



Dstl R-Cloud
Commercial Services
Porton Down
Salisbury
Wiltshire
SP4 0JQ

E-mail: dstlrccloud@dstl.gov.uk

Statement of Requirement for the R-Cloud Chemistry Strategic Capability

Introduction

The Defence Science and Technology Laboratory (Dstl), part of the UK Ministry of Defence (MOD), is refreshing its R-Cloud (Research Cloud) framework for Science and Technology (S&T) research.

MOD commissions fundamental, experimental, and applied research from industry and academia. R-Cloud enables broader supplier access, reduced barriers to entry, and more agile contracting for chemical research capabilities.

This statement of requirements outlines the Chemical Strategic Capability requirements for suppliers wishing to contribute to MOD research activity.

This statement of requirement relates to suppliers joining R-Cloud within the Chemistry Strategic Capability area. R-Cloud provides a low barrier to entry for potential suppliers and offers direct access to MOD's current and future research requirements. Academic and industrial suppliers of Chemistry research are invited to apply to R-Cloud if you are a supplier of Science and Technology Research in this area.

The UK is fully committed to its obligations under the Biological and Toxin Weapons Convention and the Chemical Weapons Convention. All MOD sponsored work must be in the context of the prophylactic, protective or other peaceful purposes that are not prohibited under the terms of these Conventions. Proposals using animals must be fully compliant with national legislation and institutions may be audited to ensure work is conducted to a suitable standard prior to a contractual commitment and whilst under contract.

Core Chemical Capability Areas:

Understanding Chemical Hazards

Research is required to improve understanding of hazardous chemical agents and materials that may threaten military or civilian populations.

Key areas include:

- Mechanisms of action of toxic chemicals (e.g. nerve agents, vesicants, pulmonary agents),
- Environmental persistence and degradation of chemical agents (including aerosols and surfaces),
- Chemical fate and transport in different environments,
- Toxicological assessment of chemicals and mixtures,
- Production, storage, and dispersion characteristics of hazardous chemicals,



- Particle and droplet size characterisation for chemical dissemination,
- Literature analysis and predictive assessment of emerging chemical threats,
- Mathematical modelling of chemical toxicity, exposure, and persistence.

Mathematical Modelling of Chemical Hazards

Development and validation of predictive models supporting operational and procurement decisions.

Model types may include:

- Dispersion and environmental persistence of chemical agents,
- Exposure pathways and hazard prediction,
- Detection system performance modelling,
- Protective equipment effectiveness,
- Physiological response to chemical exposure,
- Operational and logistical impact modelling.

Supporting research areas:

- Computational fluid dynamics (CFD),
- Mass transfer and transport phenomena,
- Surface and materials science,
- Meteorology,
- Aerosol science.

Detection of Chemical Agents

Research into advanced chemical detection technologies.

Key capability requirements:

- High sensitivity and selectivity,
- Molecular identification and classification,
- Detection across vapour, aerosol, and surface contamination,
- Rapid and programmable detection platforms.

Relevant research areas:

- Optical spectroscopy and hyperspectral imaging,
- Mass spectrometry and chemical sensing,
- Aerosol sampling and characterisation,
- Molecular recognition systems,
- Photonics (lasers, detectors),
- Analytical chemistry,
- Systems engineering.

Chemical Diagnostics

Development of technologies to diagnose chemical exposure.

Focus areas:

- Identification of chemical agents at point-of-care,
- Enhanced laboratory diagnostic capabilities,
- Detection of early exposure via biomarkers (physiological or molecular),
- Integration of sample preparation and advanced data analysis.

Key goals:

- High-confidence, low-burden diagnostics,
- Multi-agent detection capability,
- Non-agent-specific detection approaches where possible.



Physical Protection Against Chemical Agents

Development of protective materials and systems.

Research areas include:

- Respiratory and dermal protection materials,
- Collective protection systems,
- Air purification and filtration technologies,
- Adsorbents and catalytic destruction systems,
- Liquid–solid interaction mechanisms,
- Aerosol interaction with fabrics and protective systems,
- Real-time chemical vapour dosimetry,
- Testing and evaluation of protective equipment performance.

Decontamination and Chemical Hazard Management

Research into technologies to neutralise or remove chemical contaminants.

Key areas:

- Novel decontamination formulations and chemistries,
- Waste treatment and disposal processes,
- Detection of contamination on surfaces,

Surface coatings, including:

- Chemically resistant coatings,
- Self-decontaminating materials,
- Sacrificial absorbent coatings,
- Responsive materials for targeted neutralisation.

Advanced research topics:

- Nano-structured materials and composites,
- Molecular recognition and ligand design,
- Catalysis and adsorption materials (including nano-porous frameworks),
- Spectroscopy and electrochemical methods,
- Enzyme/peptide systems for chemical degradation,
- Spray application and run-off management,
- Evaluation of commercial decontamination products,
- Compatibility of decontamination methods with materials and equipment.

Medical Countermeasures for Chemical Agents

Research to develop treatments and preventative measures for chemical exposure.

Focus areas:

- Mechanisms of chemical toxicity,
- Molecular toxicology and pharmacology,
- Structure–activity relationships (SAR),
- Development of therapeutic compounds and antidotes,
- In vitro and in vivo modelling of toxicity,
- Pharmacokinetics and pharmacodynamics of treatments,
- Efficacy testing of countermeasures.

Chemical Analysis and Attribution

Advanced analytical techniques to identify chemical agents and determine origin.

Key capabilities:

- High-confidence chemical identification,



- Source attribution (production method, location, timing),
- Analysis of contaminated samples (environmental and biological matrices),
- Forensic chemical analysis.

Research areas include:

- Mass spectrometry and advanced analytical chemistry,
- Trace analysis and chemical fingerprinting,
- Forensic methodologies adapted for hazardous materials,
- Detection of residues and degradation products,
- Analysis of weapon materials and post-event evidence.

In Summary

The R-Cloud Chemistry Strategic Capability requires multidisciplinary expertise spanning:

- Chemical science and toxicology,
- Analytical and detection technologies,
- Materials science and protection systems,
- Modelling and simulation,
- Decontamination chemistry,
- Forensic and attribution science.

Suppliers should demonstrate strong capability in one or more of these areas and contribute to advancing safe, compliant, and defensive chemistry research.