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ANNEXURE A1 – SCOPE OF WORK

ENQUIRY NUMBER: AHT26709
DESCRIPTION: PROVISION OF AUTOMATED, CRAWLER BASED, REMOTE WELD UT PHASED ARRAY and TOFD, C-SCAN AND PULSED EDDY CURRENT SPECIALISED NDT OF SPHERES 51-VS-161, 51-VS-163 AND 51-VS-164

1. DESCRIPTION OF THE SERVICES – GENERAL

The Tenderer may opt to tender for either one of the Inspections below or for both.

Non-destructive testing is required at the following two areas at the PetroSA GTL Refinery in Mossel Bay;

i) Sphere Shell Inspections, and
ii) Sphere Leg Inspections.

1.1 Sphere Shell Inspection

The Supplier shall supply all labour, supervision, materials and equipment necessary for the satisfactory execution of **automated, magnetic crawler based, remote weld UT Phased Array and TOFD, shell C-scan corrosion mapping** Specialised NDT of spheres, 51-VS-161, 51-vsVS-163 and 51-VS vs-164, for the detection and sizing of service induced defects as well as any historic fabrication defects.

Table 1: UT Phased Array & TOFD Scope

Area of Equipment	Section	Location Number	Position at Location			Technique	Comments
			A	B	C		
Top Dome	T - piece	1	200 mm	200mm	200mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	2	200 mm	200mm	200mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	3	200 mm	200mm	200mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	4	200 mm	200mm	200mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	5	200 mm	200mm	200mm	Phased Array & TOFD	Section not visible on the sketch
	T - piece	6	200 mm	200mm	200mm	Phased Array & TOFD	Section not visible on the sketch
	T - piece	7	200 mm	200mm	200mm	Phased Array & TOFD	Section not visible on the sketch
	T - piece	8	200 mm	200mm	200mm	Phased Array & TOFD	Section not visible on the sketch
Top Dome/Shell	Plate Material	North	350 X 450mm			C-Scan Corrosion Mapping	As numbered on the attached sketch
	Plate Material	East	450 X 610mm			C-Scan Corrosion Mapping	As numbered on the attached sketch
	Plate Material	South	250 X 450mm			C-Scan Corrosion Mapping	As numbered on the attached sketch
	Plate Material	West	450 X 750mm			C-Scan Corrosion Mapping	As numbered on the attached sketch
Shell Area	T - piece	1	300 mm	300mm	300mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	2	300 mm	300mm	300mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	3	300 mm	300mm	300mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	4	300 mm	300mm	300mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	5	300 mm	300mm	300mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	6	300 mm	300mm	300mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	7	300 mm	300mm	300mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	8	300 mm	300mm	300mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	9	300 mm	300mm	300mm	Phased Array & TOFD	Section not visible on the sketch
	T - piece	10	300 mm	300mm	300mm	Phased Array & TOFD	Section not visible on the sketch
	T - piece	11	300 mm	300mm	300mm	Phased Array & TOFD	Section not visible on the sketch
	T - piece	12	300 mm	300mm	300mm	Phased Array & TOFD	Section not visible on the sketch
	T - piece	13	300 mm	300mm	300mm	Phased Array & TOFD	Section not visible on the sketch
	T - piece	14	300 mm	300mm	300mm	Phased Array & TOFD	Section not visible on the sketch
	T - piece	15	300 mm	300mm	300mm	Phased Array & TOFD	Section not visible on the sketch
	T - piece	16	300 mm	300mm	300mm	Phased Array & TOFD	Section not visible on the sketch
Bottom Dome	T - piece	1	200 mm	200mm	200mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	2	200 mm	200mm	200mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	3	200 mm	200mm	200mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	4	200 mm	200mm	200mm	Phased Array & TOFD	As numbered on the attached sketch
	T - piece	5	200 mm	200mm	200mm	Phased Array & TOFD	Section not visible on the sketch
	T - piece	6	200 mm	200mm	200mm	Phased Array & TOFD	Section not visible on the sketch
	T - piece	7	200 mm	200mm	200mm	Phased Array & TOFD	Section not visible on the sketch
	T - piece	8	200 mm	200mm	200mm	Phased Array & TOFD	Section not visible on the sketch

