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Classification:	**OPEN**

REPORT No.:	NLM-REP-25/217
Department/Section	WM/DP
TITLE:	Specification for the repair, refurbishment, replacement & reinstatement of the Uranium Conversion Plant ventilation systems.

Authorization

	NAME	SIGNED	DATE
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Contents

1.0 Purpose

The purpose of this document is to provide specifications for the repair, refurbishment, replacement & reinstatement of the Uranium Conversion Plant ventilation systems, located on Necsa's Pelindaba precinct. This will enable a contractor to provide Necsa with a commercial offer for the engineering, basic design, detailed design, equipment selection, supply, installation and commissioning of the refurbished ventilation system.

2.0 Background

The Uranium Conversion plant consists of several buildings and spaces within buildings, referred to Areas. The Uranium Conversion plant consist of the following Areas:

- Area 54 – ADU reception and processing
- Area 56 – UO2/U3O8 reception and UO3 production
- Area 58 – UF_4 production
- Area62 – Florine production
- Area64 – UF_6 production and distillation
- Area66 – UF_6 storage, transfer and dispatch
- Area70 – Waste treatment facility
- Area76 – Control room
- Fan rooms F1 to F8
- Areas and building occupied by PELCHEM (Areas 60, 68, 69 and 72)

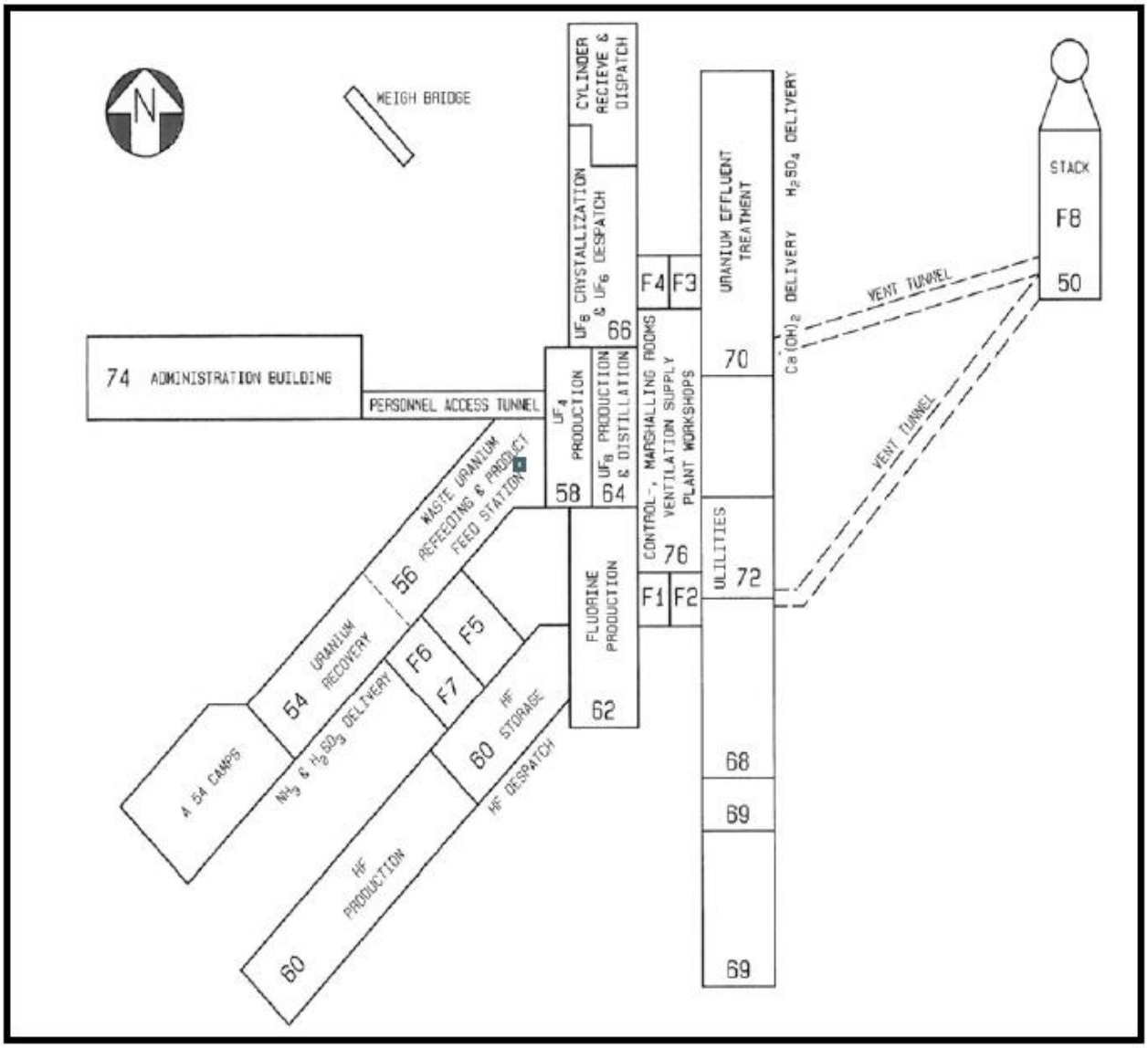

Figure 1 – Conversion Plant: Area Layout

3.0 References

[1]	ENS-MES-SPE-0003	Ventilation System User Requirement Specification for the Uranium Conversion Plant
[2]	737-52-67-J00001	Greenside Project – Ventilation: Quantitative Flow Sheets
[3]	A98-355-05	Fantechnic – Sectional Assy of Running Gear
[4]	F 0840/G1&G2	Fantechnic – Fan Performance Graph Aerex Double Inlet Centrif. Fan Type WZK 355

4.0 Abbreviations

BMS	:	Building Management System
DE	:	Driving End
DP	:	Differential Pressure
EN	:	European Norms
HEPA	:	High Efficiency Particulate Air
ISO	:	International Standards Organisation
kW	:	Kilo Watt
MCC	:	Motor Control Centre
NDE	:	Non-Driving End
Necsa	:	South African Nuclear Energy Corporation SOC Limited
O&M	:	Operating and Maintenance
PLC	:	Programmable Logic Controller
RPM	:	Revolutions per minute
SCADA	:	Supervisory Control and Data Acquisition

UF	:	Uranium Fluoride
UF_4	:	Uranium Tetrafluoride
UF_6	:	Uranium Hexafluoride
VSD	:	Variable Speed Drive

5.0 Existing Installation

5.1 Supply Air Systems

Supply air systems serving the various areas are housed within plant rooms numbered F1 to F7, see figure 1.
Supply air systems typically consist of an inlet louvre, bird mesh, spray cooler, primary filtration, heating elements with associated control elements (Steam Coils) and a supply air fan. All steam coils and associated control elements were removed & spray coolers de-commissioned and stripped.
Except for fan house 7, serving area 60 (PELCHEM), all supply air fans are of a single fan configuration, without a stand-by function and can be summarised as follows:

Plant Room	Description	Design Volume	Design Pressure	Qty	Serving areas
Fan house 1	Area 62 supply air fan	46,66 m^3/s	950 Pa	1	62
Fan house 2	Area 72 supply air fan	43,26 m^3/s	950 Pa	1	72, 68, 76
	Area 76	5,39 m^3/s	220 Pa	1	76
	Area 76	3,11 m^3/s	230 Pa	1	76
Fan house 3	Area 70 supply air fan	46 m^3/s	1030,5 Pa	1	70
Fan house 4	Area 66 supply air fan	44,35 m^3/s	950 Pa	1	66
Fan house 5	Area 58 supply air fan	54,5 m^3/s	950 Pa	1	58, 64
	Fan P1955	39,6 m^3/s	900 Pa	1	Uncertain
Fan house 6	Area 56 supply air fan	60,9 m^3/s	950 Pa	1	56, 54
Fan house 7	Area 60 supply air fan	50,665 m^3/s	1200 Pa	2	60

5.2 Supply Air Fan Houses Technical Details

Fan House 1	
Item	**Information**
Fan Assembly	P1951
Motor kW	75
Motor Bearing DE	6316C3
Motor Bearing NDE	6314C3
Pre Filters	595 X 595 X 98 - 49 off
Filter Clips	196 to be replaced
V-Belts	PHG SPC 4500 - 4 off
Plumber Blocks	SNA 518-615

Fan House 2	
Item	**Information**
Fan Assembly	P1986
Motor kW	75
Motor Bearing DE	NU315
Motor Bearing NDE	6312
Pre Filters	595 X 595 X 98 - 49 off
Filter Clips	196 to be replaced
V-Belts	22 X 5390 LP C210 - 4 off
Plumber Blocks	SNA 518-615

Fan House 3	
Item	**Information**
Fan Assembly	P2986
Motor kW	No details on nameplate.
Motor Bearing DE	No details on nameplate.
Motor Bearing NDE	No details on nameplate.
Pre Filters	595 X 595 X 98 - 52 off
Filter Clips	208 to be replaced
V-Belts	SPC 22N X 6000 - 4 off
Plumber Blocks	SNA 518-618

Fan House 4	
Item	**Information**
Fan Assembly	P1961
Motor kW	75
Motor Bearing DE	NU315
Motor Bearing NDE	6312
Pre Filters	595 X 595 X 98 - 48 off
Filter Clips	192 to be replaced
V-Belts	SPC 22N X 5600 - 4 off
Plumber Blocks	FAG SNE 518

Fan House 5	
Item	**Information**
Fan Assembly	P1921
Motor kW	90
Motor Bearing DE	NU317
Motor Bearing NDE	6314ZZ
Pre Filters	595 X 595 X 98 - 63 off
Filter Clips	252 to be replaced
V-Belts	SPC 22N X 6200 - 5 off
Plumber Blocks	SMA 522-619

Fan House 6	
Item	**Information**
Fan Assembly	P1962
Motor kW	90
Motor Bearing DE	NU317
Motor Bearing NDE	6314ZZ
Pre Filters	595 X 595 X 98 - 63 off
Filter Clips	252 to be replaced
V-Belts	SPC 22N X 5000 - 5 off
Plumber Blocks	SNA 520-617

Fan House 7 – Fan 1	
Item	**Information**
Fan Assembly	P1941
Motor kW	90
Motor Bearing DE	6317 C3
Motor Bearing NDE	6317 C3
Pre Filters	595 X 595 X 98 - 54 off
Filter Clips	216 to be replaced
V-Belts	SPC 4500 - 5 off
Plumber Blocks	unknown

Fan House 7 – Fan 2	
Item	**Information**
Fan Assembly	P1942
Motor kW	90
Motor Bearing DE	No detail on Nameplate
Motor Bearing NDE	No detail on Nameplate
Pre Filters	595 X 595 X 98 - 54 off
Filter Clips	216 to be replaced
V-Belts	C4450\22 X 4394 - 5 off
Plumber Blocks	unknown

5.3 Extract Air Systems

Exhaust air fans are housed within plant room F8 and is connected via two tunnels to the conversion plant buildings, see figure 1.
The fan house is equipped with three extract air fans with a duty point of 238 m^3/s at 1100Pa each. See figures 2 and 3. A minimum of two exhaust air fans shall be in operation to achieve the required exhaust air flow rates. See figure 4.
At present all three extract air fans are switched off.
The number three fan suffered extensive mechanical damage due to a main shaft failure. The extent of further damage is unknown.
In the past, PELCHEM reinstated fan number one with the installation of a soft-starter and some control and monitoring functionality.

