ANNEX A

STATEMENT OF WORK

RADIATION DETECTION SYSTEM(S)

NOTICE

This documentation has been reviewed by the technical authority and does not contain controlled goods. Disclosure notices and handling instructions originally received with the document must continue to apply.

AVIS

Cette documentation a été révisée par l'autorité technique et ne contient pas de marchandises contrôlées. Les avis de divulgation et les instructions de manutention reçues originalement doivent continuer de s'appliquer.

TABLE OF CONTENTS

1.0	SCOPE	**4**
2.0	APPLICABLE DOCUMENTS	**8**
3.0	PROJECT DELIVERY MANAGEMENT	**11**
4.0	COMMUNICATION AND MEETINGS	**11**
5.0	INTEGRATED LOGISTICS SUPPORT (ILS)	**13**
6.0	DELIVERABLES	**19**
A1.0	APPENDIX: GENERAL RDS REQUIREMENTS	**24**
	A1.1 Overarching System Requirement	**24**
	A1.2 Note on Probes for the Hand-Held System	**24**
	A1.3 Markings and Labelling	**24**
	A1.4 Common Environmental Requirements	**24**
A2.0	APPENDIX: VEHICLE-MOUNTED RDS TECHNICAL SPECIFICATIONS	**26**
	A2.1 General	**26**
	A2.2 Performance	**28**
	A2.3 Alarm Requirements	**28**
	A2.4 Battery Charging System	**29**
	A2.5 Weight	**29**
	A2.6 Carrying Pouch	**29**
	A2.7 Hard Transport Container	**30**
	A2.8 Included Documentation	**30**
	A2.9 RDS Software	**31**
A3.0	APPENDIX: HAND-HELD RDS TECHNICAL SPECIFICATIONS	**32**
	A3.1 General	**32**
	A3.2 Performance	**33**
	A3.3 Alarm	**34**
	A3.4 Battery Charging System	**35**
	A3.5 Weight	**35**
	A3.6 Telescoping Handle	**35**
	A3.7 Carrying Pouch	**35**
	A3.8 Hard Transport Cases	**36**
	A3.9 Included Documentation	**37**
	A3.10 RDS Software	**37**
A4.0	APPENDIX: BETA / GAMMA PROBE TECHNICAL SPECIFICATIONS	**39**
	A4.1 General	**39**
	A4.2 Performance	**40**
A5.0	APPENDIX: BETA CONTAMINATION PROBE (Frisker) SPECIFICATIONS	**41**

A5.1 General…….. **41**

A5.2 Performance…….. **42**

A6.0 APPENDIX: ALPHA / BETA PROBE SPECIFICATIONS……. **43**

A6.1 General……... **43**

A6.2 Performance…….. **44**

A7.0 APPENDIX: HIGH SENSITIVITY GAMMA PROBE TECHNICAL SPECIFICATIONS… **45**

A7.1 General…….. **45**

A7.2 Performance…… **46**

A8.0 APPENDIX: FIDLER PROBE TECHNICAL SPECIFICATIONS……. **47**

A8.1 General……... **47**

A8.2 Performance…….. **48**

A9.0 APPENDIX: NEUTRON PROBE TECHNICAL SPECIFICATIONS…… **49**

A9.1 General……... **49**

A9.2 Performance…….. **50**

1.0 SCOPE

1.1 Purpose

1.1.1 The purpose of this Statement of Work is to define the technical, operational and logistical requirements for the Radiation Detection System (RDS) that is required by The Department of National Defence (DND) to replace its aging RDS capability and ensure that Canadian Armed Forces (CAF) can continue to safely operate in Radiological and Nuclear environments.

1.2 Background

1.2.1 The Department of National Defence has a requirement to replace, on an on-going basis, the existing Hand-Held and Vehicle-Mounted RDS fleets as they become Beyond Economic Repair (BER) or unrepairable due to obsolescence.

1.2.2 DND currently employs three (3) disparate systems to accomplish the majority of its general service radiation/nuclear mandate. They are:

1.2.2.1 RDS-100, a general service radiation detector used throughout the CAF;

1.2.2.2 ADM-300C, a detection system procured by the Royal Canadian Navy in support of the Nuclear Emergency Response teams; and

1.2.2.3 AN/VDR-2, a system delivered by the various armoured vehicle procurement projects (e.g. Coyote, LAV III) as a mounted radiation monitoring capability.

1.2.3 As DND's fleet of radiation detectors continues to age, system failures are becoming more frequent and costly to repair. Considering the random nature of the failure and the rate of capability decline (i.e. 10% lost per year), the replacement model will be "replaced by attrition" by seeking a single system to adequately perform the duties of these three systems.

1.2.4 Consolidating to a single radiation detection system is the preferred solution, as it offers many benefits, including: simplified logistical support, reduced training burden and reduced skill fade. However, it is recognized that supporting both Hand-Held and Vehicle-Mounted detector systems may require two systems.

1.3 Deliverables

1.3.1 In order to fully replace existing capability, the Contractor must provide the following:

1.3.1.1 A Vehicle-Mounted system capable of detecting/displaying/recording gamma radiation data (doses and dose rates);

1.3.1.2 A Hand-Held system capable of detecting/displaying/recording gamma dose and dose rate. The Hand-Held system must also display/record radiological data from the following series of probes:

- Beta/Gamma Probe (dose/dose rate) IAW Appendix 4;
- Beta/Gamma Contamination Probe ('Frisker') IAW Appendix 5;
- Alpha/Beta Probe IAW Appendix 6;
- High Sensitivity Gamma Probe IAW Appendix 7;

- FIDLER Probe IAW Appendix 8; and
- Neutron Probe IAW Appendix 9.

1.3.1.3 Associated hardware required for the support, transport, storage, deployment, use and upkeep of the above;

1.3.1.4 Documentation (as per Contract Data Requirement Checklist and Data Item descriptions found in Annex B and Annex C); and

1.3.1.5 Training (as per Contract Data Requirement Checklist and Data Item descriptions found in Annex B and Annex C).

1.3.2 It should be noted that a single system may perform the roles of both Vehicle-Mounted and Hand-Held systems, but the evaluation will be performed as though they were distinct systems. Thus, one system might be selected for both roles, or two different systems might be selected.

1.3.3 Similarly, multiple probe functions may be combined (even in the Base Unit – which houses the display), but evaluation will proceed as though each probe were distinct. All probe requirements must still be met, regardless of the distribution of function (i.e. a single probe may detect beta/gamma and neutron radiation, but would need to meet the detection AND weight criteria for both probes).

Selection Process

The scoring of the RDS system(s) must be accomplished through a two phase process. These phases are: the Key Parameter Review, the Functional Evaluation.

Phase I, the Key Parameter Review consists of every proposed system being evaluated against the mandatory requirements presented in this document (Annex A – SOW). The evaluation form can be found in Annex D – Test and Evaluation Plan; this form details a sub-set of the Mandatory Requirements for which the Bidder is responsible for providing substantiating evidence of compliance – the Key Parameters.

Substantiating evidence for Phase I may consist of technical drawings, and third party data; other evidence that effectively demonstrates conformance to mandatory requirements will be accepted.

Bidders, whose systems have successfully demonstrated conformance to the Key Parameters will be invited to participate in Phase II

In order to participate in Phase II, a contract will be put in place to procure a limited number of systems (Base Unit, and/or probes, telescoping handle, cases, and all equipment required to operate the system as specified).

The exact number of each system and component will be determined at the time the contracts are awarded. However, it is not envisioned to have more than 5 of any one item.

Systems delivered for Phase II are not required to be in the final form that will be required at the conclusion of the procurement. Base Unit, probes, carrying pouch, and telescoping handle must fit and function as claimed, however documentation, kitting, language, and colour will not be evaluated during this phase.

Phase II, the Functional Evaluation will consist of physical examinations and testing of all proposed systems that successfully completed Phase I. Examination and testing will be performed to confirm that all claims made in Phase I are accurate and reproducible, it will also provide scores for several key performance characteristics.

Phase II, Functional Evaluation is designed to subject the systems to laboratory and operational conditions and elicit user feedback to confirm the usability in such environments. This review is performed by representatives of DND. All systems evaluated in Phase II will be assigned a total "Technical Merit" score based on individual scores and weighting factors assigned to reflect the relative importance of the various criteria. Details of the evaluations and scoring may be found in Annex D.

The results of Phase II (the Technical Merit Score) will be sent to PSPC who will perform the selection based on the highest responsive combined rating of the Technical Merit Score and price. The ratio will be 60% for the Technical Merit Score and 40% for the price.

To establish the pricing score, each responsive bid will be prorated against the lowest evaluated price and the ratio of 40%.

For each responsive bid, the technical merit score and the pricing score will be added to determine its combined rating.

Neither the responsive bid obtaining the highest Technical Merit Score nor the one with the lowest evaluated price will necessarily be accepted. The responsive bid with the highest combined rating of Technical Merit Score and price including optional quantities and all contractual support (training, Technical Data Package, *et cetera*) will be recommended for award of a contract.

1.4 Acronyms and Abbreviations

µSv	MicroSievert
ABP	Alpha / Beta Probe
AECTP	Allied Environmental Conditions Testing Publication
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ATM	Atmosphere(s)
BER	Beyond Economic Repair
BIT	Built In Test
BGP	Beta / Gamma Probe
Bq	Becquerel
BU	Base Unit
CA	Contracting Authority
CAF	Canadian Armed Forces
CBRN	Chemical/Biological/Radiological/Nuclear
CD	Compact Disc
CDRL	Contract Data Requirements List
CE	Conformité Européenne
CEPA	Canadian Environmental Protection Act
CGCM	Canadian Government Catalogue of Materials
CI	Configuration Items
BU	Base Unit
LCN	Line Control Number
LRU	Line Replacement Unit
m	Meter(s)
MB	Mega Byte
MCN	Material Change Notice
MDC	Minimum Detectable Concentration
MeV	Mega Electron Volts
mm	millimeter(s)
MOLLE	Modular Lightweight Load-carrying Equipment
MPS	Master Project Schedule
MRR	Maintenance Replacement Rate
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
N/A or NA	Not Applicable
NATO	North Atlantic Treaty Organization
NDHQ	National Defence Headquarters
NEMA	National Electrical Manufacturers Association
NOR	Notice of Revision
NP	Neutron Probe
NSN	NATO Stock Number