The coverage shall be as marked on the attached drawing and summarised in the table above

1.2 Sphere Leg Inspection

The Supplier shall supply all labour, supervision, materials and equipment necessary for the satisfactory execution of **Pulsed Eddy Current (PEC)** corrosion mapping Specialised NDT of 4 off support legs on each of the spheres, 51-VS-161, 51-VS-163 and 51-VS-164. The Specialised NDT shall be performed through the concrete-based fireproofing of the support legs, for

the detection and sizing of service induced corrosion under the concrete-based fireproofing.

Table 2: Pulsed Eddy Current Scope

Equipment	Section	Location Number	Length	Diameter	Technique
51-VS-161	Sphere Leg	1	8.25cm	24"	Pulsed Eddy Current
	Sphere Leg	2	8.25cm	24"	Pulsed Eddy Current
	Sphere Leg	3	8.25cm	24"	Pulsed Eddy Current
	Sphere Leg	4	8.25cm	24"	Pulsed Eddy Current
51-VS-163	Sphere Leg	1	8.25cm	24"	Pulsed Eddy Current
	Sphere Leg	2	8.25cm	24"	Pulsed Eddy Current
	Sphere Leg	3	8.25cm	24"	Pulsed Eddy Current
	Sphere Leg	4	8.25cm	24"	Pulsed Eddy Current
51-VS-164	Sphere Leg	1	8.25cm	24"	Pulsed Eddy Current
	Sphere Leg	2	8.25cm	24"	Pulsed Eddy Current
	Sphere Leg	3	8.25cm	24"	Pulsed Eddy Current
	Sphere Leg	4	8.25cm	24"	Pulsed Eddy Current

The coverage shall be as marked on the attached drawing and summarised in the table above.

2. DESCRIPTION OF THE SERVICES - SPECIFIC

The Supplier shall supply all the necessary equipment, consumables and personnel to undertake the Services and shall comply to the following:

2.1 Manpower Requirements

The supply of competent and skilled personnel to perform all services specified in paragraph 1.1 and 1.2 above, certified to the requirements of ASNT-TC-1A or ISO 9712. The Supplier's personnel shall have the below listed qualifications and certification

2.1.1 Spere Shell Inspection

Category	Qualification	Experience
NDT Level 3 (UT, ToFD, Phased Array) on one of the above-mentioned techniques.	A minimum of NDT Level 3 SAQCC, PCN, CSWIP or ASNT- SNT-TC-1A, or similar	Minimum 5 years industry experience as a Level 3 technician
NDT Level 2 Technician (UT, ToFD, Phased Array) either multi or individually certified in each.	A minimum of Level 2 SAQCC, PCN, CSWIP or ASNT- SNT-TC-1A, or similar	Minimum 3 years industry experience as a Level 2 technician,
NDT Level 1 Technician (UT, ToFD, Phased Array) either multi or individually certified in each.	a minimum of Level 1 SAQCC, PCN, CSWIP or ASNT- SNT-TC-1A, or similar	Minimum 1 year industry experience as a Level 1 technician,

2.1.2 Shell Leg Inspection

Category	Qualification	Experience
NDT Level 3 (PEC) either multi or individually certified in each.	A minimum of NDT Level 3 SAQCC, PCN, CSWIP or ASNT- SNT-TC-1A, or similar	Minimum 5 years industry experience as a Level 3 technician
NDT Level 2 Technician (PEC) either multi or individually certified in each.	A minimum of Level 2 SAQCC, PCN, CSWIP or ASNT- SNT-TC-1A, or similar	Minimum 3 years industry experience as a Level 2 technician,
NDT Level 1 Technician (PEC) either multi or individually certified in each.	A minimum of Level 1 SAQCC, PCN, CSWIP or ASNT- SNT-TC-1A, or similar	Minimum 1 year industry experience as a Level 1 technician,

NOTE:

- The NDT Level 3 shall perform the duties as per the company's Quality Management System and Procedures based on ASNT-TC-1A/ISO 9712/SANS 17020 and is ultimately responsible for certification of all the company's Specialised NDT Personnel and review of Specialised NDT Reports at no additional cost to PetroSA.