Fan House 8 is a radiological controlled area and as such under strict access requirements from Necsa. PPE such as half-face masks, disposable gloves and overshoes, safety shoes, disposable overalls, etc. are mandatory.
Necsa will endeavour to clean the area to within reasonably acceptable levels, but the radiological classification of the area will remain in effect throughout the project.

It shall be the responsibility of the contracting company to ensure correct PPE is always worn when performing activities within this area.
It shall further be required that all personnel working in this area be trained and registered by Necsa as radiological workers. All activities within this area shall be done under the close supervision and shall adhere to Necsa'a radiation protection personnel and requirements.

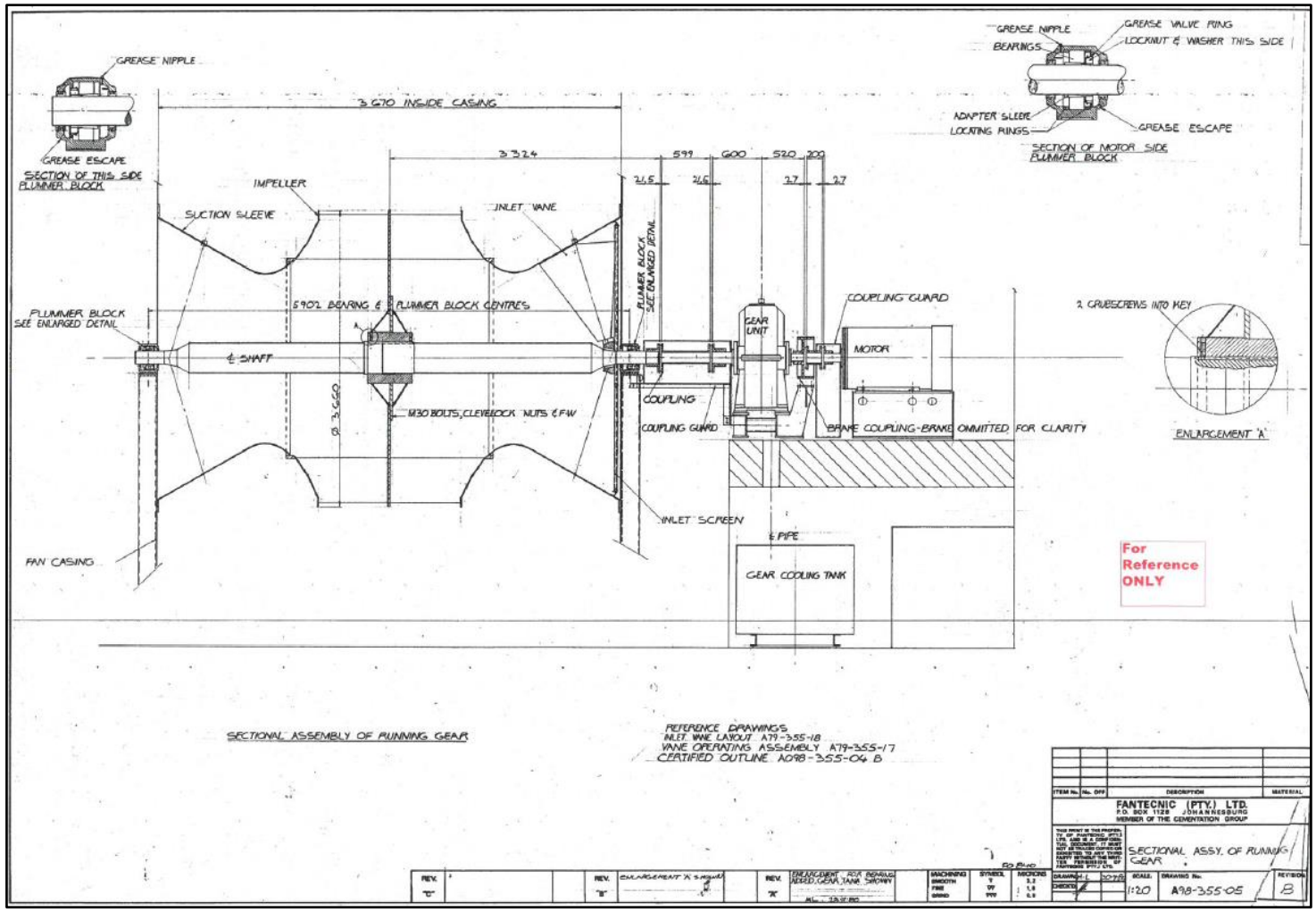
GREASE NIPPLE
GREASE ESCAPE
SECTION OF THIS SIDE PLUMMER BLOCK
3 670 INSIDE CASING
3 324
599
600
520
209
IMPELLER
SUCTION SLEEVE
INLET VANE
PLUMMER BLOCK SEE ENLARGED DETAIL
5902 BEARING C PLUMMER BLOCK CENTRES
SHAFT
M30 BOLTS, CLEVELOCK NUTS & FW
COUPLING
COUPLING GUARD
GEAR UNIT
MOTOR
BRAKE COUPLING-BRAKE OMMITTED FOR CLARITY
2 GRUBSCREWS INTO KEY
ENLARGEMENT 'A'
INLET SCREEN
PIPE
GEAR COOLING TANK
FAN CASING
GREASE NIPPLE
BEARINGS
GREASE VALVE RING
LOCKNUT & WASHER THIS SIDE
ADAPTER SLEEVE
LOCATING RINGS
GREASE ESCAPE
SECTION OF MOTOR SIDE PLUMMER BLOCK
For Reference ONLY
SECTIONAL ASSEMBLY OF RUNNING GEAR
REFERENCE DRAWINGS
INLET VANE LAYOUT A79-355-18
VANE OPERATING ASSEMBLY A79-355-17
CERTIFIED OUTLINE A098-355-04 B
FANTECNIC (PTY.) LTD.
P.O. BOX 1128 JOHANNESBURG
MEMBER OF THE CEMENTATION GROUP
SECTIONAL ASSY. OF RUNNING GEAR
1:20
A98-355-05
B

Figure 2 – Exhaust Air Fan

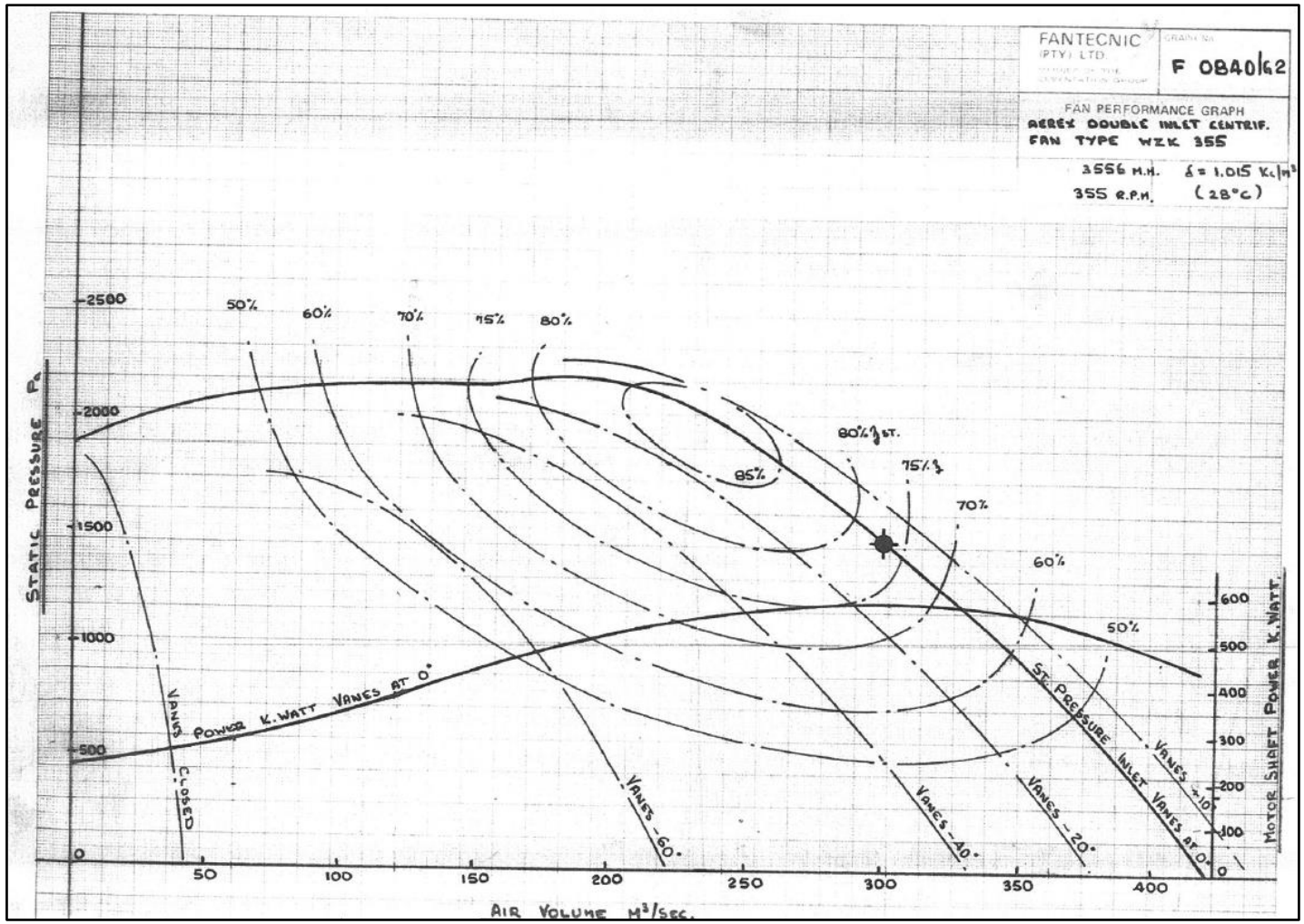
FANTECNIC (PTY) LTD.
F 0840/62
FAN PERFORMANCE GRAPH
AEREX DOUBLE INLET CENTRIF.
FAN TYPE WZK 355
3556 M.M.
355 R.P.M.
δ = 1.015 K.g/m³
(28°C)
STATIC PRESSURE Pa
2500
2000
1500
1000
500
0
50%
60%
70%
75%
80%
80% St.
75% St.
70%
60%
50%
85%
VANES POWER K.WATT VANES AT 0°
VANES CLOSED
VANES -60°
VANES -40°
VANES -20°
VANES +10°
ST. PRESSURE INLET VANES AT 0°
MOTOR SHAFT POWER K.WATT
600
500
400
300
200
100
0
50
100
150
200
250
300
350
400
AIR VOLUME M³/SEC.