cm	Centimeter(s)
CPM	Counts Per Minute
CPS	Counts Per Second
CSA	Canadian Standards Association
CSAR	Configuration Status Account Report
CSCI	Computer Software Configuration Items
CTAT	Controlled Technology Access and Transfer
DC	Direct Current
DCSEM	Director Combat Support Equipment Management
DGLEPM	Director general Land Equipment Procurement Management
DID	Data Item Description
DMC	Demilitarization Code
DND	Department of National Defence
DPI	Dots Per Inch
DSCO	Director Supply Chain Operations
DVD	Digital Video Disc
ECP	Engineering Change Proposal
EEA	Equipment Environmental Assessment
EHS	Environmental Health and Safety
eV	electron Volt(s)
FTP	File Transfer Protocol
GFE	Government Furnished Equipment
GSM	Government Supplied Material
Gy	Gray
Hr(s)	Hour(s)
HSGP	High Sensitivity Gamma Probe
Hz	Hertz
IAW	In Accordance With
ICRP	International Commission on Radiation Protection
ID	Identification
IEC	International Electrotechnical Commission
ILS	Integrated Logistical Support
ILSM	Integrated Logistical Support Manger
IP	Ingress Protection
ISO	International Organization for Standards
ITAR	International Traffic in Arms Regulations
kBq	Kilo Becquerel
keV	Kilo Electron Volts
kg	Kilograms
KO	Kick-Off (Meeting)
L	Liter(s)
LBS	Logistical Breakdown Structure
nSv	Nano Sievert
OEM	Original Equipment Manufacturer
OP Man	operator's Manual
OPI	Office of Primary Interest
PB	Production Baseline
PCA	Physical Configuration Audit
PDF	Portable Data Format
PLT	Procurement Lead Time
PM	Project Manager (Management)
PMO	Project Management Office
PPB	Provisioning Parts Breakdown
PPE	Personal Protective Equipment
PSPC	Public Services and Procurement Canada
QC	(Province of) Quebec
Qty	Quantity
R	Röentgen
rad	Radiation Absorbed Dose
RDS	Radiation Detection System
rem	Röentgen Equivalent Man
RFD	Request for Deviation
RFW	Request for Waiver
RH	Relative Humidity
RSPL	Recommended Spare Parts List
SCN	Specification Change Notice
SCORM	Sharable Content Object Reference Model
SDS	Safety Data Sheet
SNR	Serial Number Registry
SOW	Statement Of Work
SPTD	Supplementary Provisioning Technical Document
STTE	Special Tools and Test Equipment
Sv	Sievert
TA	Technical Authority
TBD	To Be Determined
TDAN	Technical Data Action Notice
UL	Underwriters Laboratories
UOI	Unit of Issue
USB	Universal Serial Bus
V	Volts
VAC	Volts, Alternating Current
WD	Working Days
WHIMS	Workplace Hazardous Information Material System

2.0 APPLICABLE DOCUMENTS

2.1 References

2.1.1 It is the responsibility of the Bidder to ensure that, where applicable, deliverables are prepared in accordance with the guidance documents referenced below.

2.2 Government Furnished Guidance Documents

2.2.1 Documents listed here comprise a complete list of external references that are called out in whole or in part in the SOW, CDRLs and DIDs.

REFERENCE NUMBER	DATED	REFERENCE TITLE
C-01-000-100/AG-004		PRODUCTION AND ACQUISITION OF ENGINEERING DATA
C-01-100-100/AG-005	2019-01-22	ACCEPTANCE OF COMMERCIAL AND FOREIGN GOVERNMENT PUBLICATIONS AS ADOPTED PUBLICATIONS
C-01-100-100/AG-006	2017-06-08	WRITING, FORMAT AND PRODUCTION OF TECHNICAL PUBLICATIONS
C-01-100-100/AG-008	2017-11-02	WRITER'S GUIDE FOR TECHNICAL DOCUMENTATION
C-02-007-000/AG-001	2016-01-01	CONTROLLED TECHNOLOGY ACCES AND TRANSFER (CTAT) MANUAL
D-01-100-204/SF-000	2000-10-31	SPECIFICATION - PREPARATION OF PREVENTIVE MAINTENANCE INSTRUCTIONS
D-01-100-205/SF-000	2000-10-31	SPECIFICATION - PREPARATION OF CORRECTIVE MAINTENANCE INSTRUCTION
D-01-100-207/SF-002	1996-07-12	SPECIFICATION - PREPARATION OF INTERIM ILLUSTRATED PARTS MANUALS FOR LAND EQUIPMENTS
D-01-100-211/SF-000	1988-12-07	SPECIFICATION – PRESERVATION, STORAGE AND HANDLING INSTRUCTION
D-01-100-214/SF-000	2002-05-01	SPECIFICATION FOR PREPARATION OF PROVISIONING DOCUMENTATION FOR CANADIAN FORCES EQUIPMENT
D-01-100-215/SF-000		PREPARATION OF MATERIAL CHANGE NOTICE
D-01-400-001/SG-000	2018-01-31	STANDARD - ENGINEERING DRAWING PRACTICES
D-01-400-002/SF-000	2018-02-23	SPECIFICATION LEVELS OF ENGINEERING DRAWINGS
D-02-002-001/SG-001	2003-04-01	STANDARD – IDENTIFICATION MARKING OF CANADIAN MILITARY PROPERTY
D-LM-008-001/SF-001	1983-02-03	METHODS OF PACKAGING
D-LM-008-002/SF-001	1991-08-01	SPECIFICATION FOR MARKING FOR STORAGE AND SHIPMENT

D-LM-008-011/SF-001	1988-11-10	PREPARATION AND USE OF PACKAGING REQUIREMENTS CODES
D-LM-008-036/SF-000	2013-12-01	DND MINIMUM REQUIREMENT FOR MANUFACTURER'S STANDARD PACK
A-LM-505-702/JS-001	2017-11-21	MATERIAL MANAGEMENT INSTRUCTION (MMI 1702)

2.3 Commercially Available Guidance Documents

REFERENCE NUMBER	DATE	REFERENCE TITLE
NEMA IEC 60529	N/A	DEGREES OF PROTECTION PROVIDED BY ENCLOSURES - IP CODE
R.S.C., 1985, C. H-3	1985	HAZARDOUS PRODUCTS ACT
DORS/2016-137	2019	OZONE-DEPLETING SUBSTANCES AND HALOCARBON ALTERNATIVES REGULATIONS
MIL-STD-3046	2013	CONFIGURATION MANAGEMENT
ASME Y14.100	2004	ENGINEERING DRAWING PRACTICES
ASME Y14.24	2004	TYPES AND APPLICATIONS OF ENGINEERING DRAWINGS
ASME Y14.34	2002	INFORMATION PROCESSING – VOLUME AND FILE STRUCTURE OF CDROM FOR INFORMATION INTERCHANGE
AECTP 400	2006	MECHANICAL ENVIRONMENTAL TESTS
CAN/CSA-Z234.1	2000	CANADAIN METRIC PRACTICES GUIDE
TIFF REVISION 6	1992	ADOBE SYSTEMS INC.
MIL-PRF-38807C	1991	TECHNICAL MANUALS ILLUSTRATED PARTS BREAKDOWN
MIL-STD-810H	31 JAN 2019	ENVIRONMENTAL ENGINEERING CONSIDERATIONS AND LABORATORY TESTS
AECPT 200 EDITION 4	7 MAY 2009	ALLIED ENVIRONMENTAL CONDITIONS AND TEST PUBLICATIONS- ENVIRONMENTAL CONDITIONS
AECPT 230 EDITION 1	7 MAY 2009	ALLIED ENVIRONMENTAL CONDITIONS AND TEST PUBLICATIONS- CLIMATIC CONDITIONS
AECPT 300 EDITION D V1	28 NOV 2019	ALLIED ENVIRONMENTAL CONDITIONS AND TEST PUBLICATIONS- CLIMATIC ENVIRONMENTAL TESTS
AECPT 400 EDITION D V1	28 NOV 2019	ALLIED ENVIRONMENTAL CONDITIONS AND TEST PUBLICATIONS- VIBRATION ENVIRONMENTAL TESTS

Order of Precedence

In the event of conflict between the content in this SOW and the referenced documents, the content of this SOW will take precedence.

3.0 PROJECT DELIVERY MANAGEMENT

3.1 Contract Manager

3.1.1 The Contractor must designate a Contract Manager with the responsibilities to coordinate, execute, and manage deliveries for the Contract. The Contract Manager must have the total responsibility for all activities required under the Contract.

3.1.2 The Contract Manager must be the primary point of contact between the Contractor, the DND Technical Authority (TA), and the PSPC Contracting Authority (CA) for all issues related to the Contract.

3.2 Master Project Schedule (MPS)

3.2.1 The Contract Manager must prepare a Master Project Schedule in accordance with (IAW) CDRL RDS-PM-001 at Annex B and its associated DID RDS-PM-001 at Annex C.

4.0 COMMUNICATION AND MEETINGS

4.1 Meeting Organization and Coordination

4.1.1 The Contractor's Contract Manager must be present at the Kick-Off Meeting, and at other meetings when requested by Canada. If the Contract Manager does not have final approval authority for decision making and changes, then the person that has that final approval authority must also be present.

4.2 Kick-Off Meeting

4.2.1 The Contractor must hold and chair a Kick-Off Meeting no later than 30 calendar days after contract award to review and secure a common understanding of the requirements expressed in the following:

- The Contract;
- The SOW;
- Training requirements;
- Maintenance Plan;
- General overview of the project, risks, delivery schedule and communication channels to follow; and
- Other contractual and programmatic issues associated with the project as agreed between the TA, CA and the Contractor.

4.2.2 Refer to Meeting Documentation requirements found at Annex A (para. 4.4)

4.3 Other Meetings

4.3.1 The Contractor and the TA may schedule informal reviews, such as teleconferences, video conferences, briefings and technical interchange meetings, to help achieve the requirements of the Contract.

4.4 Meeting Documentation

4.4.1 The Contractor must prepare and deliver a meeting agenda for all formal meetings and conferences, and prepare and deliver the meeting minutes afterwards.

4.4.2 The Contractor must provide the Meeting Agenda(s) in accordance with CDRL RDS-PM-002 at Annex B and its associated DID RDS-PM-002 at Annex C.

4.4.3 The Contractor must record, prepare, and provide the Meeting Minutes of each meeting in accordance with CDRL RDS-PM-003 at Annex B and its associated DID RDS-PM-003 at Annex C.

4.4.4 No change in the interpretation of the SOW, Performance Specification, cost, and schedule, as defined in the Contract, may be authorized by the minutes of a meeting. Such action will require a formal contract amendment by the CA.

5.0 INTEGRATED LOGISTICS SUPPORT (ILS)

5.1.1 DND's objective for the Contractor's ILS Program is to ensure that the Contractor provides the required level of logistics support to achieve the operational requirements of the system.

5.1.2 The Contractor must develop an ILS Program to plan, control, implement and maintain the necessary logistics support requirements of the RDS as defined through the following ILS sections.