- The Supplier shall be ISO 9001 certified or SANS 17020 accredited as a minimum.

The Supplier will be required to meet the following requirements:

- Personnel files containing personnel's CVs and NDT certification, including details of experience and qualification certificates, must be submitted to PetroSA NDT Technologist/delegate for review before the start of work on PetroSA site.

- PetroSA reserves the right to independently test any or all NDT technicians, using PetroSA supplied samples, prior to allowing them to work at PetroSA facilities.

2.1.3 Personnel Requirements

- It is the Supplier's responsibility to ensure they have the required certified personnel to execute the required services and scope of work as requested by PetroSA.

- No personnel will be allowed on site without prior submittal and approval of the Qualification, Certification and Experience records to the PetroSA NDT Technologist/Delegate, as well as a compliant medical certificate.

2.2 Facility Requirements:

2.2.1 Equipment

The Supplier shall supply all the necessary equipment, consumables and personnel to undertake these services.

2.2.2 Utilities

PetroSA will provide the following utilities free of charge to the Supplier unless specifically excluded elsewhere:

- Scaffolding as required
- Cranes as required
- Water
- Ablution facilities

2.2.3 Office Accommodation

PetroSA will supply office space during the execution of the services.

2.3 Execution of Services

2.3.1 All Specialised NDT work shall be performed by a Level 2 Technician, who will be required to perform all required inspections and interpretation of the results. The Level 2 Technician must be able to read and understand Mechanical Flow Diagrams (MFD) and/or Process Flow Diagram (PFD), Isometric/Layout drawings and be able to calibrate and service their own equipment, etc., as deemed necessary by their own procedures.

2.3.2 A Level 1 NDT technician may assist the Level 2 technician with the physical Specialised NDT on the plant, however, the Level 1 technician is not allowed to perform any interpretation and acceptance or rejection of identified flaws.

2.3.3 A preliminary Specialised NDT report shall be issued to PetroSA prior to leaving site. This preliminary report shall highlight any significant anomalies/defects that has been observed during the execution of the Specialised NDT as listed in Section 1.1 and 1.2.

2.3.4 All Final Specialised NDT reports shall be reviewed and approved by the Supplier's Level 3 technician before being issued to PetroSA.

2.4 Badging, Medical Examinations and Safety Induction

2.4.1 Badging, medical examinations and safety induction of the Supplier's assigned staff will be done on Site by PetroSA, by appointment only.

2.4.2 PetroSA will pay for the time spent on site during this induction process, as well as for the time for the on-site medical test to a maximum of 8 hours.

2.4.3 The costs associated with the medical assessment shall be for the Supplier's account. The Supplier may opt to utilise any other agency to conduct the medical examinations provided the required tests are done.

These can be verified with the PetroSA representative prior to the testing.

3. DESCRIPTION OF THE SERVICES – PROCEDURE

3.1 All work performed shall meet the requirements of the applicable PetroSA procedures and the approved Supplier's procedures.

3.2 The relevant Specialised NDT procedures must be authorised and approved by the Supplier's NDT Level 3 and their Management before being submitted to PetroSA.

3.3 The Specialised NDT procedures shall be issued to the PetroSA's NDT Technologist /Delegate before work can commence on PetroSA sites.

3.4 Copies of the Supplier's Written Practice shall be provided to PetroSA prior to commencement of any work.

4. REPORTING REQUIREMENTS

4.1 The Supplier shall keep accurate records of inspections performed. These records shall comprise Inspection reports, data storage disks and time sheets of satisfactory form and content to PetroSA. All time sheets shall be counter signed by authorised PetroSA personnel.