Figure 3 – Exhaust Air Fan Duty Point

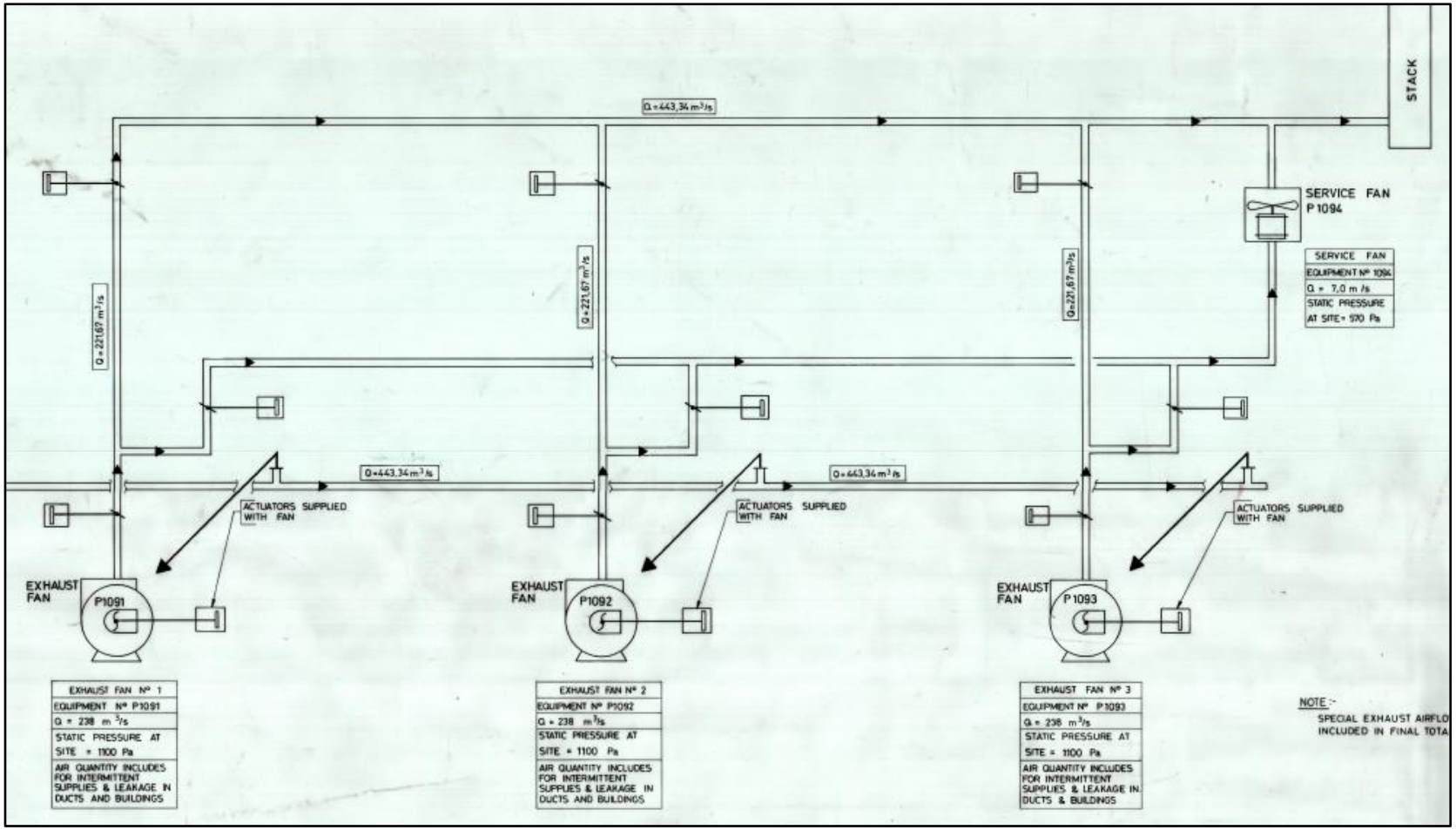

Figure 4 – Exhaust Air Fan Configuration

5.4 Existing Gearboxes

As part of the PELCHEM reinstatement of fan number one, the gearbox as well as the lubrication system (Pump, tubing, sump, etc.) and couplers was repaired and reinstated. An assessment was done on the remaining available gearboxes, by the same company that refurbished gearbox number 1. The report is attached in Annexure 1.
It will be expected that two gearboxes be refurbished, one to be used in fan number two and another to serve as a spare.

6.0 Scope of Work

The contract works to be carried out within the scope of this specification, consisting of the engineering, supply, delivery, off-loading, erection testing, setting into operation, commissioning, testing and balancing, guarantee and maintenance, complete with Operating & Maintenance manuals and “as built” drawings of the mechanical services as described herein.
The contractor shall fulfil the role of a main contractor and is responsible for all activities to successfully complete the work.
The engineering, quality control and inspections, equipment selections, preparation of installation drawings, testing, balancing, commissioning and the preparation of operating and maintenance manuals, shall be executed in a systematic manner, in accordance with an agreed program, under Necsa’s general supervision for approval by Necsa for:

a) Programming the works.
b) Equipment selection.
c) Installation drawings.
d) Procurement of equipment to be installed.
e) Installation.
f) Testing, balancing and commissioning documentation.
g) Operating, instructions and maintenance manuals.
h) Inspections and check lists.

7.0 Formal Agreement

It shall be expected from the successful contactor to enter into a formal agreement/Service Level Agreement with Necsa. Necsa shall provide the basis for the agreement/Service Level Agreement.

Items within the agreement will be mutually agreed upon before signature.

Annexure 2 contains the Standard Terms and Conditions of such a contract for reference purposes.

8.0 Program

The contractor shall submit to Necsa, within ***two weeks*** of his appointment a practical work program. This practical work program shall provide the following minimum information:

a) Required access date
b) Long lead item procurement schedule
c) Installation plan, detailing the sequence of installation activities
d) A project schedule for the submission of structural, installation, equipment selections, inspections report or completed portions of the Works, Operating & Maintenance Manuals, testing, balancing and commissioning.
e) Health and safety file

Sufficient time shall be allowed for re-submission of rejected documentation and Engineer's review/approval.
On a regular basis, the contractor shall submit updates of the practical work program should amendments be required. All such amendments are to be subject to Necsa's approval and shall not amend the project's completion date, unless official extension to the contract period has been granted.
Should the contractor fall behind the practical work program, the contractor shall take such steps as may be necessary to recover lost time.
This may require additional shifts, overtime, or additional plant and manpower, and to submit for approval, by Necsa, revised practical work programs to demonstrate the manner in which the required rate of progress will be achieved, all without additional cost to the client.
Regular meetings to monitor progress will be held. These meetings must be attended by as many representatives as is required. In addition, the meeting will be attended by the various Professionals at their own option and solely in their consulting capacity.

9.0 DRAWINGS

9.1 Necsa's Drawings and Specification

Drawings issued show only a schematic arrangement of the installation. These together with this specification, will give sufficient information to enable the contractor to determine the cost and to establish how the system must be installed, tested, balanced, inspected, operated, serviced and maintained.
These drawings are not to be used as installation drawings and therefore cannot be used as construction/ installation drawings.
Design, selection and construction details, and/or installation arrangements for equipment and distribution systems shall be obtained from either the manufacturer or

the supplier in their officially published literature/ documentation, design/application manuals.
Information issued shall be used as a basis for detailed design, manufacturing and installation drawings. The specific source to be clearly identified when making submissions.
Where the information contained in the equipment quality specifications do not provide sufficient details, reference must be made to the relevant source.

9.2 Structural Drawings

Where and if applicable the contractor shall supply Necsa with a set of structural drawings and or other drawings, showing requirements to fit equipment apparatus and materials to be installed by him.
It will be the contractor's responsibility to ensure that sufficient installation, maintenance and operation clearance is provided into the building space provided.
Such drawings shall be accepted by an approved Necsa responsible person before implementation can take place.

9.3 Installation Drawings Submission

Installation drawings shall indicate all equipment, distribution systems, testing, inspection, instrumentation positions, access requirements and work to be carried out by others.
Installation drawings shall be based on the information as supplied during tender stages such as this document, diagrams and drawings supplied as well as approved equipment selection and approved samples. The installation drawings shall have been checked and passed by a responsible member of the contractor's staff, such as the Project Engineer/ Manager.
Copies of the installation drawings of all parts of the ventilation contract works shall be submitted to Necsa.

9.4 "As-Built" Drawings

"As-Built" drawings shall comprise the installation drawings as specified above, updated with indicating all terminals and equipment controller position and further system diagrams, indicating the intended functioning capacity data and control functioning of all systems.

10.0 Equipment Selection Submissions

The details contained in the Functional Description & Desired Project Outcome as listed under item 13, are guidelines based on which the contractor should select the equipment. These selections shall be submitted to Necsa for approval.

No equipment shall form part of this contract until the equipment selection submission has been approved by Necsa. All equipment selection submissions shall be stamped and signed by a contractor's responsible person, such as Project Engineer/Manager, signifying that all the requirements of this specification have been complied with. Any deviation shall be highlighted in the equipment selection submission.
Pre-ordered equipment shall be handled in the same manner, with the contractor submitting equipment selection submissions. It is the responsibility of the contractor to ensure that the pre-ordered equipment complies fully with the requirements of this specification.

10.1 Sample Submissions

Samples required by Necsa, are physical examples required to illustrate materials finished, equipment or workmanship, and /or to assist with the onsite co-ordination, and/or to set standards by which the works may be judged. Where applicable certification, indication compliance with statutory and regulatory compliance must accompany such a submission The approved samples will be retained by Necsa until the relevant component is supplied and delivered as per samples but will then be returned to the contractor for incorporation in the works.