5.2 ILS Manager (ILSM)

5.2.1 The Contractor must designate an ILSM with authority to plan, execute and monitor all ILS work under the acquisition contract.

5.2.2 The Contractor's ILSM must be the point of contact between the Contractor and the DND ILSM.

5.3 Maintenance and Support Concept Overview

5.3.1 The RDS Maintenance Concept embodies a "Line Replacement Unit" approach for completing maintenance support. This means that any system/subsystem of RDS requiring maintenance beyond "Field Maintenance" will be replaced with a corresponding system/subsystem from spare (logistical) stock.

5.3.2 Field Maintenance is defined here as any maintenance or corrective action that can be accomplished by an Operator in the field or through "First Line" maintenance.

5.3.3 CAF operators and maintainers will perform operator and first line maintenance activities that do not require:

- Any RDS units to be opened;
- The use of special tools and test equipment (STTE) by Operator or First Line Maintenance; and
- Software maintenance or updates

5.3.4 Sample Field Maintenance activities performed by an operator are expected to be, but are not limited to:

- Non-technical inspections for wear and tear;
- Preventive maintenance;
- Cleaning;
- Initiating equipment self-calibration; and
- Additional activities as recommended by the Contractor and agreed to by DND TA.

5.3.5 Beyond the actions detailed above, First Line maintenance will be performed by trained 1st Line personnel, this is envisioned to be via removal and replacement of damaged, worn or otherwise unserviceable parts.

5.3.6 Sample First Line maintenance activities performed by CAF technicians are expected to be, but are not limited to;

- Serviceability assessments;
- Preventive maintenance;
- Initiating built-in test (BIT);
- Minor repairs and adjustments such as straps, covers, switch knobs, harness attachments that do not require unit disassembly or Special Tools and Test Equipment (STTE) other than those already in DND inventory;
- Software updates using a laptop computer (if allowed by the Contractor);
- Packaging, preservation and long term storage; and
- Additional corrective maintenance tasks as recommended by the Contractor and as agreed to by the TA.

5.3.7 2nd line maintenance is not planned for this system.

5.3.8 The Contractor will provide training sufficient to allow the outlined maintenance as well as: software modifications, replacement of (sub) systems, and other minor repairs not requiring level three drawings.

5.3.9 The Contractor will provide technical support via telephone and email, for the duration of the contract plus one year.

5.4 Maintenance Plan

5.4.1 The Contractor must prepare and submit an RDS Maintenance Plan IAW CDRL RDS-ILS-101 and DID RDS-ILS-101 based on the maintenance and support concept summarized in section 5.3.

5.5 Logistical Breakdown Structure (LBS)

5.5.1 The Contractor must prepare and submit an RDS LBS identifying Configuration Items (CIs) IAW CDRL RDS-ILS-102 and DID RDS-ILS-102.

5.6 Configuration Items (CI)

5.6.1 A Configuration Item is a product or an aggregation of products that accomplishes an end-use function that requires separate identification. An item is designated as a CI for purposes of additional configuration management focus due to its complexity, logistic support requirements, acquisition strategy, or because it is intended to undergo configuration status accounting or verification and audit separately from other items. Configuration items are end items or major components of end items, which typically have performance requirements allocated to them and documented in their own specification.

5.6.2 The Contractor must select the hardware CIs and Computer Software CI (CSCI) for the RDS. The CI/CSCI list must be approved by the TA.

5.6.3 CI/CSCI must be identified in the Logistical Breakdown Structure (LBS), see para 5.5.1, supporting provisioning documentation and listed in the Configuration Status Accounting Report (CSAR), see para 5.6.4.

5.6.4 The Contractor must establish and maintain a Configuration Status Accounting system. The Contractor must prepare and submit a CSAR IAW CDRL RDS-ILS-103 and DID RDS-ILS-103.

5.7 Serial Number Register

5.7.1 The Contractor must establish and maintain a registry for all information associated with the serialization and delivery of RDS IAW CDRL RDS-ILS-104 and DID RDS-ILS-104.

5.7.2 The Contractor must retain the serial number register up to three (3) years after the end of the acquisition contract.

5.8 Safety Data Sheets

5.8.1 The contractor must prepare and submit Safety Data Sheets IAW CDRL RDS-ILS-105 and DID RDS-ILS-105.

5.9 Equipment Identification Plates

5.9.1 The Contractor must prepare and submit Equipment Identification Plate drawings IAW CDRL RDS-ILS-106 and DID RDS-ILS-106.

5.9.2 The Contractor must label and mark the RDS, including all associated major accessories (as per LBS) with the approved identification plates (ID plates) IAW D-02-002-001/SG-001.

5.9.3 The Contractor must arrange for the manufacture of all equipment identification plates and affix them prior to delivery.

5.10 Marking Data for Storage and Shipment

5.10.1 The Contractor must prepare and submit Marking Data for Storage and Shipment IAW CDRL RDS-ILS-107 and DID RDS-ILS-107.

5.10.2 The Contractor must identify all shipping containers and palletized unit loads in accordance with CDRL RDS-ILS-107 and DID RDS-ILS-107.

5.11 Packaging and Handling for Transportation

5.11.1 The Contractor must use the most economical means for packaging of batch quantities as well as grouping of items/ systems.

5.11.2 The Contractor must seek approval from the TA with regards to the packaging and shipping methods as it relates to issues such as batch quantities and grouping of items/systems.

5.11.3 Unless otherwise authorized by the TA, all spare parts must be individually packaged, with each package bearing a label with the item name, NATO Stock Number (NSN), manufacturer part number, quantity, shelf-life (if applicable) and any special instructions (if applicable).

5.11.4 The Contractor must label and ship goods falling within the Hazardous Products Act, R.S.C. 1985, C. H-3 and regulation(s) there under, IAW said Act and regulation(s).

5.11.5 The Contractor must clearly identify the contents of the hazardous material with labels, and the SDS must explain what those hazards are IAW CDRL RDS-ILS-105 and DID RDS-ILS-105.

5.11.6 If Lithium or Lithium-polymer batteries are used, the procedures in C-02-008-001/TS-000, General Safety Lithium Batteries Handling, Storage Preservation and Disposal Instructions must be used.

5.11.7 The Contractor must prepare and submit packaging data for all transit cases and shipping containers, spare parts, bulk items, training equipment and consolidation containers that are to be shipped to or stored in a facility owned by DND IAW CDRL RDS-ILS-108 and DID RDS-ILS-108.

5.12 Provisioning Support

5.12.1 The Contractor must prepare and submit the Provisioning Parts Breakdown/Recommended Spare Parts List (PPB/RSPL) for RDS IAW CDRL RDS-ILS-109 and DID RDS-ILS-109. The PPB/RSPL data must match the LBS (DID RDS-ILS-102).

5.13 Supplementary Provisioning Support

5.13.1 A Supplementary Provisioning Technical Documentation (SPTD) will be used in the cataloguing process to uniquely identify each item considered for provisioning so that it can be correctly catalogued and assigned an NSN.

5.13.2 The Contractor must prepare and submit SPTD IAW CDRL RDS-ILS-110 and DID RDS-ILS-110 for each CI, spare part, and consumable item procured by DND that has not already been assigned a NSN. The SPTD will be used in the cataloguing process to uniquely identify each item considered for provisioning so that it can be correctly catalogued and assigned an NSN as well as for maintenance support activities. Any item with an existing NSN and needing modifications in order to meet DND requirements will require a new NSN.

5.14 Material Change Notice (MCN)/Obsolescence

5.14.1 The Contractor must prepare and submit a MCN IAW CDRL RDS-ILS-111 and DID RDS-ILS-111 to inform the TA of each change to accepted provisioning data, including anticipated obsolescence for the duration of the acquisition contract.

5.14.2 For the duration of the acquisition contract, the Contractor must be aware of the availability of the parts comprising the system/equipment and must warn the TA of parts recommended for provisioning that are no longer manufactured, have become obsolete or are expected to become obsolete within two years.

5.14.3 Six months prior to the expiry date of the acquisition contract, the Contractor must prepare a detailed list of all parts that are expected to become obsolete within two years after the expiry of the acquisition contract. The Contractor must prepare and submit this information using the MCN.

5.15 Engineering Drawings and Associated Lists

5.15.1 The Contractor must prepare and submit Level 2 Provisioning Drawings and Associated Lists defining RDS IAW CDRL RDS-ILS-112 and DID RDS-ILS-112.

5.15.2 ID Plate and label placement locations must be shown on the applicable item drawings.

5.16 Technical Publications

5.16.1 The Contractor must prepare and submit a bilingual, Canadian English and Canadian French, Operators Manual IAW CDRL RDS-ILS-113 and DID RDS-ILS-113. The manual must also include the requisite Environmental, Health and Safety warnings, instructions and product identifications.

5.16.2 The Contractor must prepare and submit a bilingual, Canadian English and Canadian French, Maintenance Manual as per the Maintenance Plan (CDRL RDS-ILS-101 and DID RDS-ILS-101) IAW CDRL RDS-ILS-114 and DID RDS-ILS-114. The manual must also include the requisite Environmental, Health and Safety warnings, instructions and product identifications.

5.16.3 The Contractor must prepare and submit a bilingual, Canadian English and Canadian French, Quick Start Guide IAW CDRL RDS-ILS-115 and DID RDS-ILS-115.

5.16.4 The Contractor must prepare and submit a bilingual, Canadian English and Canadian French, RDS Case Contents IAW CDRL RDS-ILS-116 and DID RDS-ILS-116.

NOTE: The LBS, PPB/RSPL, ID Plates, Marking and Labelling, engineering drawings and CSAR will be used during the conduct of the Physical Configuration Audit (PCA). RDS Production Baseline (PB) will be established upon the successful completion of the PCA (i.e. no discrepancies identified between the inspected product and the DND approved technical data above).

5.17 Training

5.17.1 Training must be designed to develop CAF members, with no predefined qualifications, to the point where they are functionally able to use the RDS effectively in operations.

5.17.2 Preliminary functional training must be performed by the Contractor. Operational training remains the purview of the CAF.

5.17.3 The Contractor must provide the following at a minimum:

5.17.3.1 Three separate training modules, designed to instruct:

- Basic Use to include at a minimum: power, self-test, menu navigation, alarm acknowledgement, swapping probes, and changing batteries;
- Advanced use including: addition of data handling, check-source verification, background subtraction, changing a Mylar window and other advanced topics; and
- Maintenance including: software/firmware updates, diagnostics/triage – and any other maintenance, as required based on the Maintenance Plan (section 5.4).

