Handling Instruction: Not to be shared beyond MOD and the supplier(s) named in this document

Annex 1 to Schedule 2

STATEMENT OF REQUIREMENTS – Contract Number PA0000002410

1. Chemical, Biological and Radiological (CBR) division directly supports the Chemical and Biological Analysis and Attribution Capability (CBAAC) to analyse suspect samples on behalf of a wide range of Defence and Security stakeholders. [redacted]
2. [redacted]. As part of the upgrade to the capability, a new latest generation 600MHz NMR spectrometer is required to ensure DSTL retain and maintain CBR's state-of-the-art analytical capabilities. The new system will be as per the specification in the Schedule of Requirements and paras 9 - 21 below.
3. The new system will be delivered, installed and commissioned (performance demonstrated) within the [redacted] This is a new facility and has been designed specifically for the complete NMR system with standard size magnet, with easy access for installation.
4. Whilst DSTL expects the initial liquid helium required for installation to be provided by the successful Contractor, the continued provision of liquid helium to the NMR system would be via DSTL's current helium provider.
5. Provision of liquid nitrogen to the NMR system would be via DSTL's current nitrogen provider.
6. Delivery, installation and commissioning will need to be co-ordinated with DSTL's allocated Point of contact: email [redacted] or telephone 01980 [redacted]
7. The Contractor will provide comprehensive training on the system (including safety-related instruction) for up to three DSTL personnel on the Authority's premises following installation and commissioning. Further and future training opportunities should be included as an option on a by course basis in case of DSTL personnel changes or adjustments to the capability.
8. The Contractor will provide the continuous and comprehensive support to the system, including but not limited to magnets, console, probes, firmware and software upgrades, and any relevant documentation (either electronic or paper formats). The detailed requirement for Service Support is set out in paras 26 – 29 below.

Specifications

9. It is a requirement for this spectrometer, to be able to observe and irradiate nuclei from ^{31}P - ^{15}N, ^{19}F and ^{1}H. The requirement is for X{^{1}H} and X{^{19}F}, X{^{1}H and ^{19}F} and ^{1}H{^{19}F} and ^{19}F{^{1}H}.
10. The latest generation of a 600 MHz superconducting shielded NMR magnet will have a Helium boil rate of <20ml/hr. It will have a standard 54mm RT bore and shielded z-gradient unit to enable the measurement of diffusion.
11. The spectrometer will be triple channel plus 2H lock, with cryogenic level monitors for Helium and Nitrogen) and a variable temperature (VT) unit to maintain constant temperature with capability to cool the system down to -80°C. Maximum temperature range will be +150°C.
12. The control computer will be the most up date and appropriate version of Windows environment with control software to handle all aspects of automated NMR spectroscopy and spectrometer control, including automatic gradient shimming, tune and match optimisation, sample temperature control, pulsed Z-gradients.
13. Control software should include diffusion acquisition and processing, spectral and spin stimulation. In addition to standard software requirements for acquisition and processing, DSTL requires the ability to auto calibrate the system to maintain optimum performance. The software must be capable of automatically declaring the instrument is suitable to collect data on the samples.

14. The data processing software will run on a standalone computer, therefore must include a standalone licence to operate the system.
15. The Autosampler must have a minimum of 60 samples with a kit of spinners. Spinner sets will cover variable temperature 5mm, 3mm and 1.7 mm sample tubes.
16. Probeheads 1 and 2 (essential) below must have 2H lock, auto-tune and match, with gradient shimming, z-gradient coil and variable temperature range of -80°C to +150°C. In addition:
    16.1. Probehead 1 must be 5mm Broadband with 'normal' configuration, ^{1}H outer coil, ^{19}F and ^{31}P to ^{15}N inner coil. Allows ^{1}H{^{19}F} and ^{19}F{^{1}H} and X{^{1}H} optimised for lower frequency range;
    16.2. Probehead 2 must be 5mm Triple resonance probehead 'normal' configuration, ^{31}P to ^{15}N inner coil. Allows X{^{1}H and ^{19}F} optimised for lower frequency range;
17. Probehead 3 (desirable option) must have 2H lock, auto-tune and match, with gradient shimming, z-gradient coil and variable temperature range of -80°C to +150°C.
    17.1. Probehead 3 must be 1.7 mm TXI microprobe 'Inverse' configuration. ^{1}H, ^{13}C, and optional ^{31}P channel.
18. As the typical lifecycle of the electronic parts of the system (console, probes etc) is currently 6-8 years, planning for support and optional follow on work must include for a full electronic upgrade, to indicate costs and timeframe for the specific instrumentation being installed.
19. The Authority expects a minimum twelve month warranty for the system, to start at point of final system acceptance by DSTL. Optional extended warranties will be considered.
20. The Authority expects that any spare or replacement parts supplied during proactive or reactive maintenance will be covered by warranty and free from material defects for a minimum of 90 days.
21. The full contractor's specification for each individual component of the system will be incorporated via the successful Contractor's tender quotation.