10.2 Submission procedures

Submission of installation drawings and equipment selections shall consist of the following activities carried out by the contractor and the other involved /interested parties:

a) The contractor shall prepare his submission in a manner and format agreed with Necsa. All submissions shall be dated and signed by the contractor's responsible person and shall be submitted in any orderly sequence and timeously as not delay the works, giving the approving parties sufficient time to proper approval procedures.
b) All submissions shall clearly indicate, and Necsa shall be informed in writing of all deviations from the requirements of this specification.
c) Equipment selection submissions shall be indexed in a manner to conform with the indexing of the Operating and Maintenance Manual, to allow direct incorporation.
d) At least 3 copies of all Installation drawings, diagrams and Equipment selections shall be submitted to Necsa for approval. By submitting drawings, diagrams, Equipment selections and/or samples, the contractor confirms that he has determined and verified all site measurements, site instruction criteria, materials, catalogue numbers, and that he has checked and coordinated with all available drawings issued for compliance with the requirements of the works and that of this specification.

e) Necsa shall approve the contractor's submissions with reasonable promptness for conformance with the design concept of the ventilation contract works and with the information given in this specification. Necsa's approval of a separate item shall not indicate the approval of the assembly in which the item functions.

f) The contractor shall make all corrections to the submissions required by Necsa and shall re-submit the required and corrected copies for re-approval until approved by Necsa. This process is to take place with reasonable promptness so as not to cause any delay to the works. The contractor shall highlight any revisions on the re-submitted documents, other than corrections required by Necsa on previous submissions.

11.0 Operating and maintenance manuals, wiring and control diagrams

The contractor shall prepare a draft operation and maintenance manual and submit this to Necsa for approval. The manual must be typed in English on A4 paper with consecutively numbered pages and shall contain the following information arranged in sections in the order stated below:

a. Section 1: System Description (this section shall contain a brief description of the system, what its function is and how it operates. A list of any abbreviations used in the O & M manuals shall be included.)

b. Section 2: Operating Instructions (this section should describe how to start and stop the systems, any special procedures after a power failure, how to change system parameters, etc. This can cross-reference to the control section for more detailed information.)

c. Section 3: Trouble Shooting (this section shall provide schedules of procedures to follow to find faults in event of a system malfunction.)

d. Section 4: Commissioning Data (this section shall contain all the final measurements of the installation as commissioned and shall also include full details of the design parameters specified.)

e. Section 5: Maintenance Instructions (this section shall detail maintenance operations to be carried out on a daily, weekly, monthly, etc. In addition, it should detail which daily/weekly activities should be carried out by the Client during the guarantee period.)

f. Section 6: List of Equipment Suppliers (this section should list all the equipment, with make, model no., and serial no. as well as full particulars of the suppliers contact details.)

g. Section 7: Spare Parts List (this section shall detail the recommended spare parts, differentiating which should be held on site and which could be ordered as required. Details of all lubricating oils and greases required must be included.)

h. Section 8: Equipment Data Schedules (this section shall contain schedules giving the full particulars of each item of equipment and its subcomponents e.g. Size, mass, flow rates, current ratings, safety devises, gas charge, motor/fan rpm, etc.)

i. Section 9: Supplier's Literature (this section shall all the relevant catalogues, performance curves and pamphlets of the equipment installed.)
j. Section 10: Control System (this section shall contain details on the operation of the control system, control philosophy, block logic diagrams, etc.)
k. Section 11: Electrical Drawings (this section shall contain the panel layout drawings and the wiring diagrams.)
l. Section 12: As-built Drawings (this section shall contain all the as-built and detail drawings of the installation. Separate as-built drawings indicating the positions of all control devices and sensors must be included)

After approval of the draft described above, a soft copy of this manual as well as two sets bound in hard covers, shall be handed to Necsa.
The Final Certificate of Completion will not be issued until this manual has been supplied and the wiring diagrams installed.

12.0 Guarantee

The contractor shall guarantee the entire installation (materials, equipment and workmanship) for a period of 12 months. The guarantee shall cover patent and latent defects and all items that become defective during the 12-month guarantee period shall be replaced and installed free of charge.

Any equipment in need of replacement but came into contact with radioactive substances shall not be removed from site and cannot be recovered by the contractor.

The guarantee period shall commence at the date when the installation is put into beneficial use to the satisfaction of Necsa. Beneficial use may take place before or after the official completion and hand-over date and beneficial use shall mean full time operation of the system by the Client or at the request of the Client.

Equipment purchased well in advance of the completion of the project, shall still carry the 12-month guarantee from date of handover or date of beneficial use. Where the installation is handed over in phases, the guarantee for equipment of that phase shall commence on handover of that phase.

The guarantee shall only commence once the following criteria have been met:

a. Practical completion has been achieved.
b. All commissioning data submitted and approved.
c. & M Manuals approved and issued to the Client Validation data issued and approved.
d. Client training has been carried out.

13.0 Practical Completion

Practical completion shall mean the following:

a. All remedial items within the facility and any items which may affect the continued operation of the installation, shall be completed.
b. Commissioning data shall have been submitted for approval.
c. & M manuals shall be available. The guarantee will not commence until O & M manuals are submitted.

14.0 Functional Description & Desired Project Outcome

The main function of the ventilation system is to keep all areas under a negative pressure and ensure an adequate air change rate, around 10 air changer per hour, in all areas. Under no circumstances will it be permitted that an area becomes positively pressurised. Activities described in this document aims to reinstate the ventilation systems to provide the above-mentioned functionality.

14.1 Engineering

It shall be expected that the contractor employs suitably qualified and experienced engineers, project manager, and supporting staff on a full-time basis to perform engineering, design, procurement and contract management activities.
During implementation full time site supervision shall be required for, as a minimum, coordination, communication, quality and health & safety purposes.

This document can be interpreted as a concept design. It shall be expected from the successful contractor to approach this project on a systems engineering basis with document submissions for approval at predefined milestones.
Major milestones are end of Basic Engineering, end of Detail Engineering, Commissioning, As-Built documentation & Project Completion.

Engineering activities shall focus on the following as a minimum:

- Electrical engineering for all VSD design with associated cabling, switchgear and MCC's
- C&I for the industrialised network and associated control and interlock system
- SCADA/BMS system
- Mechanical engineering for the reinstatement and control of the four downstream exhaust air dampers as well as mechanical component evaluation, selection, refurbishment and replacement where applicable.

14.2 Supply Air Systems

All supply air systems shall be refurbished which shall include, but not be limited to:

- Reinstate bird mesh screens
- Refurbish Pre-Filter frames
- Install new set of Pre-Filters
- Install new differential pressure gauge across pre-filter bank
- Lock open all existing inlet vortex dampers in the fully open position
- Install variable speed drive to control supply air pressure from a newly installed pressure transducer in the supply air ducting
- Replaces fan belts
- Inspect & replace, if necessary, fan plumber blocks
- Inspect & replace, if necessary, fan motor bearings
- remedial repair work to plant room such as repair and/or replace plant room doors and/or interleading doors.
- Repair and/or replace plant room light fittings

14.3 Pre-Filters

All pre-filters supplied shall be supplied by a reputable manufacturer holding a valid ISO 9001 certificate.
Filter case shall be constructed as a minimum from galvanised sheet steel with an external dimension of 595mm x 595 x 98 mm.
Faces of the filter case shall be flat and parallel to within a total allowance of 5 mm. The filter case shall be square to within a total allowance of 10 mm when measured diagonally across the corners of both faces.
Gaskets shall be a closed cell, oil resistant, low swell, expanded cellular elastomer. The gasket shall be sealed to the filter frame to ensure no leak path is possible. The edge of the gasket shall not project beyond the outside of the frame.
If gasket joints are required, they shall be formed in such a way as to eliminate leak paths through the joint. There shall be no more than four gasket joints per filter.
The filter element shall be a pleated element manufactured from non-woven synthetic fibres.
Filter media shall be tested in accordance with EN 779: 2012 and shall meet the requirements for a G4 classification.
Filters shall be packed in cartons with shock absorbing properties to prevent damage during shipping and handling.
Each filter shall be labelled clearly showing the following information as a minimum:

- Manufacturer's name or company logo
- Model Number
- Serial Number
- Manufacturing Batch Number
- Rated flow capacity
- Direction of air flow

At least one filter per batch shall be tested for resistance to air flow in accordance with ISO 9053 / DIN EN 29053 and a certificate to this effect shall be provided to Necsa for acceptance.
At least one filter per batch shall be tested in accordance with EN 779: 2012 providing proof of filter efficiency meeting G4 requirements and a certificate to this effect issued to Necsa for acceptance.
The test certificate shall at least include the following:

- Model
- Individual filter serial number and test result
- Name and address of laboratory/facility
- Name and address of client
- Name and signature of person(s) who checked the results
- Name and signature of person(s) that performed the test

14.4 Extract Air Systems

Extract air Fan 1 shall be inspected and placed back into operation which shall include, but not be limited to:

- Inspect & replace, if necessary, fan plumber blocks
- Inspect & replace, if necessary, fan motor bearings
- Inspect & replace, if necessary, couplers
- Refurbish braking system
- Inspect & service lubrication system
- Lock open all existing inlet vortex dampers in the fully open position
- Install variable speed drive to control exhaust air fan exhaust air pressure from a newly installed pressure transducer in the exhaust air plenum
- Inspect & replace if necessary complete fan motor
- Reinstate downstream damper functionality
- Repair and/or replace plant room light fittings
- Install critical parameter measuring devices to monitor and “trip” if required the fan motor such as bearing temperature, oil temperature, fan vibration, fan RPM, etc.

Extract air Fan 2 shall be refurbished and placed back into operation which shall include, but not be limited to:

- Refurbish two existing gearboxes
- Install new couplers
- Refurbish braking system
- Refurbish lubrication system
- Lock open all existing inlet vortex dampers in the fully open position
- Install variable speed drive to control exhaust air fan exhaust air pressure from a newly installed pressure transducer in the exhaust air plenum

- Inspect & replace, if necessary, fan plumber blocks
- Inspect & replace, if necessary, fan motor bearings
- Inspect & replace if necessary complete fan motor
- Reinstate downstream damper functionality
- Repair and/or replace plant room light fittings
- Install critical parameter measuring devices to monitor and "trip" if required the fan motor such as bearing temperature, oil temperature, fan vibration, fan RPM, etc.

14.5 Dampers

With reference to figure 4.
Functionality of the four dampers, downstream of exhaust air fan 1 and 2 shall be reinstated to isolate the fans when not in operation.
The same dampers downstream of exhaust air fan 3 shall be manually closed and locked in position.
The three dampers serving the service fan shall be manually closed and locked in position.
The vortex dampers of exhaust air fan 1 and 2 shall be manually opened and locked in position.
The vortex dampers of exhaust air fan 3 shall be manually closed and locked in position.