5.17.3.2 Optional Training videos in support of all modules at the discretion of the CAF;

5.17.3.3 Optional On-line training in support of all modules (SCORM compliant) at the discretion of the CAF; and

5.17.3.4 Optional live training sessions at the discretion of the CAF.

5.17.4 The Contractor can use the following constraints to design training:

- Course size – 20 persons (Contractor to provide course material/handouts);
- The first course may be delivered unilingual in English, all subsequent courses must be offered bilingually (Canadian English and French);
- CAF will provide venue and hardware (projectors, computers, *et cetera*); and
- Scheduling – Once *per annum*, starting with First Delivery after PCA.

Training cost must be quoted for time and materials only, travel will be dealt with on a pure cost recovery basis. Although Canada reserves the right to require up to five (5) training sessions, **quotes should be for a single session only**.

Quote for videos in support of training must clearly define what deliverable is being quoted and the cost breakdown.

Quote for on-line training must be for training sufficient to cover all material mandated in section 5.17.3

5.17.5 Scope of training will be decided at the Kick-Off Meeting, based on the difference in form/fit/function of the selected system from the current systems.

5.17.6 The Contractor must submit Training Material IAW CDRL RDS-ILS-117 and DID RDS-ILS-117.

5.18 Environmental Health and Safety (EHS) Management

5.18.1 The Contractor must comply with all Canadian EHS legislation and regulations in force in relation to the provisions of goods and services.

5.18.2 Substances listed under Prohibition of Certain Toxic Substances Regulations (SOR/2012-285) must not be incorporated in any part of the equipment.

5.18.3 Asbestos and asbestos containing products must not be incorporated in any part of the equipment, in accordance with the Prohibition of Asbestos and Products containing Asbestos Regulations (SOR/2018-196).

5.18.4 Halocarbons that are incorporated into the design of equipment, must comply with the Federal Halocarbon Regulations (SOR/2003-289) and the Ozone-depleting Substances and Halocarbon Alternative Regulations (SOR/2016-137). If such substances must be used, the Contractor must:

5.18.5 Inform the Technical Authority by identifying the substance(s); and

5.18.6 Identify the specific location within the equipment and its concentration.

5.18.7 Mercury that is present in any part of the equipment, must comply with the mercury content limit as identified in the Products Containing Mercury Regulations (SOR/2014-254). If such substances must be used, the Bidder must:

5.18.8 Inform the Technical Authority by identifying the substance(s); and

5.18.9 Identify the specific location within the equipment and its concentration.

5.18.10 Polychlorobiphenyl (PCBs) that are present in any part of the equipment, must comply with the PCB Regulations (SOR/2008-273). If such substances must be used, the Bidder must:

5.18.11 Inform the Technical Authority by identifying the substance(s); and

5.18.12 Identify the specific location within the equipment and its concentration

5.18.13 The Contractor must prepare and submit an Equipment Environmental Assessment (EEA) IAW CDRL RDS-ILS-118 and DID RDS-ILS-118. The EEA evaluates the potential risks to the environment during the operation, maintenance and disposal of the equipment. Technical documents must include appropriate warnings and instructions to mitigate these risks. The equipment environmental assessment must include Safety Data Sheets (SDS) that are less than three years old for all Chemical Products in accordance with WHMIS 2015 requirements. The Contractor may provide confidential information in a separate document. Note: Proprietary information will be treated with confidentiality.

5.19 Demilitarization Instructions

5.19.1 In the event that the system/sub systems are ITAR, Controlled Goods and/or contain hazmat substances, Demilitarization instructions must be issued IAW CDRL RDS-ILS-119 and DID RDS-ILS-119.

6.0 DELIVERABLES

6.1 General

6.1.1 This section describes the various deliverables required to satisfy the DND requirements for the RDS System.

6.2 Technical

6.2.1 The Contractor must comply with all specified requirements of the RDS, stated in:

- A1.0 APPENDIX 1: RDS GENERAL REQUIREMENTS
- A2.0 APPENDIX 2: VEHICLE-MOUNTED SYSTEM TECHNICAL SPECIFICATIONS
- A3.0 APPENDIX 3: HAND-HELD BASE UNIT TECHNICAL SPECIFICATIONs
- A4.0 APPENDIX 4: BGP TECHNICAL SPECIFICATION
- A5.0 APPENDIX 5: FRISKER TECHNICAL SPECIFICATION
- A6.0 APPENDIX 6: ABP TECHNICAL SPECIFICATION
- A7.0 APPENDIX 7: HIGH SENSITIVITY GAMMA PROBE
- A8.0 APPENDIX 8: FIDLER TECHNICAL SPECIFICATION
- A9.0 APPENDIX 9: NP TECHNICAL SPECIFICATION
- ANNEX B: CONTRACT DATA REQUIREMENTS LIST

- ANNEX C: DATA ITEM DESCRIPTION

6.3 **Training phase**

6.3.1 All training material must be provided in accordance with CDRL & DID RDS-ILS-117

6.3.2 Additionally, the Contractor must deliver the following items to coincide with the delivery of the training material:

6.3.2.1 <u>For the Vehicle-Mounted System:</u>

- Five (5) Base Units for vehicle mounting;
- Five (5) of any probe required for vehicle operation;
- All supporting equipment (power adapters, pouches, check sources, cables, battery chargers, connectors, caps, et cetera) and software, required to allow the systems to function as specified herein; and
- All sundries that will be stored in the case(s) at time of final delivery.

6.3.2.2 <u>For the Hand-Held System:</u>

- Ten (10) Hand-Held General kit;
- Five (5) Hand-Held Advanced kit;
- Ten (10) Beta/Gamma Probes, as described herein;
- Ten (10) Beta “Frisker” Probes, as described herein;
- Ten (10) Alpha/Beta Probes, as described herein;
- Two (2) High Sensitivity Gamma Probes, as described herein;
- Two (2) FIDLER Probes, as described herein;
- Two (2) Neutron Probes, as described herein;
- Ten (10) telescoping handles, as described herein;
- All supporting equipment (power adapters, pouches, check sources, cables, battery chargers, connectors, caps, extra Mylar windows, et cetera) and software, required to allow the system to function as specified herein; and
- All sundries that will be stored in the case(s) at time of final delivery.

6.3.2.3 Note: Any additional items which will ultimately be part of a complete kit (such as Case Contents List), but which first require approval by the TA, may not be completed at this time and may be omitted with the TA approval.

6.3.2.4 Further Note: Additional items omitted at this time must be provided with the initial contract delivery, such that training systems can be rendered identical to final delivery systems.

6.3.2.5 All special tooling, training aids, consumables and all related software in sufficient quantities to conduct the training for up to 20 individuals. DND will provide classrooms, video/audio equipment.

Fielding phase

The table below delineates the quantities and timeline for delivery that the Contractor must commit to. Additionally, Canada reserves the right to exercise the optional quantities listed below.

Table 1 Delivery Quantities

Schedule	Item	Item Description	Estimated Qty
6 Month from Contract award (Training Kits)	1	Vehicle Kit (see section A2.7)	5
	2	Hand-Held General Use Kit (see section A3.8.2)	10
	3	Hand-Held Advanced Use Kit (see Section A3.8.3)	5
	4	High Sensitivity Gamma Probe Kit (see section A3.8.5)	2
	5	FIDLER Probe Kit (see section A3.8.6)	2
	6	Neutron Probe Kit (see section A3.8.7)	2
	7	Project Delivery Plan (4.1.3)	LOT
	8	Kick-off Meeting (5.2)	1
	9	Meeting Agenda (5.4.2)	LOT
	10	Meeting Minutes (5.4.3)	LOT
	11	Top Level Assembly Drawing (3.2.3)	LOT
	12	Training Package	Lot
	13	Initial Cadre Training	1
18 Months from Contract award	1	Vehicle Kit (see section A2.7)	5
	2	Hand-Held General Use Kit (see section A3.8.2)	30
	3	Hand-Held Advanced Use Kit (see Section A3.8.3)	5
	4	High Sensitivity Gamma Probe Kit (see section A3.8.5)	12
	5	FIDLER Probe Kit (see section A3.8.5)	1
	6	Neutron Probe Kit (see section A3.6.7)	1
	7	Master Project Schedule	LOT
	8	Maintenance Plan	LOT
	9	Configuration Status Account Report (CSAR)	LOT
	10	Serial Number Registry (SNR)	LOT
	11	Safety Data Sheets (SDS)	LOT
	12	Equipment Identification Plate Drawings	LOT
	13	Marking Data for Storage and Shipment	LOT
	14	Packaging Data	LOT
	15	Provisioning Parts Breakdown / Recommended Spare Parts List	LOT
	16	Supplementary Provisioning Technical Documentation (SPTD)	LOT
	17	Material Change Notice (MCN)	LOT
	18	Operators Manual (Op Man)	LOT
	19	First Line Maintenance Manual	LOT

Schedule	Item	Item Description	Estimated Qty
	20	RDS Case Contents	LOT
	21	Equipment Environmental Assessment	LOT
	22	Demilitarization Instructions	LOT
	23	Provisioning Drawings & Associated Lists	LOT
30 Months from Contract award	1	Vehicle Kit (see section A2.7)	25
	2	Hand-Held General Use Kit (see section A3.8.3)	94
	3	Hand-Held Advanced Use Kit (see Section A3.8.4)	40
	4	High Sensitivity Gamma Probe Kit (see section A3.8.5)	21
	5	FIDLER Probe Kit (see section A3.8.5)	3
	6	Neutron Probe Kit (see section A3.8.5)	6
42 Months from Contract award	1	Vehicle Kit (see section A2.7)	25
	2	Hand-Held General Use Kit (see section A3.8.3)	94
	3	Hand-Held Advanced Use Kit (see Section A3.8.4)	40
	4	FIDLER Probe Kit (see section A3.8.5)	0
	5	Neutron Probe Kit (see section A3.8.5)	6
54 Months from Contract award	1	Vehicle Kit (see section A2.7)	20
	2	Hand-Held General Use Kit (see section A3.8.2)	60
	3	Hand-Held Advanced Use Kit (see Section A3.8.3)	40
	4	FIDLER Probe Kit (see section A3.8.6)	0
	5	Neutron Probe Kit (see section A3.8.6)	3

Options

Canada has the right to exercise options to procure additional Systems as needed within 2022-2027 as shown in the table below.

