pig plus 0.5 meter, the Bypass Valve should be closed to divert full flow through the receiver so as to avoid stoppage of the pig.
1 Launcher/Receiver Safety Precautions

1.1 General Precautions and Safety Concerns

1.1.7 Integrity status of Launcher & Receiver.

The pig launcher and receiver to be fit for purpose/service (FFS) to execute the pigging operation safely. Any clamp found installed on Pig trap to be raised to respective concern asset pipeline & integrity function team to confirm the status of pig trap, evaluate RA and raise a variance (MOC) to continue operating launcher and receiver.

1.1.8 Naturally Occurring Radioactive Material (NORM)

NORM may be produced in some areas from the reservoir and be entrained in pigging debris. Those receivers where NORM is present must be identified and indicated to the pigging crew. Methodology for handling and disposing of NORM waste from pigging operations is covered in SP-1170 - Naturally Occurring Radioactive Materials.

1.1.9 Hydrogen Sulphide

Pigging operations carried out in designated H2S areas shall be in accordance with PR-1078 - Hydrogen Sulphide Management Procedure and Section “High Sour Pipelines” of this procedure.

NOTE: All lines with H2S concentrations in excess of 300 ppm in gas stream and 20mg/l in non-gaseous phase shall have dedicated pig trap operation procedures (as per GU-1008 appendix-1 MIV(D)-KIC(D)-BAL(A) High Sour), and all personnel in the immediate vicinity of the pig trap shall wear self-contained breathing apparatus when opening the pig trap door, the pig trap door is open or when opening drain valves. PTW Procedure shall be adhered.

1.1.10 PPE’s

All crewmembers shall comply with a proper PPE’s according to the pipeline area classification and Hazard associated with pigging operation, like corrosivity of the fluid. All PPE requirements shall be as per SP-1234 PPE specification.

Note: SCBA is required to be worn in a sour facility when performing any breaking of system containment until the work area has been tested for H2S and declared safe to proceed without BA (e.g. breaking flanges, opening the pig trap end door closure).

1.2 Precaution for Gas Pipelines

During gas line pigging the ‘bypass valve’ does not require to be closed before the pig’s arrival at the receiver, with the possible exception of (i) running a magnetic pig e.g. MFL IP tool, in the line, or (ii) if the line in which the pig is being run has a low flow and pressure. In these cases the bypass valve can be closed ½ hour (or 5km) before estimated pig arrival time to drive the pig direct into receiver to avoid stopping pig near bypass tee. If this is not done and the pig stops just past the barrel tee of the bypass line, it may require developing high ∆P to house the pig in the receiver and this may drive it at an unacceptably high speed.

Permanent gas freeing / purging facilities are not provided at PDO pig launcher / receiver sites. If it is considered necessary for safety reasons that purging with an inert gas is necessary, then temporary facilities shall be provided.

NOTE:
1. Ignition sources shall be removed from the area and continuous atmospheric monitoring within the area shall be carried out.
2. For H2S designated areas entry and working MUST be in accordance with PR-1078 - Hydrogen Sulphide Management Procedure
3. All lines where classified as high sour as specific method of statement shall be followed as per GU-1008 appendix-1 MIV(D)-KIC(D)-BAL(A) High Sour.
1 Launcher/Receiver Safety Precautions

1.1 General Precautions and Safety Concerns

1.2.1 Pyrophoric Dust
Pyrophoric dust can be formed in dry gas lines which can produce an exothermic reaction when it comes in contact with air and cause fire in the barrel. Special precautions are to be taken when pyrophoric dust is present or may be present during pigging operations.

- Hydraulic oil will be used to dampen down any dust and to ‘wet’ the inside of the barrel. Rubber hand gloves are to be worn by personnel handling the spray gun and pig
- Plastic sheets will be laid around receiver door area to capture hydraulic oil and dust escaping from the trap
- One person will open the door while others in the team apply the hydraulic spray into the barrel and over the pig.
- After opening the trap and while pulling the pig towards the trap door, hydraulic oil will be continuously sprayed on the pig and the surrounding barrel. Spraying will continue until the pig is clear of the barrel. Once outside of the receiver and in the cradle the pig will be wetted using water. Hydraulic oil will continue to be used inside the barrel to damp down any pyrophoric remaining in the pig trap. Loose pyrophoric dust will be collected for disposal.
- Once the pig has been retrieved and all loose dust / debris removed, the trap door will be closed, and the trap secured. The complete trap shall be purged with gas and vented. A second charge of gas will be applied when all drains and vents are closed to prevent the ingress of air into the trap.