14.6 Control & Monitoring Systems

Apart from a soft starter and some parameter measurement on exhaust air fan 1, there is no control, alarming, interlock, etc. systems in place at present.

All supply air systems shall be interlocked with the exhaust air system. If the exhaust air falls away, or diminishes below an acceptable limit, all supply air systems shall be stopped.

All main areas pressures in relation to atmosphere shall be measured. Should the pressure rise to higher than an acceptable limit, the supply air fan to that area shall be stopped.

All interlocks and controls shall be performed by expanding the already installed ABB, PLC-based control system. This function shall ***not*** be performed by the likes of BMS software running from a desktop, laptop, notebook, or any Microsoft Windows, Apple Mac, Linux, Chrome, Android, iPhone, etc. operating systems.

The two exhaust air fans shall be controlled simultaneously to achieve the desired exhaust air plenum pressure. Should one of the exhaust air fans fail, the remaining fan shall remain operational and control around the exhaust air plenum pressure setpoint.

The existing iFIX SCADA System (GE Fanuc) shall be expanded to provide plant status at-a-glance as well as monitor and log critical parameters and relay notifications (e-mail, SMS, WhatsApp, etc.). Critical parameters shall include, but not be limited to:

- Area pressures

- Fan status (Running, Not Running, Frequency, Running %)
- Exhaust fans bearing and oil temperatures
- Exhaust air brake system temperature
- Filter DP
- Supply air pressures (Ducting)
- Exhaust air pressures (Plenum)
- Damper status on exhaust air fans

14.7 Differential Pressure Monitoring

Each primary filter bank shall be provided with a calibrated analogue type magnehelic gauge to enable the measurement of the differential pressure across the filter bank. Each primary filter bank shall be provided with a calibrated pressure transducer to communicate with the SCADA/BMS for monitoring and data logging purposes.
Main areas shall be equipped with a calibrated analogue type magnehelic gauge to enable the measurement of the differential pressure of the room in relation to the outside of the building. The gauge shall be located at the main entrance to the respective areas for ease of reading by building staff. The final positioning shall be agreed upon before installation. The same areas shall be equipped with a calibrated pressure transducer measuring the differential pressure of the room in relation to the outside of the building and communicate this data with the centralised PLC and SCADA/BMS for interlocking, monitoring, alarming and data logging purposes.

Main area pressures to be monitored:

- Area 54: ADU reception and processing
- Area 56: UO2/U3O8 reception and UO3 production
- Area 58: UF4 production
- Area 60: HF Storage
- Area 62: Florine production
- Area 64: UF6 production and distillation
- Area 66: UF6 storage, transfer and dispatch
- Area 68: Salt Plant
- Area 70: Waste treatment facility
- Area 72: Utilities
- Area 76: Control room

Bills of Quantities

15.0 Preambles

a) These bills of quantities contain pages numbered consecutively in each bill as indicated in the index. Before the tenderer submits his tender he should check the number of pages, and if any are found missing or duplicated or the figures or writing indistinct, or the bills of quantities contain any obvious errors, he should apply to Necsa at once and have same rectified, as no liability whatsoever will be admitted by Necsa in respect of errors in tender due to the foregoing.

b) The bills of quantities form part of and must be read in conjunction with the specifications and drawings which contain the full description of the work to be done and material and equipment to be used.

c) Tenders shall be submitted for initial consideration on the declaration of the total value of the bills. The fully priced and completed bills will be submitted with the tenders.

d) The total tender sum in the tender form shall constitute the contract price of the successful tenderer. Tenderers are advised to check their item extensions and total additions, as no claim for arithmetical errors will be considered.

e) No alteration, erasure or addition is to be made in the text of the bills of quantities. Should any alteration, erasure or addition be made, it will not be recognized but the original wording of the bills of quantities will be adhered to.

f) The priced bills of quantities of the successful tenderer will be checked and Necsa reserves the right to call for reasonable adjustments to any individual price and to rectify any discrepancy whilst the total tender price, as submitted, remains unaltered.

g) The responsibility for the accuracy of the quantities written into the bills remains with the party who prepared the bills. The tenderer shall be relieved of responsibility of measuring quantities at the tender stage, and the tender submitted shall be in respect of the quantities set out in the bills, although he will be required to make his assessment of items such as fixings, etc from details stated in the bills and shall include in the item prices for such small installation materials as are required for the complete installation in accordance with the specification.

h) The contractor and the employer or his agent may agree that the total of any bill(s), including any variations by way of additions there to or deductions there from, represents a fair and accurate quantification of the items set out in the bills and the parties may agree final payment on that basis. In the event any dispute as to the quantities, then the disputed item(s) shall be adjusted where necessary.

i) The quantities in these bills of quantities are not to be used for ordering purposes.

j) Variations in the scope and extent of the work included in the bills shall be allowed to meet the employers' requirements. The rules governing the extent and valuation of variations shall be those provided for in the conditions of contract.

k) Unless separate rates for the supply and for the installation of any item is specifically called for, the supply and installation costs of any items shall be fully

included in the unit price. The description of each item shall, unless otherwise stated herein, be held to include making, conveying and delivering, unloading, storing, unpacking, hosting, setting, fitting and fixing in position, cutting and waste, patterns, models and templates, plant, temporary works, return of packing, establishment charges, profit and all other obligations arising out of the conditions of contract.

l) All provisional sums shall be expended as directed by Necsa and any balance remaining shall be deducted from the amount of the contract sum.

Uranium Conversion Plant Ventilation System					
1. Preliminaries & General					
Item	**Description**	**Unit**	**QTY**	**Unit Price**	**Total**
1.1	Site Establishment	Item	1		
1.2	Training of Personnel – Necsa Specific Courses such as: Radiation Workers Scaffolding Erector Scaffold Awareness Safety Harness Training First Aid Officer Necsa Orientation Compulsory Training – Emergency, Waste Management, PDO induction	PC	1	R100 000-00	
1.3	Scaffolding	Item	1		
1.4	Rigging & Crane Hire	Item	1		
1.5	Occupational Health & Safety	Item	1		
1.6	Full time site supervision during site activities	Item	1		
1.7	Specialised PPE	Item	1		
1.8	One-year guarantee of the new installation	Item	1		
1.9	Training of the maintenance staff in the operation of the new installation	Item	1		
1.10	Other P&G Items (List in Cover Letter)	Item	1		
Sub-total to be carried over to Summary					

2. Engineering					
Item	**Description**	**Unit**	**QTY**	**Unit Price**	**Total**
2.1	Mechanical Engineering				

2.2	Electrical Engineering				
2.3	C&I Engineering				
2.4	Other (List in Cover Letter)				
2.5	Preparing and keeping to date of the manufacturing drawings up to and including the as built drawings inclusive of all duplicating of drawings as required.				
2.6	Operating and maintenance manuals inclusive of duplicating.				
2.7	Commissioning of the new installation				
Sub-total to be carried over to Summary					

3. Supply Air Systems					
Item	**Description**	**Unit**	**QTY**	**Unit Price**	**Total**
3.1	Reinstate bird mesh screens	Item	7		
3.2	Refurbish Pre-Filter frames: Frames to be wire brushed and treated for rust, primed with at least two layers suitable primer and all filter clips reinstated. Where required flashing shall be reinstated to seal off the filter frames from the adjacent chambers.	Item	7		
3.3	Supply and install new set of Pre-Filters	Item	7		
3.4	Supply one complete set of spare Pre-Filters	Item	7		
3.5	Supply and install new set of fanbelts	Item	7		
3.6	Supply one complete set of spare fanbelts	Item	7		

3.7	Supply and install new, calibrated, analogue type differential pressure gauge (Magnehelic) as well as pressure transducer (could be one instrument) across pre-filter bank. Calibration certificate to be issued to Necsa.	Item	7		
3.8	Lock open all existing inlet vortex dampers in the fully open position	16			
3.9	Supply and install variable speed drive to control supply air pressure from a newly installed pressure transducer in the supply air ducting. Complete with cabling, switch gear, MCC, etc. to establish a fully functional VSD system serving the fan motor.	Item	7		
3.10	Visual inspection of fan blades and confirmation of mechanical integrity of fan (Bent blades, shaft damage, excessive corrosion, all fixings tight, etc.).				
3.11	Confirm fan balancing correct				
3.12	Balance fan if required				
3.13	Inspect fan plumber blocks	Item	16		
3.14	Replace fan plumber blocks	Item	8		
3.15	Replace complete set of pulleys	Item	4		
3.16	Inspect fan motor bearings: - Excessive noise - Running hot - Discolouration - Pitting - Sufficient lubricant - Alignment	Item	16		
3.17	Replace fan motor bearings	Item	8		

3.18	Replace, if necessary 75kW electrical motor	Item	2		
3.19	Replace, if necessary 90kW electrical motor	Item	1		
3.20	Replace plant room interleading door	Item	10		
3.21	Replace plant room external door	Item	2		
3.22	Repair plant room interleading doors	Item	10		
3.23	Repair plant room external door	Item	2		
3.24	Replace plant room light fittings, inclusive of wiring	Item	35		
3.25	Clean out plant room		7		
Sub-total to be carried over to Summary					

4. Extract Air Fan 1					
Item	**Description**	**Unit**	**QTY**	**Unit Price**	**Total**
4.1	Inspect fan plumber blocks	Item	2		
4.2	Replace fan plumber blocks	Item	2		
4.3	Visual inspection of fan blades and confirmation of mechanical integrity of fan (Bent blades, shaft damage, excessive corrosion, all fixings tight, etc.).	Item	1		
4.4	Confirm fan balancing correct	Item	1		
4.5	Balance fan if required	Item	1		
4.6	Inspect fan motor bearings: - Excessive noise - Running hot - Discolouration - Pitting - Sufficient lubricant - Alignment	Item	2		

4.7	Replace fan motor bearings	Item	2		
4.8	Inspect fan motor	Item	1		
4.9	Replace, if necessary 600kW electrical motor	Item	1		
4.10	Inspect couplers & Alignment	Item	2		
4.11	Replace couplers	Item	2		
4.12	Inspect gearbox	Item	1		
4.13	Inspect lubrication system	Item	1		
4.14	Service lubrication system	Item	1		
4.15	Replace lubrication system oil and filters	Item	1		
4.16	Replace braking system	Item	1		
4.17	Lock open all existing inlet vortex dampers in the fully open position	Item	2		
4.18	Install variable speed drive to control exhaust air fan exhaust pressure from a newly installed pressure transducer in the exhaust air plenum. VSD to work in conjunction with Fan 2 and control around the same setpoint. Complete with cabling, switch gear, MCC, etc. to establish a fully functional VSD system serving the fan motor.	Item	1		
4.19	Reinstate downstream damper functionality	Item	2		
4.20	Replace plant room light fittings, inclusive of wiring	Item	10		
Sub-total to be carried over to Summary					