Commissioning / Validation / Testing / Acceptance

22. The Contractor will ensure the system is functioning satisfactorily and passes their predefined installation criteria. These technical Acceptance tests will be defined in the successful Contractor's tender, but shall include:
    22.1. Variable temperature (VT) unit to work in the range of -80 to +150 degree Celsius;
    22.2. Helium boil off rate. Set at less than 20ml/hr;
    22.3. Probe auto tuning;
    22.4. Number of samples and range of sample tubes that can be used in automation;
    22.5. Performance checks meet those specific to the proposed equipment as per the successful Contractor's tender specification.
23. The equipment and any parts provided will be fully tested and commissioned by the Contractor. On installation/commissioning by the Contractor, the Dstl Technical Lead will confirm acceptance for the final deliverable for each item against the following criteria:
    23.1. The installed instruments are operating fully and as expected;
    23.2. Technical reports have been provided to the DSTL Technical Lead to evidence the correct and completed installation of all instruments and the system in entirety;
    23.3. The training for DSTL personnel has been completed satisfactorily;
    23.4. The instrumentation shall be evaluated under the ISO17025 quality system to ensure it meets the Authority's requirements.

Delivery Date(s)

24. DSTL will inform the Contractor at least 30 days of any DSTL-related delays in being able to receive the equipment into [redacted]

Preventative and Care Package

25. Support will be from point of final system acceptance by DSTL in accordance with the Schedule of Requirements Table I – Contractor Deliverables and run for a minimum of 3 years with an Option (at the Authority's sole discretion) for a further 2 years.

26. All servicing and support will be performed by manufacturer qualified engineers, from point of delivery of the instrumentation.

27. Support provided by the Contractor will be incorporated via the successful Contractor's tender, but must include but not limited to detail for the following:

    27.1. Catastrophic loss of the magnetic field (quench);

    27.2. Catastrophic magnet fault;

    27.3. Proactive support, i.e. planned maintenance, including software and data system updates and optimisation:

        27.3.1. Proposed schedule of maintenance;

        27.3.2. Authority obligations in accordance with instrument manuals / training;

        27.3.3. Review of maintenance findings and records with DSTL Technical Lead;

        27.3.4. Appropriate software configuration;

        27.3.5. Updates to software / firmware as required.

    27.4. Reactive support, i.e. fault response and repairs or replacements, including support modality, response and escalation timings:

        27.4.1. Process for reactive support;

        27.4.2. Authority obligations to ensure effective resolution;

        27.4.3. Timings from point of fault report to Contractor to on-site engineer attendance, to provision of repairs or replacement parts, as appropriate;

        27.4.4. Review of repair / resolution and records with DSTL Technical Lead, as required.

28. The Authority will ensure that any items returned to the Contractor for repair will be certified to be free of any toxic, biological, chemical or radioactive contamination, producing, if necessary, evidence of completion for cleaning and decontamination procedures.

29. Any items returned to the Contractor for disposal shall be disposed of in accordance with Health, Safety and Environmental laws and local operating procedures.

    29.1. Adhere to the DSTL procedures for on-site engineer attendance for either proactive or reactive maintenance tasks, including informing the Contractor's engineer of hazards that may exist in the workspace or wider DSTL site, as required to ensure safety is maintained;

    29.2. Notify the Contractor of problems or unexpected behaviour with the instruments, in accordance with the successful Contractor's reactive maintenance procedures;

    29.3. Notify the Contractor of any undesired non-mandatory modifications or changes to the instrumentation in accordance with the successful Contractor's proactive support procedures.