Table 2 Optional Quantities

Schedule	Item	Item Description	Option Qty
2022-2027	1	Vehicle Kit (see section A2.7)	Up to 305
	2	Hand-Held General Use Kit (see section A3.8.3)	Up to 314
	3	Hand-Held Advanced Use Kit (see Section A3.8.4)	Up to 343
	4	FIDLER Probe Kit (see section A3.8.5)	Up to 25
	5	Neutron Probe Kit (see section A3.8.5)	Up to 10
	6	Option to purchase additional Vehicle-Mounted Base Unit	40
	7	Option to purchase additional Hand-Held Base Unit	96
	8	Option to purchase additional Gamma / Beta Probe + Cables/Connectors	100
	9	Option to purchase additional Beta “Frisker” Probe + Cables/Connectors	100
	10	Option to purchase additional Alpha / Beta Probe + Cables/Connectors	100
	11	Option to purchase additional FILDER Probe +	6
	12	Option to purchase additional Neutron Probe + Cable/Connectors	3
	13	Option d’achat de sonde gamma à sensitivité élevée additionnelle + câbles/connecteurs	20
	14	Option to purchase additional Telescoping Handle	100
	15	Option to purchase spare parts, consumables for 5 years, ordered on an “as and when” required basis from the “Provisioning Parts Breakdown”, up to the maximum approved total cost.	1
	16	Option to purchase additional Initial Cadre Training	3
	17	Option to purchase additional Operator Training	3

A1.0 APPENDIX 1: GENERAL RDS REQUIREMENTS

A1.1 Overarching System Requirement

A1.1.1 The proposed system (whether Hand-Held or Vehicle Mounted), or a substantively similar system, must currently have a minimum of 300 systems in use by a NATO military.

A1.1.2 The definition of 'in use' here is under a current contract, or an expired contract if the systems are currently in physical use by the NATO military.

A1.1.3 The definition of 'substantively similar' is left to the discretion of the DND reviewers, but will likely be limited to variation in model number within a family of detectors.

A1.2 Note on Probes for the Hand-Held System

A1.2.1 Although multiple probes are described herein, the functionality detailed may be combined into fewer probes.

A1.2.2 At least one probe (for gamma detection) useable at a distance from the Base Unit MUST be provided.

A1.2.3 All technical requirements of all probes must still be met, regardless of the number of probes provided. As an example: a single proposed 9kg probe might meet all the performance requirements listed under the neutron probe Annex, but it would fail the requirements for all other probes based on weight requirements.

A1.3 Markings and Labelling

A1.3.1 All transport cases, base units, and probes must have ID Plates IAW CDRL and DID RDS-ILS-106; additionally these and all telescoping handles, carrying pouches, and connector cables (Base Unit to probe) must be clearly labeled in accordance with STANDARD – IDENTIFICATION MARKING OF CANADIAN MILITARY PROPERT (D-02-002-001/SG-001).

A1.4 Common Environmental Requirements

A1.4.1 All Base Units and probes must meet all performance requirements in this SOW without incurring physical damage and without degradation of performance during and after exposure to any combination of the meteorological and induced climatic conditions that can be found within the geographic climatic regions identified in this document and described in NATO STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2. Exceptions, if applicable, will be detailed in individual SOW statements.

A1.4.2 All Base Units and probes must withstand being stored, transported and operated without physical damage and without degradation of performance in all high humidity environments associated with the B1, B2, and B3 climatic regions as described in NATO STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2.

A1.4.3 All Base Units and probes must withstand being transported and stored without physical damage and without degradation of performance in all low temperature environments associated with the C0 and C1 (-32°C min) climatic regions as described in NATO STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2.

A1.4.4 All Base Units and probes must operate without physical damage and without degradation of performance in all low temperature environments associated with the C0 and C1 (-25°C

min) climatic regions as described in NATO STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2

A1.4.5 All Base Units and probes must withstand being transported and stored without damage and without degradation of performance in all ambient and induced high temperature environments associated with the A3, A2, and A1 (+71°C max) climatic regions as described in NATO STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2.

A1.4.6 All Base Units and probes must operate without physical damage and without degradation of performance in all ambient high temperature environments associated with the A3,A2 and A1 (+49°C max) climatic regions as described in NATO STANAG 4370, AECTP 200, AECTP 230, Leaflet 2311/1 and Leaflet 2311/2.

A1.4.7 All Base Units and probes must operate without physical damage and without degradation of performance under conditions of rapid changes in ambient air temperature as encountered during movements from indoor controlled temperature environments to outdoor environments that are at either high temperature (+49°C max) or low temperature (-25°C min) extremes. The RDS must not require any physical modifications or preparations in advance of encountering a temperature shock and must be fully operable during and following the temperature shock.

A1.4.8 All Base Units and probes must conform to Electromagnetic Environmental Effects (E3) in accordance with MIL-STD-461F. Specifically the Base Unit will conform to the following tests: CE101, CE102, CS101, CS106, CS114, CS115, CS116, RE102, RS101, and RS103. Conformance will be with the base unit connected to probes, power leads and whatever other connections are applicable.

A2.0 APPENDIX 2: VEHICLE-MOUNTED RDS TECHNICAL SPECIFICATIONS

A2.1 General

The Vehicle-Mounted System must:

A2.1.1 Be mountable in existing vehicle mounts:

- The thickness (which will be the direction under compression by straps) must be no greater than 55 mm;
- The length no greater than 210 mm;
- The width no greater than 170 mm;
- The display must be on the 'front' which is the side with the (max) 55 mm by 170 mm dimensions;
- If detection is accomplished by use of a probe, that probe must also (along with the BU) fit within the above dimensions;
- Compression must not prevent the unit from functioning (block access to, or inadvertently press buttons, *et cetera*); and
- The vehicle-Mounted (V-M) BU may be smaller than these dimensions, and may be provided with a sleeve or other mechanism to prevent inadvertent button compression, but this mechanism may not exceed the given dimensions.

A2.1.2 Be capable, without modification, of being powered by both of the following:

- Batteries (rechargeable);
- Vehicle power (24V DC);
    - System must interface with vehicle power supply via a Bendix 9210 71-573127-98S or equivalent;
    - Note, here equivalent means any connector from any manufacturer that matches all fit, form, function, and performance of the Bendix connector.
- If detection is done using a probe, that probe(s) must be powered from the base unit; and
- Rechargeable batteries must be provided with the system, but the ability to run off commercially available alkaline batteries is an asset.

A2.1.3 Maintain specified radiation detection performance, under normal conditions of use (i.e. not exceeding the conditions defined in this document), for at least 12 months without the need for recalibration.

A2.1.4 Be operable from batteries alone for a minimum of 12 hours of continuous use in the highest sustained power draw mode, at 21^{o} C and one Atm. Note Highest Sustained Draw mode is defined as follows:

- System in search mode;
- No back light;

- No ancillary equipment is drawing power;
- No audible alarm (there may be a visible alarm indicator); and
- System will be recording dose rate not raw counts.

A2.1.5 Meet IP54 (protection against dust penetration and water spray).

A2.1.6 While the preferred system colour is either black or olive drab, each component must be of any colour except Yellow, Orange, Red or Blue.

A2.1.7 Be capable, without modification, of being setup, equipped and operated by personnel wearing complete CAF CBRN Personnel Protective Equipment including gloves.

- The intent of this requirement is twofold: to ensure all knobs, latches, closures, fasteners, dials, switches, buttons and other design elements can be manipulated or controlled, as required, by personnel wearing protective CBRN equipment; and to ensure there are no sharp parts or tools that could inadvertently breech personal protective clothing.

- This requirement extends to all support equipment required to setup, equip and operate the base unit and probes.

A2.1.8 Have all battery caps, protective covers or otherwise removable components be held captive by lanyards, chains or other appropriate mechanisms to prevent loss.

A2.1.9 Communicate with a computer for the purpose of both data management and software/firmware modification.

A2.1.10 Communication must be through wires (USB) and not accomplished wirelessly.

- If wireless is an option, there must be a means of disabling it.

A2.1.11 Possess sufficient physical memory to store a minimum of 1,000,000 data points (a data point is defined as a dose or dose rate reading and the time it was recorded).

A2.1.12 Be readable in all lighting conditions, with all displays and indicators; and being readily visible and easily readable in all lighting conditions, ranging from direct sunlight to complete darkness, without requiring external light sources.

A2.1.13 Be fully functional, as defined by the technical requirements herein, after enduring a transit drop in its hand carried configuration (with any protective covering that the device would normally be used in, and outside the transit case) as per MIL-STD-810H, Method 516.8, Shock, Procedure IV Transit Drop. *Note: drop will be modified to be from a height of 1m.

A2.1.14 Operate without physical damage and without degradation of performance under shock and vibration conditions when mounted in any Canadian Forces vehicle with provided vehicle mount kit. Shock and vibrations conditions are described by MIL-STD-810H, Method 514.8, Transportation, Procedure I, Category 4 – Composite Wheeled Vehicle, Figure 514.8C-7, and MIL-STD-810H, Method 516.8, Shock, Procedure II Transportation, Table 516.8-VII.

A2.1.15 The calibration orientations for the detector elements must be clearly marked on the outside of the detector.

A2.1.16 Have display in either Canadian English or Canadian French, selectable within the settings menu.

A2.2 Performance

The Vehicle-Mounted System must:

A2.2.1 Display readings of dose rate (Sv/hr, Gy/hr) and accumulated dose (Sv, Gy).

A2.2.2 Present (gamma) energy compensated readings providing dose rate equivalent H*(10).

A2.2.3 Detect gamma radiation between 60keV and 3MeV.

A2.2.4 Detect, display, and record a dose rate between 50nSv/h and 100Sv/h (the operational range).

A2.2.5 Detect, display, and record an accumulated dose between 50nSv and 10Sv.

A2.2.6 When exposed to a dose rate above the operational range, the display must clearly indicate this is the case.

A2.2.7 Have a dose rate accuracy of ±20% within 80% of the operational range (for gamma energies between 60 keV and 1.2 MeV).

A2.2.8 Have an accumulated dose accuracy of ±20% within 80% of the operational range (for gamma energies between 60 keV and 1.2 MeV).

A2.2.9 The angular dependence of the base unit gamma detection capability must be in accordance with ANSI N42.17A Para 7.7.

A2.2.10 Have a built in background subtraction feature.

A2.2.11 The V-M Base Unit will allow the user to enter “Attenuation Factors” that adjust the displayed value relative to the detected field (to compensate for intrinsic shielding in vehicles).

A2.2.12 Have a response time in accordance with ANSI N42.17A Para 6.5; and

A2.2.13 Emit a volume-adjustable audible indication proportional to the exposure rate detected by the Base Unit and any connected Probe (“chirping”).

- “Chirping” is to be proportional to raw unfiltered counts, to minimize latency.

A2.3 Alarm Requirements

The system must:

A2.3.1 Have the following alarm types:

Table 3 Vehicle-Mounted RDS Alarm Outputs

Alarm Trigger*	Audio Output	Visual Output
Dose/Exposure Rate	mandatory	mandatory
Accumulated Dose/exposure	mandatory	mandatory
System Performance Error	optional	mandatory

Low Battery	optional	mandatory
Low Memory	optional	mandatory

*Alarms apply regardless of whether the reading (or error) originates in the Base Unit or in a Probe.