5. Extract Air Fan 2

Item	Description	Unit	QTY	Unit Price	Total
5.1	Replace fan plumber blocks	Item	2		
5.2	Visual inspection of fan blades and confirmation of mechanical integrity of fan (Bent blades, shaft damage, excessive corrosion, all fixings tight, etc.).				
5.3	Confirm fan balancing correct				
5.4	Inspect fan motor	Item	1		
5.5	Replace fan motor bearings	Item	2		
5.6	Replace, if necessary 600kW electrical motor	Item	1		
5.7	Refurbish gearbox	Item	2		
5.8	Replace couplers & confirm alignment	Item	2		
5.9	Refurbish lubrication system	Item	1		
5.10	Replace lubrication system oil and filters	Item	1		
5.11	Replace braking system	Item	1		
5.12	Lock open all existing inlet vortex dampers in the fully open position	Item	2		
5.13	Install variable speed drive to control exhaust air fan exhaust pressure from a newly installed pressure transducer in the exhaust air plenum. VSD to work in conjunction with Fan 1 and control around the same setpoint. Complete with cabling, switch gear, MCC, etc. to establish a fully functional VSD system serving the fan motor.	Item	1		
5.14	Reinstate downstream damper functionality	Item	2		

5.15	Replace plant room light fittings, inclusive of wiring	Item	10		
Sub-total to be carried over to Summary					

6. Extract Air Fan 3 Dampers					
Item	**Description**	**Unit**	**QTY**	**Unit Price**	**Total**
6.1	Lock closed all existing inlet vortex dampers in the fully open position		2		
6.2	Lock closed downstream dampers		2		
6.3	Lock closed service fan dampers		3		
Sub-total to be carried over to Summary					

7. Control and Monitoring System					
Item	**Description**	**Unit**	**QTY**	**Unit Price**	**Total**
7.1	Instrumentation/hardware, inclusive of installation, to measure the following parameters on Exhaust air fan 1 and 2: - Fan status running/not running by means of positive identification measures. - Fan drum RPM - Fan bearing temperature - Vibration monitoring on each fan bearing - Fan motor bearing temperature - Vibration monitoring on each fan motor bearing - Gearbox oil temperature - Brake system temperature	Item	1		

	- Downstream damper positioning - Exhaust air plenum pressure in relation to atmosphere - Plenum pressure in between exhaust air fan and stack, downstream of dampers				
7.2	Instrumentation/hardware, inclusive of installation, to measure the following parameters on the Supply air fans: - Fan status running/not running by means of positive identification measures. - Fan motor speed % derived from VSD - Supply air duct pressure in relation to atmosphere.	Item	8		
7.3	Supply and install new, calibrated, analogue type differential pressure gauge (Magnehelic) as well as pressure transducer (could be one instrument) to measure and display area pressures in relation to atmosphere, see item 13.7. Calibration certificate to be issued to Necsa.	Item	11		
7.4	Wiring of all field instrumentation/ devices to the SCADA/BMS system	Item	1		
7.5	Expand existing ABB PLC based control system to fulfil control and interlocking requirements, see Item 13.6. Inclusive of additional hardware, wiring, programming, etc. to ensure a fully functional system.	Item	1		
7.6	Expand the existing iFIX SCADA system to provide plant status information, monitoring, data	Item	1		

	logging and alarming/notification, see Item 13.6. Inclusive of additional hardware, wiring, programming, etc. to ensure a fully functional system.				
Sub-total to be carried over to Summary					

Summary		
1	Preliminaries & General	
2	Engineering	
3	Supply Air Systems	
4	Extract Air Fan 1	
5	Extract Air Fan 2	
6	Extract Air Fan 3 Dampers	
7	Control and Monitoring System	
8	Contingency Provision – to be expended only as directed by Necsa and any balance remaining shall be deducted from the amount of the contract sum.	R500 000-00
	Sub-Total	
	Vat	
	Total	

Annexure 1:

Gearbox Inspection Report & Recommendations


necsa
We're in your world
Gearbox
Inspection
Report
CROSS
ENGINEERING & PROJECTS
Bearings & Seals
Chains & Sprockets
Electric Motors & Drives
Belts & Pulleys
Gearboxes & Couplings
Lubricants & Tools
Field Services
BEARINGS
INTERNATIONAL

Gearbox 1

Make	BEW
Serial No.	SBN 24- 59
Input	1485
Ratio	5.04
Recommended Lubrication	Castrol Alpha SP 220

Findings

- Upon opening the inspection cover we found hit marks right around the main gear as shown by picture 2.
- The breather on the gearbox is also severely blocked as shown by picture 3.
- On the secondary shaft non drive side the bearing collapsed, the cage completely melted leaving only damaged and burned roller as shown on picture 1 & 4.

Gearbox 2

Make	BEW
Serial No.	SBN 24- 59
Input	1485
Ratio	5.04
Recommended Lubrication	Castrol Alpha SP 220

Findings

- Upon opening the inspection cover we found the gear is still in a very good condition.
- The breather on the gearbox is also severely blocked as shown by picture 3.
- All 4 bearings on the gearbox is still in a good condition and intact.
- Input and output shaft seals to be replaced

Additional Details

- Couplings on both gearboxes are worn, need to be replaced.
- Braking mechanism needs to be properly cleaned. New bolts, nuts, washers and pipes is recommended.
- Bearing part number for the secondary shaft is 23036. Primary bearings part numbers not visible.
- Fan plumber blocks needs new seals and inner bearings condition are unknown. (SD3136)
- Gearbox input size is 90mm
- Gearbox output size is 150mm
- No Electric motor installed

BEARINGS INTERNATIONAL
in motion

Bearings International – Brits
39 De Witts Avenue
0250
012 252 7955 / 6
Vat No : 4740230513
Company Reg No : 1984/005432/07
Private Bag 9
Elandsfontein
South Africa

Date of inspection 28 August 2024

Customer : The South African Nuclear Energy Corporation SOC limited

Physical Adress : Necsa Eco-Industrial Park
Pelindaba - Gate3
Church Street Ext. West
Pretoria
South Africa

Recommendations for Fan repairs

- Procure new and install electric motor
- Frequency control drive or Soft starter to be procured and installed.
- Procure and install new high speed coupling between motor and gearbox input.
- Magnetic brake system need to be overhauled or replaced should it be irreparable.
- Fit new input and output shaft seals off the gearbox.
- Replace and install new breather to gearbox
- Procure and install new slow speed coupling between gearbox and fan shaft.
- Remove and replace drive end and non-drive end fan bearings. (SD3136 one located bearing and one non-located bearing) and record radial internal clearance of the bearings.
- Laser alignment to be done, motor and gearbox, gearbox to fan shaft and bearings.
- Refurbish lubrication system and replace filter.
- Vibration and temperature instrumentation to be procured and installed.
- Frequency control drive or Soft starter to be procured and installed.

Jurgens Pieterse
HJJ Pieterse

Annexure 2:

Terms and Conditions of Contract

necsa
We're in your world
South African Nuclear Energy Corporation SOC Limited

THE SOUTH AFRICAN NUCLEAR ENERGY
CORPORATION SOC LTD

TERMS AND CONDITIONS OF CONTRACT

June 2017

CONTENTS

TERMS AND CONDITIONS OF CONTRACT

These TERMS AND CONDITIONS OF CONTRACT are applicable to all bids, contracts and orders issued by the South African Nuclear Energy Corporation to service providers for the supply of goods or works or rendering of services

1. DEFINITIONS AND INTERPRETATION

1.1 Clause headings in this *Agreement* are for convenience and reference purposes only and shall not affect the interpretation of the Agreement.

1.2 Where the context requires words implying the singular only shall also include the plural and vice versa and words signifying one gender shall signify all genders.

1.3 In this *Agreement* the following words and expressions shall have the meanings hereby assigned to them except where the context otherwise requires:

1.3.1 **"Agreement"** means these Terms and Conditions of Contract including all attachments and appendices hereto and all documents incorporated by reference therein and, where applicable, special conditions of contract.

1.3.2 **"Bid Documents"** means Bid Specification, Request for Proposal, Request for Quotation documents, or any other document, used by NECSA to solicit the supply of goods or works or services.

1.3.3 **"Fees"** means the contract price(s) as set out in the Pricing Schedule, attached as Annexure "E" in the accompanying SLA, which are payable to the Service Provider under this Agreement for the full and proper performance of the Service Provider's contractual obligations.

1.3.4 **"Order"** means an official written Purchase Order issued for the supply of goods or works or for the rendering of a service. A copy of the Order must be attached in the accompanying SLA as Annexure "C".

1.3.5 **"The South African Nuclear Energy Corporation SOC Ltd"**

hereinafter referred to as NECSA

1.3.6 "**NECSA Data**" means information, reports or data and related matter, whether of a confidential or proprietary nature or not, belonging to NECSA or in the possession, or under the control of NECSA provided by NECSA to Service Provider pursuant to the Service Provider providing the Services.

1.3.7 **"Party"** means either NECSA or the Service Provider and **"Parties"** means NECSA and the Service Provider jointly.

1.3.8 **"Project Plan and Schedule of Deliverables"** means a document addressing how and when the Services are to be achieved by showing activities to be performed, the deliverables to be achieved and the milestones/timelines to achieve the deliverables, attached in the accompanying SLA as Annexure "B".

1.3.9 **"Proposal"** means a document, in the form of a business proposal, quotation or other document, setting out the Service Provider's proposed course of action or plan, with proposed solutions to address the Service needs of NECSA and the resources required, in response to the Bid Documents, attached hereto as Annexure "A" (or where Proposal is voluminous, sufficiently referenced in Annexure "A").

1.3.10 **"Service Level Agreement or SLA"** means the special conditions of contract entered into by the Parties to address specific conditions applicable to specific *Services* with the purpose of either amplifying or amending these Terms and Conditions of Contract.

1.3.11 **"Services"** means those functional services ancillary and incidental to the supply of goods, works or rendering of services and other such obligations of the Service Provider covered under this Agreement or any document purporting to engage the professional services of the Service Provider.

1.3.12 **"Service Provider"** means a service provider, consultant or contractor engaged by NECSA to supply goods or works or render services.