Pyrophoric waste and contaminated debris will be collected and bagged for disposal at a nominated PDO disposal area designated to handle pyrophoric waste. Care shall be taken to hose down the pig to remove all pyrophoric deposits before further transportation.

NOTE: Water or wet clothes should be carried by the transport vehicle to prevent the pig igniting during transit.
1.1 Preparation and HSE requirements for High Sour H₂S Pipelines

Fields producing from reservoirs with high H₂S, such as Hanweel, Birba, Al Noor and Yibal Kuff shall be required to demonstrate greater control over the possible release of high concentrations H₂S during pigging operations.

1.1.1 Pre-Requisites

The following will be required to be met or provided before the pigging operations can be undertaken.

- All pigging crews will be fully trained to PDO Standard in the use of Breathing Apparatus (BA).
- Sufficient N₂, in cylinders, will be available at site to facilitate gas freeing and purging operations. This will include tested regulators, piping and cylinder isolation / de-isolation tools (cylinder keys).
- Calibrated pressure gauges able to accommodate pressure ranges, max to min, to be encountered during the operation.
- Sufficient BA Sets for all personnel to be available
- Sufficient Escape Sets for all personnel to be available (to be used only in low H₂S pipelines).
- Personal H₂S monitors
- Portable meters capable of measuring H₂S, hydrocarbons in air and hydrocarbons in an inert gas.
- Continuous gas monitoring if vehicle is running inside the station
- Lifting plan for loading / unloading pigs in accordance with PR-1709 - Lifting and Hoisting Procedure Lift Planning Execution

Vents from launcher must be connected to common vent flare away from the launcher/Receiver.

Drain piping must be connected to a close drain system.

1.1.2 Risk Assessment and Management

A Risk Assessment or a Job Safety Plan (JSP) will be required for any pigging undertaken in high H₂S environments. The purpose of the Risk Assessment or JSP will be to ensure that all risks have been identified and mitigated to ALARP.

1.1.3 Purging with Nitrogen or an Inert Medium

Because of the risk of H₂S being released during the launching and retrieval phases of the pigging operations strict controls and mitigation shall be in place to ensure that pigging crews are not exposed.

Nitrogen, in quads shall be provided at the pig launcher and the pig receiver. By design a provision shall be made to allow nitrogen to be injected under controlled conditions into the barrel of the launcher and / or receiver before open the Launcher and receiver door.

Warning: In the event of any passing valve purging of nitrogen will not eliminate the H₂S and pigging operation must be stopped.

Before launching a pig the receiver must be lined up and pressurised. (Line-up of a high sour receiver does not involved opening the Receiver door or exposed to H₂S and though line up of the receiver do not required any nitrogen purging). But Nitrogen cylinders must be available and filled and enough for retrieving the pig.
1. Connect the nitrogen supply line to the launcher / receiver barrel (if not hard piped).

OPEN the nitrogen quad isolation valve and pressurise the launcher slowly up to the isolation valves on the launcher / receiver barrel.

WARNING: A double block arrangement comprising of a block and a needle valve shall be fitted at the launcher / receiver barrel connection point.

2. OPEN the block valve and use the fine control needle valve to control the nitrogen flow into the launcher / receiver barrel.

Cyclic purge the launcher / receiver barrel in accordance with PR-1073 - Gas-Freeing, Purging and Leak Testing Process Equipment and Pipework section. Ensure the launcher / receiver barrel is depressurised on completion and the vent valves are OPEN.

3. On completion of gas freeing and purging instruct all personnel to put on BA.

Slowly remove ‘bleed screw’ or crack the door seal.

WARNING: The door locking ‘device’ shall be slackened but not removed.

4. Carry out a gas test at the ‘bleed screw’ or at the cracked door seal and ensure that hydrocarbon and H2S readings according to PR-1073 section 2 Gas freeing process : <80% LEL and < 5 ppm H2S. If conditions are safe then the BA’s can be removed.
1.1 Additional Safety Precautions when Running a Pig

1.1.1 Pig Tracking and Use of Locators
- When running a pig in a gas pipeline it will be accompanied by a transmitter, unless otherwise instructed by PDO.
- The use of transmitters and tracking will always be required when non-standard pigging operations are being carried out.
- Trailing transmitters are not to be used for any tracking operations.
- The use of a transmitter in a liquid pipeline will only be allowed with written instruction from PDO.