A2.3.2 Have alarms that do not interfere with the reading of the displayed dose/dose rate (except in the case of a system performance error) if an alarm is visual.

A2.3.3 Terminate the display and recording of potentially false readings in the presence of a system error.

A2.3.4 Keep displaying a visual alarm until the alarm state has ended (not dismissible).

A2.3.5 Have a volume control where an alarm is audible including a mute feature.

A2.3.6 Be provided with a headset that when attached halts all audio projection from the base unit.

- Headset volume must be adjustable.

A2.4 Battery Charging System

A2.4.1 The kit must include a Battery Charging System.

A2.4.2 The Battery Charging System must have a universal power input of 110VAC – 220VAC, 50Hz – 60Hz, with a North American plug type.

A2.4.3 The Battery Charging System must provide visual indications of battery charging in order to indicate when charging is in progress and when it is complete.

A2.4.4 The Battery Charging System full re-charge time for one (1) Battery Set must not exceed three (3) hours.

A2.4.5 The Battery Charging System must be certified CSA, CE, UL or equivalent.

A2.5 Weight

A2.5.1 The V-M BU must weigh no more than 2.0 kg.

A2.6 Carrying Pouch

There exist situations where the Vehicle-Mounted system may be removed from the vehicle for limited uses, this necessitates having a Carrying Pouch, which must:

A2.6.1 Be capable, without modification, of simultaneously carrying the following items:

- The RDS V-M BU,
- One (set of) backup battery(ies),
- A pair of RDS compatible headsets, and
- A Gamma or (Beta/Gamma) probe if a probe is required for detection (if the Vehicle-Mounted system makes use of an internal detector space for a probe is not required).

A2.6.2 Be able to attach securely to either the wearer's belt or MOLLE webbing.

A2.6.3 Allow for continued V-M BU radiation detection and data functions, while the V-M BU is stowed within the carrying pouch.

A2.6.4 Allow the display to be clearly visible.

A2.6.5 Allow attachment and operation of an RDS probe (if use requires an external probe) while the BU is stowed in the carrying pouch.

A2.6.6 Allow use of a connected headset while the V-M BU is stowed in the carrying pouch.

A2.7 Hard Transport Container

A2.7.1 A stackable, Hard Transport Container must be in accordance with NEMA IEC 60529, with no less than an IP65 rating or equivalent.

A2.7.2 While the preferred system colour is either black or olive drab, each component must be of any colour except Yellow, Orange, Red or Blue.

A2.7.3 The Vehicle Kit case must include:

- 1 V-M Base Unit;
- Any power adapter and cabling required in order to draw power from the vehicle (24VDC), for the V-M BU;
- A battery charger as described in A2.4;
- A headset;
- Any sleeve or adapter required to physically conform to the requirements described in A2.1.1; and
- All Technical Publication(s) (stored without needing to be folded or otherwise distorted from flat) as required in section A2.8.

A2.7.4 The case must also include (stored within the Hard Transport Container) a single set of all tools required to setup and maintain the V-M BU and probe (if the base units employ a probe for Vehicle-Mounted configuration).

A2.7.5 The Vehicle-Mounted Base Unit and accessories, while packaged in their protective transport case, must Be capable, without modification, of enduring unsecured transport as per MIL-STD-810H, Method 514.8, Transportation, Procedure II, Category 5 Loose Cargo, for a duration of 9 minutes; or AECTP 400 (edition 3), Method 406, for a duration of 9 minutes.

A2.7.6 The interior of the each case must be lined with foam or other suitable, flexible, shock-absorbing material, to provide secure and fitted storage for all case contents.

A2.8 Included Documentation

A2.8.1 Each case must contain a "Case Contents" document, consisting of a laminated, bilingual (English and French) single page clearly:

- Listing each item contained in the case, and
- Showing their location in the case.

A2.8.2 Each case must contain one “Quick Start Guide”, for each Vehicle-Mounted system in the transport case, consisting of a laminated, bilingual (English and French) single page clearly describing the following basic functions:

- Powering on/off,
- Changing scale,
- Acknowledging alarms, and
- Changing Batteries.

A2.8.3 Each case must contain one “Operator’s Manual” document, consisting of a bilingual (English and French) manual describing the system and its use. The document will be of sufficient detail that a non-technical person could look up and perform any function or access any feature the system is capable of.

A2.9 RDS Software

A2.9.1 Software must be provided for configuration, calibration, operation, data transfer, or maintenance for the base units and all probes.

A2.9.2 This RDS software must be provided installed on the RDS and a separate soft copy must be provided on CD or DVD.

A2.9.3 The version number must be clearly indicated.

A2.9.4 If software is provided that runs on a stand-alone computer (i.e. for data transfer or viewing) it must be compatible with Microsoft Windows operating systems (Windows 7, Windows 8, Windows 10).

A2.9.5 Any required software licenses must be included for use on an unlimited number of DND computers.

A2.9.6 Software/firmware updates must be provided for a period of ten (10) years following contract award.

- Here “update” means all patches, extensions, or other modifications to the software necessary to maintain or achieve the advertised performance and information security of the system.

A3.0 APPENDIX 3: HAND-HELD RDS TECHNICAL SPECIFICATIONS

A3.1 General

The Hand-Held (H-H) Base Unit must:

A3.1.1 Be Hand-Held (one hand):

- Possessing a gripping surface,
- Having all the manual interfaces that are located on the BU (buttons, toggles, dials, et cetera) useable by the same hand that is gripping the BU.

A3.1.2 Be capable, without modification, of being powered by all of the following:

- Batteries (Rechargeable); and
- Main power (100-240V AC, 50-60Hz).
- Note: probes may be powered from the base unit.

A3.1.3 Maintain specified radiation detection performance, under normal conditions of use (i.e. not exceeding the conditions defined in this document), for at least 12 months without the need for recalibration.

A3.1.4 Be operable for a minimum of 12 hours of continuous use in the highest sustained power draw mode, at 21°C and one Atm. Note Highest Sustained Draw mode is defined as follows:

- System in search mode;
- The probe with the highest power draw is providing readings;
- No back light;
- No ancillary equipment is drawing power;
- No audible alarm (there may be a visible alarm indicator); and
- System will be recording dose rate not raw counts (unless using the FIDLER or Alpha/Beta probe, in which case, raw counts is acceptable).

A3.1.5 Meet IP64 (protection against dust penetration and water spray).

A3.1.6 While the preferred system colour is either black or olive drab, each component must be of any colour except Yellow, Orange, Red or Blue.

A3.1.7 Be capable, without modification, of being setup, equipped and operated by personnel wearing complete CAF CBRN Personnel Protective Equipment including gloves;

- The intent of this requirement is twofold: to ensure all knobs, latches, closures, fasteners, dials, switches, buttons and other design elements can be manipulated or controlled, as required, by personnel wearing protective CBRN equipment; and to ensure there are no sharp parts or tools that could inadvertently breech personal protective clothing.
- This requirement extends to all support equipment required to setup, equip and operate the base unit and probes.

A3.1.8 Have all battery caps, protective covers or otherwise removable components be held captive by lanyards, chains or other appropriate mechanisms to prevent loss.

A3.1.9 Communicate with a computer for the purpose of both data management and software/firmware modification.

A3.1.10 Communication must be through wires and not accomplished wirelessly.

- If wireless is an option, there must be a means of disabling it.

A3.1.11 Possess sufficient physical memory to store a minimum of 1,000,000 data points (a data point is defined as a dose or dose rate reading and the time it was recorded).

A3.1.12 Be Readable in all lighting conditions, with all displays and indicators; and being readily visible and easily readable in all lighting conditions, ranging from direct sunlight to complete darkness, without requiring external light sources.

A3.1.13 Be fully functional, as defined by the technical requirements herein, after enduring a transit drop in its hand carried configuration (with any protective covering that the device would normally be used in, and outside the transit case) per MIL-STD-810H, Method 516.8, Shock, Procedure IV Transit Drop. *Note: drop will be modified to be from a height of 1m.

A3.1.14 Operate without physical damage and without degradation of performance under shock and vibration conditions when mounted in any Canadian Forces vehicle with provided vehicle mount kit. Shock and vibrations conditions are described by MIL-STD-810H, Method 514.8, Transportation, Procedure I, Category 4 – Composite Wheeled Vehicle, Figure 514.8C-7, and MIL-STD-810H, Method 516.8, Shock, Procedure II Transportation, Table 516.8-VII.

A3.1.15 The calibration orientations for the detector elements must be clearly marked on the outside of the detector.

A3.1.16 Have display in either Canadian English or Canadian French, selectable within the settings menu.

A3.2 Performance

The H-H Base Unit must:

A3.2.1 Display readings of count rate (cpm, cps), dose/exposure rate (Sv/hr, rad/hr, Gy/hr, rem/hr, R/hr) and total dose/exposure (Sv, rad, Gy, rem, R) in its base unit (no probe) configuration (i.e. the BU must have a built-in detector(s)).

A3.2.2 Present (gamma) energy compensated readings providing dose rate equivalent H*(10).

A3.2.3 Detect gamma radiation between 60keV and 3MeV.

A3.2.4 Include a means of differentiating gamma from beta (e.g. a shutter) if the base unit also detects beta radiation.

A3.2.5 Detect, display, and record a dose rate between 50nSv/h and 100Sv/h (the operational range).

A3.2.6 Detect, display, and record an accumulated dose between 50nSv and 10Sv.

A3.2.7 When exposed to a dose rate above the operational range, the display must clearly indicate this is the case.

A3.2.8 Have a dose rate accuracy of ±20% within 80% of the operational range (for gamma energies between 60 keV and 1.2 MeV).

A3.2.9 Have an accumulated dose accuracy of ±20% within 80% of the operational range (for gamma energies between 60 keV and 1.2 MeV).

A3.2.10 The angular dependence of the base unit gamma detection capability must be in accordance with ANSI N42.17A Para 7.7.

A3.2.11 Have a built in background subtraction feature.

A3.2.12 Have a response time in accordance with ANSI N42.17A Para 6.5; and

A3.2.13 Emit a volume-adjustable audible indication proportional to the exposure rate detected by the Base Unit and any connected Probe ("chirping").

- "Chirping" is to be proportional to raw unfiltered counts, to minimize latency.

A3.3 Alarm

The system must:

A3.3.1 Have the following alarm types:

Table 4 Hand-Held RDS Alarm Outputs

Alarm Trigger*	Audio Output	Visual Output	Vibration
Dose/Exposure Rate	mandatory	mandatory	optional
Accumulated Dose/exposure	mandatory	mandatory	optional
System Performance Error	optional	mandatory	optional
Low Battery	optional	mandatory	optional
Low Memory	optional	mandatory	optional

*Alarms apply regardless of whether the reading (or error) originates in the Base Unit or in a Probe.