4.2 Equipment drawings, MFD, plots of defects and comparisons of results shall form the minimum reporting criteria. The Supplier shall issue two copies of reports & a CD back-up of any electronic data for each sphere completed.

4.3 A draft / interim report shall be issued, immediately after completion of on-site work, to the PetroSA representative before demobilising from PetroSA.

4.4 All final hardcopy reports shall be submitted within 30 (thirty) days to the PetroSA representative after completion of each work assignment on PetroSA site. Only hardcopies and CD backup will be acceptable. A report transmittal form and the invoice must be attached to the final reports.

4.5 All reports reviewed and approved as per Section 2.3

5. TECHNICAL REQUIREMENTS

5.1 All work shall meet the requirements of the codes as specified by PetroSA and all pre-approved Supplier procedures. In addition to other rights or remedies of PetroSA, all Services not performed in accordance with this Sub-clause shall be for the Supplier's account.

5.2 PetroSA reserves the right to independently test/verify the ability of any or all technicians using PetroSA specific test samples.

5.3 Any personnel that do not pass such a test may, at the discretion of PetroSA, be removed from site. Any personnel that are found deliberately performing inferior quality work will immediately be dismissed.

5.4 The Supplier's performance of its obligations pursuant to this agreement shall not be deemed complete until PetroSA has reviewed and accepted the final reports.

5.5 All results queried by PetroSA shall be reviewed and verified by the Supplier's Level 3 technician, who shall then issue a verification report. This Level 3 additional verification report shall be submitted to PetroSA together with the final test report as per Section 4, as required.

6. QUALITY OF SERVICE

6.1 The PetroSA NDT Technologist/Delegate shall be at liberty to object to any person employed on the site by the Supplier, who shall be found to be unsuitable in respect of qualification, workmanship, safety, equipment and/or machinery, behaviour, misdemeanours, and negligence.

6.2 The Supplier shall immediately replace the person(s) so objected to upon valid written or verbal notice from PetroSA requiring them to do so. PetroSA shall not be liable for any costs, including demobilisation costs of personnel due as a result of any of the conditions as stated in the clause above.

6.3 The Supplier must familiarise all its management with the details of this service and all accompanying PetroSA procedures.

6.4 Work which does not meet the minimum requirements, including quality, will be rejected and re-work will be for the Supplier's account.

7. SAFETY

7.1 The Supplier shall at all times be responsible for and strictly adhere to the provisions of the Safety Precautions as prescribed in terms of:

- Mine Health and Safety Act No 29 0f 1996
- Minerals Act no 50 0f 1991
- Department of Health regulations
- Government Gazette
- PetroSA Procedures and policies
- PetroSA Safety Specifications

7.2 Supplier's Safety File Requirements

In addition to the legal requirements and regulations applicable to the Services, the following safety procedures shall also apply:

7.2.1 Supplier's safety file shall be submitted to PetroSA Safety Department (an index of all requirements will be provided to the Supplier).

7.2.2 No Services shall be carried out unless a Safety Authorisation for vessel

entry and a permit to work has been issued to the technician.

7.2.3 No assignment shall be carried out without a proper risk assessment being conducted by personnel and copies of risk assessment forms to be submitted to PetroSA production personnel before the work is executed.

7.2.4 All electrical equipment used is to be checked and approved by the PetroSA Electrical department before usage.

7.2.5 All equipment calibration certificates must be readily available and valid.

7.2.6 No personnel will be allowed to enter PetroSA site if their alcohol level is above the specified limit as per PetroSA procedure.

7.2.7 A maximum of 45km/hr speed shall be adhered to at all times while driving on PetroSA site.

7.2.8 The Supplier shall ensure adherence to all PetroSA security requirements at all times.

7.2.9 Strict control will be enforced on hours worked in accordance with the Minerals Act, Act 50 of 1991