1.1.2 Use of Single or Multi-Bolt Pigs
- Single bolt design pigs are not allowed for use in gas/oil or multiphase liquid pipelines.
- Only standard approved (by PDO) pigs shall be used by the pigging contractor.

1.1.3 Stuck Pig
In events of pig stuck the pigging supervisor to check directly the operating parameters, differential pressure and valves positions. After confirming those checks, then pigging supervisor to stop the operation, isolate the launcher and receiver, depressurized and check visually the pig trap. After doing those steps directly reported to area authority, SPE and pipeline maintenance supervisor. Recovery plan with specific method statement and RA if required to be initiated by SPE and to be reviewed by operation and approved by pipeline maintenance coordinator & respective technical authority.

Note: In the event that the location of the stuck pig is not found due to malfunctioning of the locators or any other reasons, a volumetric calculation of the fluid entering the pipelines or flowrate/pressure surge monitoring, shall become necessary.

In the event of a ‘stuck pig’ the following steps in below section can be followed for the recovery.

1.1.3.1 General Steps and Recovery of Stuck Pig
1. Regulating the differential pressure in front and back of the pig, i.e. increasing the pressure at the launching end and/or reducing it at the receiving end.

Note: when creating a differential pressure by closing bypass valve, it has to be closed gradually (5% and wait for 10 minutes, 10% then wait for 10 minutes, and 20% then wait for 10 minutes till max 60%). Don’t close the main bypass valve for more than 60% unless you have a specific recovery procedure and approved RA.

2. Use a higher flow rate than normal flow (1m/sec).

3. For a bi-directional pig, the starting pressure at the launch can be lowered in an attempt to move the pig backwards before resuming flow at higher flow rate/pressure in order for the pig to negotiate any restrictions.

4. Flow could be reversed for a bi-directional pig, if practicable (pipeline process), in order to send back the pig to the launching station.

5. Launching a ‘rescue’ pig that has stiffer cups with harder sealing capabilities may be authorised.

Failure of any of the above to free the pig may, in a worst-case scenario, require a shutdown and removal of the section of pipeline where the pig is located.

IMPORTANT Note: Whenever a ‘stuck pig’ incident occurs a specific procedure based on a Risk Assessment and including all contingencies shall be developed and authorised by the PDO pipeline maintenance coordinator/supervisor or respective technical authority.
### Pigging Calculation Sheet

<table>
<thead>
<tr>
<th>Oil Calculation</th>
<th>Data</th>
<th>Gas Calculation</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line I/D</td>
<td></td>
<td>Line I/D</td>
<td></td>
</tr>
<tr>
<td>Pipe Size inch</td>
<td>8</td>
<td>Pipe Size inch</td>
<td>16</td>
</tr>
<tr>
<td>Wall Thickness mm zero if under 12&quot;</td>
<td>0</td>
<td>Wall Thickness mm zero if under 12&quot;</td>
<td>0</td>
</tr>
<tr>
<td>Flow Rate m³/day</td>
<td>2000</td>
<td>Flow Rate S/m³/day</td>
<td>1000000</td>
</tr>
<tr>
<td>Pipeline Length Km</td>
<td>30</td>
<td>Pressure bar</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pipeline Length Km</td>
<td>9</td>
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#### Results

<table>
<thead>
<tr>
<th>Line Volume m³</th>
<th>972.88</th>
<th>Line Volume S/m³</th>
<th>1167</th>
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<tbody>
<tr>
<td>Pig Speed Km/hr.</td>
<td>2.57</td>
<td>Pig Speed Km/hr.</td>
<td>6.42</td>
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<td>1km - min/sec</td>
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<td>1 Km in mm:ss</td>
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<tr>
<td>Pig Speed m/sec</td>
<td>0.71</td>
<td>Pig Speed m/sec</td>
<td>1.78</td>
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<tr>
<td>pigrunT hrs/mins</td>
<td>11:40</td>
<td>Pig Run Time hh:mm</td>
<td>1:24</td>
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<tr>
<td>Joint in Seconds</td>
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<td>Line Pack S/m³</td>
<td>58373</td>
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<td></td>
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<td>Joint in Seconds</td>
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### Pipeline Pigging Operation Procedure

#### PR-1082 Version History

<table>
<thead>
<tr>
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<th>Date</th>
<th>Author</th>
<th>Scope/Remarks</th>
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<td>6.0</td>
<td>Jan-22</td>
<td>Mohammed Balushi UIPT 44</td>
<td>Procedure Simplified</td>
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<td>July-17</td>
<td>Siyabi Mohammed UIPT4</td>
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<td>UOP/1</td>
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