A3.3.2 Have alarms that do not interfere with the reading of the displayed counts/dose/dose rate (except in the case of a system performance error) if an alarm is visual.

A3.3.3 Terminate the display and recording of potentially false readings in the presence of a system error.

A3.3.4 Keep displaying a visual alarm until the alarm state has ended (not dismissible).

A3.3.5 Have a volume control where an alarm is audible including a mute feature.

A3.3.6 Be provided with a headset that when attached halts all audio projection from the base unit.

- Headset volume must be adjustable.

A3.4 Battery Charging System

A3.4.1 The kit must include a Battery Charging System.

A3.4.2 The Battery Charging System must have a universal power input of 110VAC – 220VAC, 50Hz – 60Hz, with a North American plug type.

A3.4.3 The Battery Charging System must provide visual indications of battery charging in order to indicate when charging is in progress and when it is complete.

A3.4.4 The Battery Charging System must recharge to 95% full in under three (3) hours.

A3.4.5 The Battery Charging System must be certified CSA, CE, UL or equivalent.

A3.5 Weight

A3.5.1 The H-H BU must weigh no more than 1.5 kg.

A3.6 Telescoping Handle

In order to both provide a method of increasing the distance to a source and reaching a detector into otherwise inaccessible locations, a telescoping handle is required, that must:

A3.6.1 Attach securely to the Beta/Gamma probe (use with the other probes would be an asset, but is not required).

A3.6.2 Collapse to no more than 51cm in length (excluding probe).

A3.6.3 Extend to a length of at least 1.5m (excluding probe); and

A3.6.4 Weigh no more than 1.2kg.

A3.7 Carrying Pouch

The Carrying Pouch must:

A3.7.1 Be capable, without modification, of simultaneously carrying the following items, must be included: RDS H-H BU, one (set of) backup battery(ies), any two of the RDS probes (except for the FIDLER probe and neutron probe), and all associated cables.

A3.7.2 Be able to attach securely to either the wearer’s belt or MOLLE webbing.

A3.7.3 Be provided with a detachable shoulder strap.

A3.7.4 Allow for continued H-H BU radiation detection, visible display, and data functions, while the BU is stowed within the carrying pouch.

A3.7.5 Allow attachment and operation of RDS probes while the H-H BU is stowed in the carrying pouch.

A3.7.6 Allow use of a connected headset while the H-H BU is stowed in the carrying pouch.

A3.8 Hard Transport Cases

A3.8.1 A series of stackable, Hard Transport Cases must be provided with no less than an IP65 rating or equivalent, in accordance with NEMA IEC 60529.

A3.8.2 While the preferred system colour is either black or olive drab, each component must be of any colour except Yellow, Orange, Red or Blue.

A3.8.3 One case configuration – the General Use Kit - will include in addition to the H-H BU:

- The telescoping handle,
- Carrying Pouch,
- Support equipment (battery charger, one (set of) spare battery(ies), cables, headset, repair tools (i.e. Spare Mylar windows), shoulder strap, and anything else required to achieve the functionality defined within this SOW),
- The Beta / Gamma Probe,
- The Beta Frisker Probe, and
- A caesium-137 check source of no more than 10kBq.
- Note, no equipment specific to vehicle mounting is required in this case.

A3.8.4 A second case configuration – the Advanced Use Kit - will include in addition to the H-H BU:

- The telescoping handle,
- Carrying Pouch,
- Support equipment (battery charger, one (set of) spare battery(ies), cables, headset, repair tools (i.e. Spare Mylar windows), shoulder strap, and anything else required to achieve the functionality defined within this SOW),
- The Beta / Gamma Probe,
- The Beta Frisker Probe,
- The Alpha / Beta Probe, and
- A caesium-137 check source of no more than 10kBq.
- Note, no equipment specific to vehicle mounting is required in this case.

A3.8.5 A separate Hard Transport Case must be provided for each of the High Sensitivity Gamma Probes. These cases must include (stored without needing to be folded or otherwise distorted from flat) all Technical Publication(s) listed in Section A3.9

A3.8.6 A separate Hard Transport Case must be provided for each of the FIDLER Probes. These cases must include (stored without needing to be folded or otherwise distorted from flat) all Technical Publication(s) listed in Section A3.9

A3.8.7 A separate Hard Transport Case must be provided for each of the Neutron Probes. These cases must include (stored without needing to be folded or otherwise distorted from flat) all Technical Publication(s) listed in Section A3.9

A3.8.8 The cases must include (stored within the Hard Transport Case) all tools required to setup and maintain all kit stored within that case.

A3.8.9 The cases must include (stored without needing to be folded or otherwise distorted from flat) all Technical Publication(s) listed in Section A3.9

A3.8.10 The H-H Base Unit and accessories, while packaged in their protective transport case, must be capable, without modification, of enduring unsecured transport as per.

- MIL-STD-810G (change 1), Method 514.7, Procedure II, for a duration of 9 minutes. or
- AECTP 400 (edition 3), Method 406, for a duration of 9 minutes.

A3.8.11 The interior of the each case must be lined with foam or other suitable, flexible, shock-absorbing material, to provide secure and fitted storage for all case contents.

A3.9 Included Documentation

A3.9.1 Each case must contain a “Case Contents” document, consisting of a laminated, bilingual (English and French) single page clearly:

- Case Contents must be IAW CDRL & DID RDS-ILS-116,
- Listing each item contained in the case, and
- Showing their location in the case.
- Note, this is not required for the FIDLER and Neutron Probe cases, if the contents of the cases do not include more than the probe and connection cabling.

A3.9.2 Each kit must contain a “Quick Start Guide” document, consisting of a laminated, bilingual (English and French) single page clearly describing the following basic functions:

- Powering on/off,
- Connecting probes,
- Changing scale,
- Acknowledging alarms,
- Changing Batteries, and
- Verifying function with a check source.

A3.9.3 Each kit must contain an “Operator’s Manual” document, consisting of a bilingual (English and French) manual describing the system and its use. The document will be of sufficient detail that a non-technical person could look up and perform any function or access any feature the system is capable of.

A3.10 RDS Software

A3.10.1 Software must be provided for configuration, calibration, operation, data transfer, or maintenance for the base units and all probes.

A3.10.2 This RDS software must be provided installed on the RDS and a separate soft copy must be provided on CD or DVD; and

A3.10.3 The Version number must be clearly indicated.

A3.10.4 If software is provided that runs on a stand-alone computer (i.e. for data transfer or viewing) it must be compatible with Microsoft Windows operating systems (Windows 7, Windows 8, Windows 10).

A3.10.5 Any required software licenses must be included for use on an unlimited number of DND computers.

A3.10.6 Software/firmware updates must be provided for a period of ten (10) years following contract award.

- Here “update” means all patches, extensions, or other modifications to the software necessary to maintain or achieve the advertised performance and information security of the system.

A4.0 APPENDIX 4: BETA / GAMMA PROBE TECHNICAL SPECIFICATIONS

A4.1 General

The Beta/Gamma Probe must:

A4.1.1 Be Hand-Held (one hand):

- Possessing a gripping surface,
- Having all the manual interfaces that are located on the probe (buttons, toggles, dials, et cetera) useable by the same hand that is gripping the BGP.

A4.1.2 Be capable, without modification, of being powered:

- By batteries; or
- Indirectly from the Base Unit.

A4.1.3 Maintain specified radiation detection performance, under normal conditions of use (i.e. not exceeding the conditions defined in this document), for at least 12 months without the need for recalibration.

A4.1.4 Meet IP54 (protection against dust penetration and water spray).

A4.1.5 While the preferred component colour is either black or olive drab, each probe must be of any colour except Yellow, Orange, Red or Blue.

A4.1.6 Be capable, without modification, of being setup, equipped and operated by personnel wearing complete CAF CBRN Personnel Protective Equipment including gloves.

- The intent of this requirement is twofold: to ensure all knobs, latches, closures, fasteners, dials, switches, buttons and other design elements can be manipulated or controlled, as required, by personnel wearing protective CBRN gloves; and to ensure there are no sharp parts or tools that could inadvertently breech personal protective clothing.
- This requirement extends to all support equipment required to setup, equip and operate the base unit and probes.

A4.1.7 Have all battery caps, protective covers or otherwise removable components be held captive by lanyards, chains or other appropriate mechanisms to prevent loss.

A4.1.8 Be connected to the Base Unit via cable(s) at least one meter (1m) long.

- If multiple probes are used, multiple cables may be employed, but they must either be interchangeable between probes, or made in such a way that it is physically disallowed to connect a probe with the wrong cable.
- Cables must be of the coil variety to minimize hindrance

A4.1.9 Communicate through wires and not accomplished wirelessly.

- If wireless is an option, there must be a means of disabling it.

A4.1.10 Be fully functional, as defined by the technical requirements herein, after enduring a transit drop in its hand carried configuration (with any protective covering that the device would normally be used in, and outside the transit case) per MIL-STD-810H, Method 516.8,

Shock, Procedure IV Transit Drop – Tactical Drop for infantry and man-carried equipment as specified in Table 516.8-X, from a drop height of 1m.

A4.1.11 Be interchangeable and “hot swappable” with any other Beta/Gamma probe. This means that without powering down the Base Unit, any probe may be unplugged from the Base Unit and any Beta/Gamma probe may be plugged in. The Base Unit will automatically detect what probe is attached and adjust display/recording appropriately. Calibration data from the newly plugged in probe will also be used for the calculation of dose and dose rate.

- Note: for the Vehicle-Mounted system only: if a probe is required to function, it does NOT need to be “hot swappable”.

A4.2 Performance

The BGP must:

A4.2.1 Display (through the BU) readings of count rate (cpm, cps), dose/exposure rate (Sv/hr, rad/hr, Gy/hr, rem/hr, R/hr) and total dose/exposure (Sv, rad, Gy, rem, R).

A4.2.2 Detect gamma radiation between 60keV and 3MeV.

A4.2.3 Detect beta radiation between 200keV and 3.5MeV.

A4.2.4 Detect a gamma dose rate between 50nSv/h and 100Sv/h (the operational range).

A4.2.5 Detect a beta dose rate between 50nSv/h and 50mSv/h (the operational range).

A4.2.6 Detect/display/record an accumulated dose between 50nSv and 100Sv.

A4.2.7 Have a gamma dose rate accuracy of ±20% within 80% of the operational range (for gamma energies between 60 keV and 1.2 MeV).

A4.2.8 Have an accumulated gamma dose accuracy of ±20% within 80% of the operational range (for gamma energies between 60 keV and 1.2 MeV).

A4.3 Weight

A4.3.1 The BGP must weigh no more than 1.0 kg.