1.3.13 **"Service Provider's Intellectual Property/Technology"** means know-how, techniques, concepts, ideas, methods, methodologies, procedures, models, processes, templates; generalised features of the structure, sequence and organisation of software, user interfaces and screen designs; general purpose consulting and software tools, utilities and routines and logic, coherence and methods of operation systems, created or acquired by the Service Provider or where the Service Provider otherwise obtained rights in.

1.4 All terms referred to or defined in the Service Level Agreement shall have the meanings assigned to them therein.

1.5 Any reference to days, months or years shall be a reference to calendar days, months or years as the case may be.

2. APPLICATION

2.1. These Terms and Conditions of Contract are applicable to all bids, contracts and orders issued by NECSA to service providers for the supply of goods or works or rendering of services.

2.2. Where applicable, Service Level Agreements may be provided to address specific Services. Such SLA shall, by reference therein, incorporate these Terms and Conditions of Contract.

2.3. Where there is a conflict between the provisions of such Service Level Agreement and the provisions of these Terms and Conditions of Contract, the Service Level Agreement shall, to the extent of the conflicting provisions, supersede these Terms and Conditions of Contract.

3. AGENCY

This *Agreement* does not constitute either of the *Parties* as the agent of the other for any purposes whatsoever and neither party will be entitled to act on behalf of, or to represent the other unless duly authorised thereto in writing.

4. ASSIGNMENT

Neither *Party* may assign, transfer, subcontract or otherwise part with this *Agreement* or any part thereof or any right or obligation there under, without obtaining the other *Party's* prior written consent thereto.

5. SUBCONTRACTING

In the event of subcontracting any of the work the *Service Provider* shall give preference to Black Empowerment Companies as subcontractors. The *Service Provider* shall notify NECSA in writing of all subcontracts awarded under the *Agreement* if not already specified in the *Bid Documents*. Such notification, in the *Bid Documents* or later, shall not relieve the *Service Provider* from any liability of obligation under the *Agreement*.

6. INDEMNITY AND LIMITATION OF LIABILITY

6.1. The *Service Provider* hereby indemnifies NECSA and undertakes to hold NECSA harmless against all loss or damage, from any cause arising, which the *Service Provider* and/or its employees may sustain as a result of the performance of the *Services* under this *Agreement*.

6.2. The *Service Provider* indemnifies NECSA against all third-party claims of infringement of patent, trademark or industrial design rights arising from use of the goods, works or rendered services or any part thereof by NECSA.

6.3. The *Service Provider* further indemnifies NECSA against any loss, damage, expenses, legal costs, including attorneys and own client costs, which NECSA may incur as a result of the *Service Provider's* breach of any of the warranties and representations as may have been provided.

6.4. Except in cases of criminal, negligence or wilful misconduct, neither *Party* shall be liable to the other, whether in contract, tort or otherwise, for any indirect or consequential loss or damage in any way arising out of or in connection with this *Agreement*.

7. INSURANCE

7.1. The goods supplied under the contract shall be fully insured in a freely convertible currency against loss or damage incidental to manufacture or acquisition, transportation, storage and delivery in the manner specified in the Service Level Agreement.

7.2. Each *Party* hereby accepts its own legal liabilities resulting from its culpable actions and shall ensure that it has sufficient insurance cover to cover its liabilities so arising.

8. FEES AND PAYMENT TERMS

8.1. Subject to the provisions of clause 11 (Penalties), where applicable, NECSA shall pay the *Service Provider Fees* as set out in the Pricing Schedule in the manner specified in the SLA as an Annexure “E” for full and complete performance of the *Services*.

8.2. NECSA shall pay the *Fees* only after the *Services* have been fully performed and completed and the reports/deliverables as per Annexure “B” concerning the performance and completion of such *Services* have been accepted in accordance with the provisions of clause 9 (Reports/Deliverables).

8.3. The *Service Provider* shall submit a monthly statement no later than the last day of the month, along with an original invoice and associated documents, in a format acceptable to NECSA, for the *Fees* due after completion and acceptance of the deliverables.

8.4. If the documents mentioned in 8.3 are correct, payments shall be effected within thirty (30) days after date of statement. All payments will be made by NECSA only through electronic bank transfer into a banking account nominated by the *Service Provider*.

8.5. Where travel, accommodation and disbursement expenses are not included in the *Fees* and NECSA has agreed to reimburse the *Service Provider* for reasonable expenses incurred, the *Service Provider* shall, in accordance with, and subject to, the provisions of 8.3 submit an invoice for payment of such expenses.

8.6. Where deemed necessary, Necsa shall be entitles to a Retention Fee of 10% of the contract value. Such fees will be paid to the Service Provider within three (3) months of receipt of all Goods and/or Services and the issue of a certificate of acceptance.

8.7. Should the Service Provider render services and be entitled to labour costs for installation or erection on a recovery basis, a monthly statement shall be provided to Necsa no later than the last day of the month and Necsa will, if the statement is correct, effect payment within thirty (30) days. Should the monthly statement be in error, Necsa will be entitled to make the adjustment at the next payment or on payment of the retention fees.

9. REPORTS/DELIVERABLES

9.1. Where the carrying out of the *Services* requires reports to be submitted as deliverables, interim and final reports in connection therewith must be furnished to NECSA at its *domicilium*, within the stages set out by the *Parties* and attached as a Schedule in the Service Level Agreement.

9.2. Acceptance of Reports/Deliverables:

9.2.1. NECSA shall have a period of **seven (7) days** (the **"Evaluation Period"**) after furnishing of the Reports/Deliverables, or any part thereof provided in stages in accordance with the agreed to Schedule, to verify that such Reports/Deliverables, or part thereof, conform in all material respects with *NECSA* requirements.

9.2.2. Should there be a non-conformity with NECSA requirements, NECSA must notify the *Service Provider*, in writing, prior to the expiration of the relevant Evaluation Period that such Reports/Deliverables, or part thereof, fail in any material respect to conform with such specifications (a **"Nonconformity"**), the *Service Provider* shall, at its expense, promptly correct such

Nonconformity, whereupon NECSA shall receive an additional **seven (7) day period** ("the **Verification Period**") commencing upon *NECSA's* receipt of the corrected Reports/Deliverables, or part thereof, to verify

that the previously reported Nonconformity has been corrected.

9.2.3. NECSA shall provide the *Service Provider* with such assistance as the *Service Provider* may reasonably require to enable the *Service Provider* to verify the existence of, and correct, a reported Nonconformity.

9.2.4. Should NECSA not inform the *Service Provider* of its acceptance of the Report/Deliverables, NECSA agrees that the Reports/Deliverables, or any part thereof, which has been provided to NECSA shall be deemed accepted by NECSA upon the expiration of the Evaluation Period or, in the event that NECSA has notified the *Service Provider* of a Nonconformity as provided above, upon expiration of the relevant Verification Period.

9.2.5. Upon full and final payment to the *Service Provider* of amounts due to the *Service Provider* for fully performed and completed *Services* and accepted Reports/Deliverables, all Reports/Deliverables shall, subject to the provisions of clause 17 (Ownership and Intellectual Property), become the property of NECSA .

10. CONTRACT AMENDMENTS

No variation in or modification of the terms of the contract shall be made except by written amendment signed by the parties concerned.

11. PENALTIES

If the *Service Provider* fails to deliver any or all of the deliverable(s) or to perform the *Services* within the period(s) specified in this *Agreement*, NECSA shall, without prejudice to its other remedies under this *Agreement*, deduct from the *Fees*, as a penalty, a sum calculated in accordance with a formula specified in the Penalty Formula attached hereto as Annexure “D” of the Service Level Agreement, for each day of the delay until actual delivery or performance. NECSA may also consider termination of the contract pursuant to clause 19 (Breach of Agreement).

12. IMPOSSIBILITY OF PERFORMANCE

12.1. In the event of a failure or delay in performance by either *Party* arising from a cause beyond its reasonable control or unforeseeable with reasonable foresight at the time of execution of this *Agreement*, such failure or delay shall not be deemed to be a breach of the *Agreement*.

12.2. If either *P*arty is affected by such failure or delay, it shall give to the other *Party* notice in writing thereof within five (5) days after its existence has manifested. A *Party* shall be entitled to rely on the provisions of clause 12.1 above only if it has given such notice.

12.3. Should either *Party*, after having given the notice in clause 12.2, be unable to rectify its impossibility of performance within fourteen (14) days of the occurrence thereof, the other *Party* may cancel this *Agreement* without any further notice.

13. PROJECT PLAN AND VARIATION

13.1. The *Services* shall be completed in accordance with the stages/phases set out in the Project Plan and Schedule of Deliverables attached hereto in the SLA as Annexure “B”.

13.2. If, however, there arises a need to vary and/or add the *Services* and the Project Plan and Schedule of Deliverables as a result of matters, circumstances and/or necessary additional procedures that were not reasonably foreseen at the onset or if there are delays in obtaining the required documentation and there arises a need to vary and/or extend the delivery time frames, either *Party* will notify the other in writing, as soon as they become aware of this fact and the *Parties* shall agree on the variation of the Project Plan and Schedule of Deliverables and, where applicable, *Fees*.

14. DELAYS IN THE *SERVICE PROVIDER’S* PERFORMANCE

Notwithstanding the provisions of clauses 12 (Impossibility of Performance), 13 (Variation of Project Plan) and 19 (Breach of Agreement), in the event of a delay in the *Service Provider*’s performance beyond the essential delivery time period,

NECSA shall, without cancelling the *Agreement*, be entitled to obtain the services of another service provider at the *Service Provider's* expense or to cancel the *Agreement* and procure the services of another service provider as may be required to complete the *Agreement* and without prejudice to *NECSA 's* other rights.

15. FORCE MAJEURE

Neither *Party* shall be liable, whether direct or consequential, to fulfil its obligations in terms of this *Agreement* if such failure is caused by any circumstance or event beyond the reasonable control of such *Party* which shall without limitation include any act of God, riot, strike action, civil commotion, war, civil war, public disorder, any form of labour disturbances, acts of terrorism, insurrection, rebellion or revolution and/or any other event or activity beyond their reasonable control.

16. CONFIDENTIALITY

16.1. It is envisaged that pursuant to this *Agreement* information, reports or data and related matter, whether of a confidential or proprietary nature or not, belonging to either *Party* may be disclosed or otherwise become available to the other *Party*. Each *Party* agrees to:

16.1.1. Accept such information, reports or data and related matter in confidence and not to copy, disclose, reproduce or make such information, reports or data and related matter available to any third party, unless authorised thereto in writing by the other *Party*, and

16.1.2. Use such information, reports or data and related matter solely in connection with the performance of its obligations in terms of this *Agreement*, and

16.1.3. Restrict the use of such information, reports or data and related matter exclusively to the purpose directed by the other *Party*.

16.1.4. The *Service Provider* undertakes, upon signing hereof, to ensure that all its Employees or agents (as the case may be) who may be privy to any information, reports, data and related matter, process or any other information whatsoever emanating from this process, are well

informed and aware of the contents and legal implications of Section 51 of Nuclear Energy Act, 1999 (Act No. 47 of 1999) and have signed confidentiality agreements to hold *NECSA* information in confidence.

16.2. Use of contract documents and information; inspection:

16.2.1. The Service Provider shall not, without NECSA's prior written consent, disclose the contract, or any provision thereof, or any specification, plan, drawing, pattern, sample, or information furnished by or on behalf of NECSA in connection therewith, to any person other than a person employed by the Service Provider in the performance of the contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purposes of such performance.

16.2.2. The Service Provider shall not, without NECSA's prior written consent, make use of any document or information mentioned in the Service Level Agreement except for purposes of performing the contract.

16.2.3. Any document, other than the contract itself shall remain the property of NECSA and shall be returned (all copies) to NECSA on completion of the Service Provider's performance under the contract if so required by NECSA.

16.2.4. NECSA shall permit the Service Provider to inspect NECSA's records relating to the performance of the Service Provider and to have them audited by auditors appointed by NECSA at its own cost, if so required by NECSA.

17. OWNERSHIP AND INTELLECTUAL PROPERTY

17.1. All *NECSA Data* and *Service Provider's Intellectual Property/Technology* and any other intellectual property rights, including but not limited to copyright, in and to the original material supplied by one *Party* to the other *Party* shall vest in the *Party* supplying the material.

17.2. Ownership in all *NECSA Data* belonging to *NECSA,* whether under its control

or not, shall continue, to vest in NECSA, and the *Service Provider* shall not obtain any proprietary rights in such data. Any improvements to NECSA *Data* resulting from this *Agreement* shall remain the property of NECSA.

17.3. Where the *Service Provider* utilizes any of its property including the *Service Provider's Intellectual Property/Technology* in connection with the *Services* provided in terms of this *Agreement*, such property shall remain the property of the *Service Provider* and any improvements to the *Service Provider's Intellectual Property/Technology* resulting from this *Agreement* will remain the property of *Service Provider*.

17.4. The *Service Provider* warrants that no aspect of the *Service Provider's Intellectual Property/Technology* utilised by NECSA in terms of this *Agreement* will infringe any patent, design, copyright, trade secret or other proprietary right of any third party ("**third party proprietary rights**"), and the *Service Provider* shall, at its cost, defend NECSA against any claim that the use of the Deliverables infringe any such third party proprietary rights: Provided that NECSA gives prompt notice to the *Service Provider* of such claim, the *Service Provider* controls the defence thereof and *NECSA* does not jeopardise the claim in any way.

17.5. To the extent that there are any components of the *Service Provider's Intellectual Property/Technology* included in the Deliverables, the *Service Provider* grants to NECSA , a royalty-free, perpetual, non-exclusive, non-transferable licence to use such *Service Provider's Intellectual Property/Technology* solely in connection with such Deliverables.

17.6. In the event of *NECSA* requesting the use of any *Service Provider's Intellectual Property/Technology* outside the scope of this *Agreement*, this would be subject to the *Parties* agreeing to a written licence agreement for such use.

18. SETTLEMENT OF DISPUTES

18.1. If any dispute or difference of any kind whatsoever arises between the *Parties* in connection with or arising out of the *Agreement*, the *Parties* shall make every effort to resolve amicably such dispute or difference by mutual consultation.

Either *Party* shall in writing notify the other of the dispute, providing the details of the dispute.

18.2. The dispute shall first be referred to the respective project managers of each *Party*, who must use their best endeavours to resolve the dispute within **seven (7) days** of the dispute having been referred to them, or such other time frame agreed between the *Parties*.

18.3. Should the project managers of the *Parties* be unable to resolve the dispute in accordance with the foregoing, the dispute shall be escalated to the respective executive managers/managing directors (or equivalent officers) of the *Parties*, who must use their best endeavours to resolve the dispute within **ten (10) days** of the dispute having been referred to them, or such other time frame agreed between the *Parties*.

18.4. Should it not be possible to settle a dispute by means of mutual consultation, then the *Parties* may exercise their rights afforded to them by law.

19. BREACH OF AGREEMENT

In the event of anyone of the *Parties* ("the Defaulting Party") committing a breach of any of the terms of this *Agreement* and failing to remedy such breach within a period of **seven (7) days** after receipt of a written notice from the other *Party* ("the Aggrieved Party") calling upon the Defaulting Party so to remedy, then the Aggrieved Party shall be entitled, at its sole discretion and without prejudice to any of its other rights in law, either to –

19.1. claim specific performance of the terms and of this *Agreement*; or

19.2. terminate this *Agreement* forthwith and without further notice, to claim and recover damages from the Defaulting Party.

20. TERMINATION FOR INSOLVENCY

Should either *Party* become bankrupt or otherwise insolvent, or commit an act of insolvency or in the event of any of the following circumstances:

20.1. Either *Party* being placed under judicial management whether provisionally or

finally;

20.2. A judgment of any competent court being given against either *Party* which judgement is not satisfied within a period of fourteen (14) days from date of knowledge thereof by either *Party*, or no application to be made to a competent court to rescind such judgement within a period prescribed by the rules of the court:

either *Party* shall have the right without prejudice to any other rights or claims which it may have, to cancel and terminate this *Agreement* without notice.

21. NOTICES

The *Parties* choose the addresses set out in *SLA* as their *domicilium citandi et executandi* for all purposes under this *Agreement*, whether in respect of the service or delivery of court process, notices or other documents or all other communications. The *Parties* also choose the persons named in the *SLA* as their project managers and contact persons for the purpose of this *Agreement.* Any notice to be given or to be made for any purpose under this *Agreement* shall be in writing and shall:

21.1. If delivered to the addressee's physical address, be deemed to have been received when so delivered; or

21.2. If sent by registered post to the addressee's postal address, be deemed to have been received seven (7) days after it has been posted; or

21.3. If sent by facsimile, be deemed to have been received on the day on which it was sent; or

21.4. If sent by email, be deemed to have been received on transmission on the day on which a document was emailed.

21.5. Any of the *Parties* shall be entitled to change its respective *domicilium* and any other address, as the case may be, on **fourteen (14) days' notice** to the other, provided such address is within the Republic of South Africa.

22. NON-SOLICITATION OF PERSONNEL

22.1. The *Parties* agree not to make any offer of employment or to employ any member of either *Party's* personnel working on the basis of this *Agreement*,

either during the period of this *Agreement* or for a period of six (6) months after completion of the *Services* in terms of this *Agreement*. The *Parties* also agree not to use either *Party's* personnel as consultants, either independently or via a third party for the same period.

22.2. A breach of this condition will render the breaching *Party* liable to pay damages in an amount equal to six (6) month's salary of the relevant member of personnel, provided that such damages shall be calculated in respect of the six (6) month period prior to such member of personnel leaving the employ of non-breaching *Party*. The *Parties* agree that the aforementioned damages are fair, based on the damage the non-breaching *Party* is likely to suffer, and considering the difficulty in calculating the actual damages.

23. RELAXATION

No latitude, extension of time or other indulgence which may be given or allowed by any *Party* to the other *Party* in respect of the performance of any obligation hereunder, and no delay or forbearance in the enforcement of any right of any *Party* arising from this *Agreement*, and no single or partial exercise of any right by any *Party* under this *Agreement*, shall in any circumstances be construed to be an implied consent or election by such *Party* or operate as a waiver or a novation of or otherwise affect any of the *Parties*' rights in terms of or arising from this *Agreement* or stop or preclude any such *Party* from enforcing at any time and without notice, strict and punctual compliance with each and every provision or term hereof.

24. VALIDITY AND SEVERABILITY

24.1. If any provision of this *Agreement* is found or held to be invalid, unlawful, or unenforceable, such terms will be severable from the remaining terms.

24.2. The validity of all the other remaining provisions will not be affected and will continue to be valid and enforceable. If any invalid term is capable of amendment to render it valid, the *Parties* agree to negotiate an amendment to remove the invalidity.

25. VARIATION

No variation of or addition to this *Agreement* will be of any force or effect unless

reduced to writing and signed by the *Parties* or their duly authorised representatives.

26. WARRANTIES

26.1. The Service Provider warrants that the goods supplied under the contract are new, unused, of the most recent or current models, and that they incorporate all recent improvements in design and materials unless provided otherwise in the contract. The Service Provider further warrants that all goods supplied under this contract shall have no defect, arising from design, materials, or workmanship (except when the design and/or material is required by NECSA's specifications) or from any act or omission of the Service Provider, that may develop under normal use of the supplied goods in the conditions prevailing in the country of final destination.

26.2. This warranty shall remain valid for twelve (12) months after the goods, or any portion thereof as the case may be, have been delivered to and accepted at the final destination indicated in the contract, or for eighteen (18) months after the date of shipment from the port or place of loading in the source country, whichever period concludes earlier, unless specified otherwise in SLA.

26.3. NECSA shall promptly notify the Service Provider in writing of any claims arising under this warranty.

26.4. Upon receipt of such notice, the Service Provider shall, within the period specified in SLA and with all reasonable speed, repair or replace the defective goods or parts thereof, without costs to NECSA.

26.5. If the Service Provider, having been notified, fails to remedy the defect(s) within the period specified in SLA, NECSA may proceed to take such remedial action as may be necessary, at the Service Provider's risk and expense and without prejudice to any other rights which NECSA may have against the Service Provider under the contract.

27. APPLICABLE LAW

This *Agreement* shall in all respects be governed by and construed in accordance with the Laws of the Republic of South Africa and all disputes, actions and other matters in connection therewith shall be determined in accordance with such law.

28. GOVERNING LANGUAGE

The contract, all correspondence and other document pertaining to the *Agreement* that is exchanged by the *Parties* shall be written in English.

29. TAXES AND DUTIES

29.1. A foreign Service Provider shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies imposed outside NECSA's country.

29.2. A local Service Provider shall be entirely responsible for all taxes, duties, license fees, etc., incurred until delivery of the contracted goods to NECSA.

29.3. No contract shall be concluded with any bidder whose tax matters are not in order. Prior to the award of a bid the Department must be in possession of a tax clearance certificate, submitted by the bidder. This certificate must be an original issued by the South African Revenue Services.