A5.0 APPENDIX 5: BETA CONTAMINATION PROBE (Frisker) SPECIFICATIONS

A5.1 General

The Beta Contamination Probe (Frisker) must:

A5.1.1 Be Hand-Held (one hand):

- Possessing a gripping surface,
- Having all the manual interfaces that are located on the probe (buttons, toggles, dials, et cetera) useable by the same hand that is gripping the Frisker.

A5.1.2 Be capable, without modification, of being powered:

- By batteries; or
- Indirectly from the Base Unit.

A5.1.3 Maintain specified radiation detection performance, under normal conditions of use (i.e. not exceeding the conditions defined in this document), for at least 12 months without the need for recalibration.

A5.1.4 Meet IP54 (protection against dust penetration and water spray).

A5.1.5 While the preferred component colour is either black or olive drab, each probe must be of any colour except Yellow, Orange, Red or Blue.

A5.1.6 Be capable, without modification, of being setup, equipped and operated by personnel wearing complete CAF CBRN Personnel Protective Equipment including gloves.

- The intent of this requirement is twofold: to ensure all knobs, latches, closures, fasteners, dials, switches, buttons and other design elements can be manipulated or controlled, as required, by personnel wearing protective CBRN gloves; and to ensure there are no sharp parts or tools that could inadvertently breech personal protective clothing.
- This requirement extends to all support equipment required to setup, equip and operate the base unit and probes.

A5.1.7 Have all battery caps, protective covers or otherwise removable components be held captive by lanyards, chains or other appropriate mechanisms to prevent loss.

A5.1.8 Be connected to the H-H Base Unit via cable(s) at least one meter (1m) long.

- If multiple probes are used, multiple cables may be employed, but they must either be interchangeable between probes, or made in such a way that it is physically disallowed to connect a probe with the wrong cable.
- Cables must be of the coil variety to minimize hindrance

A5.1.9 Communication must be through wires and not accomplished wirelessly.

If wireless is an option, there must be a means of disabling it.

A5.1.10 Be fully functional, as defined by the technical requirements herein, after enduring a transit drop in its hand carried configuration (with any protective covering that the device would normally be used in, and outside the transit case) per MIL-STD-810H, Method 516.8,

Shock, Procedure IV Transit Drop – Tactical Drop for infantry and man-carried equipment as specified in Table 516.8-X, from a drop height of 1m.

A5.1.11 Be interchangeable and “hot swappable” with any other Beta Contamination probe. This means that without powering down the Base Unit, any probe may be unplugged from the Base Unit and any Beta Contamination probe may be plugged in. The Base Unit will automatically detect what probe is attached and adjust display/recording appropriately. Calibration data from the newly plugged in probe will also be used for the calculation of dose and dose rate.

A5.2 Performance

The Beta Contamination Probe (Frisker) must:

A5.2.1 Be capable, without modification, of displaying (through the H-H BU) readings of count rate (cpm, cps) and count rate per unit area (cpm/cm^2, cps/cm^2).

A5.2.2 Have a ‘Scalar Mode’ where the user may enter a duration over which the counts are averaged.

A5.2.3 Detect gamma radiation between 60keV and 3MeV.

A5.2.4 Detect beta radiation between 200keV and 3.5MeV.

A5.2.5 When in scalar mode, be capable, without modification, of an MDC of 120 Bq/cm^2 for C-14 at a static source-to-probe separation of 3 mm from a uniformly contaminated surface, within 30 seconds.

A5.2.6 When in scalar mode, be capable, without modification, of an MDC of 1.1 Bq/cm^2 for sealed Co-60, at a source-to-probe separation of 3 mm, from a uniformly contaminated surface while moving at a scan speed of 10 cm/s.

A5.2.7 Have a relative intrinsic error of no more than 30% for all beta reference isotopes in Table 3 of ANSI N42.17A, above 300keV.

A5.3 Weight

A5.3.1 The Frisker must weigh no more than 1.0 kg.

A6.0 APPENDIX 6: ALPHA / BETA PROBE SPECIFICATIONS

A6.1 General

The Alpha / Beta Probe (ABP) must:

A6.1.1 Be Hand-Held (one hand):

- Possessing a gripping surface; and
- Having all the manual interfaces that are located on the ABP (buttons, toggles, dials, et cetera) useable by the same hand that is gripping the ABP.

A6.1.2 Must be powered:

- By batteries; or
- Indirectly from the Base Unit.

A6.1.3 Maintain specified radiation detection performance, under normal conditions of use (i.e. not exceeding the conditions defined in this document), for at least 12 months without the need for recalibration.

A6.1.4 Meet IP54 (protection against dust penetration and water spray).

A6.1.5 While the preferred component colour is either black or olive drab, each probe must be of any colour except Yellow, Orange, Red or Blue.

A6.1.6 Be capable, without modification, of being setup, equipped and operated by personnel wearing complete CAF CBRN Personnel Protective Equipment including gloves.

- The intent of this requirement is twofold: to ensure all knobs, latches, closures, fasteners, dials, switches, buttons and other design elements can be manipulated or controlled, as required, by personnel wearing protective CBRN gloves; and to ensure there are no sharp parts or tools that could inadvertently breech personal protective clothing; and

- This requirement extends to all support equipment required to setup, equip and operate the base unit and probes.

A6.1.7 Have all battery caps, protective covers or otherwise removable components be held captive by lanyards, chains or other appropriate mechanisms to prevent loss.

A6.1.8 Be connected to the Base Unit via cable(s) at least one meter (1m) long.

- If multiple probes are used, multiple cables may be employed, but they must either be interchangeable between probes, or made in such a way that it is physically disallowed to connect a probe with the wrong cable; and

- Cables must be of the coil variety to minimize hindrance

A6.1.9 Communication must be through wires and not accomplished wirelessly.

- If wireless is an option, there must be a means of disabling it.

A6.1.10 Be fully functional, as defined by the technical requirements herein, after enduring a transit drop in its hand carried configuration (with any protective covering that the device would normally be used in, and outside the transit case) per MIL-STD-810H, Method 516.8,

Shock, Procedure IV Transit Drop – Tactical Drop for infantry and man-carried equipment as specified in Table 516.8-X, from a drop height of 1m.

A6.1.11 Be interchangeable and “hot swappable” with any other Alpha / Beta Probe. This means that without powering down the Base Unit, any probe may be unplugged from the Base Unit and any Alpha / Beta Probe may be plugged in. The Base Unit will automatically detect what probe is attached and adjust display/recording appropriately. Calibration data from the newly plugged in probe will also be used for the calculation of dose and dose rate.

A6.2 Performance

The ABP must:

A6.2.1 Display (through the H-H BU) readings of count rate (cpm, cps) and count rate per unit area (cpm/cm^2, cps/cm^2).

- The display must clearly differentiate between the alpha and beta channels;
- The alpha channel must have an alpha response at least 100 times its response to a beta source at similar energy;
- The beta channel must have a beta response at least 20 times its response to an alpha source at similar energy;

A6.2.2 Have a ‘Scalar Mode’ where the user may enter a duration over which the counts are averaged.

A6.2.3 Have a display range between 0 and 1,000,000 cpm.

A6.2.4 Detect alpha radiation between 3MeV and 6MeV.

A6.2.5 Detect beta radiation between 150keV and 5MeV.

A6.2.6 Have a gamma response of no more than 1.5 cps per µSv/h (Cs-137) in the alpha channel.

A6.2.7 Have a gamma response of no more than 3 cps per mSv/h (Cs-137) in the beta channel.

A6.2.8 Have a 4Π alpha efficiency of at least 10% for all alpha reference isotopes in Table 3 of ANSI N42.17A.

A6.2.9 Have a 4Π beta efficiency of at least 10% for all beta reference isotopes in Table 3 of ANSI N42.17A and at least 5% for C-14.

A6.2.10 Have a relative intrinsic error in the response to the reference alpha radiation (isotope used for A6.2.8) must not exceed +/-30% across the energy range.

A6.2.11 Have a relative intrinsic error in the response to the reference beta radiation (isotope used for A6.2.9) must not exceed +/-30% between 300keV and 5 MeV.

A6.2.12 Have an active detection area within 5% of 100cm^2.

A6.3 Weight

A6.3.1 The ABP must weigh no more than 1.2 kg.

A7.0 APPENDIX 7: HIGH SENSITIVITY GAMMA PROBE SPECIFICATIONS

A7.1 General

The High Sensitivity Gamma Probe (HSGP) must:

A7.1.1 Be Hand-Held (one hand):

- Possessing a gripping surface,
- Having all the manual interfaces that are located on the probe (buttons, toggles, dials, et cetera) useable by the same hand that is gripping the HSGP.

A7.1.2 Be capable, without modification, of being powered:

- By batteries; or
- Indirectly from the Base Unit.

A7.1.3 Maintain specified radiation detection performance, under normal conditions of use (i.e. not exceeding the conditions defined in this document), for at least 12 months without the need for recalibration.

A7.1.4 Meet IP54 (protection against dust penetration and water spray).

A7.1.5 While the preferred component colour is either black or olive drab, each probe must be of any colour except Yellow, Orange, Red or Blue.

A7.1.6 Be capable, without modification, of being setup, equipped and operated by personnel wearing complete CAF CBRN Personnel Protective Equipment including gloves.

- The intent of this requirement is twofold: to ensure all knobs, latches, closures, fasteners, dials, switches, buttons and other design elements can be manipulated or controlled, as required, by personnel wearing protective CBRN gloves; and to ensure there are no sharp parts or tools that could inadvertently breech personal protective clothing.
- This requirement extends to all support equipment required to setup, equip and operate the base unit and probes.

A7.1.7 Have all battery caps, protective covers or otherwise removable components be held captive by lanyards, chains or other appropriate mechanisms to prevent loss.

A7.1.8 Be connected to the Base Unit via cable(s) at least one meter (1m) long.

- If multiple probes are used, multiple cables may be employed, but they must either be interchangeable between probes, or made in such a way that it is physically disallowed to connect a probe with the wrong cable.
- Cables must be of the coil variety to minimize hindrance

A7.1.9 Communicate through wires and not accomplished wirelessly.

- If wireless is an option, there must be a means of disabling it.

A7.1.10 Be fully functional, as defined by the technical requirements herein, after enduring a transit drop in its hand carried configuration (with any protective covering that the device would normally be used in, and outside the transit case) per MIL-STD-810H, Method 516.8,

Shock, Procedure IV Transit Drop – Tactical Drop for infantry and man-carried equipment as specified in Table 516.8-X, from a drop height of 1m.

A7.1.11 Be interchangeable and “hot swappable” with any other Beta/Gamma probe. This means that without powering down the Base Unit, any probe may be unplugged from the Base Unit and any Beta/Gamma probe may be plugged in. The Base Unit will automatically detect what probe is attached and adjust display/recording appropriately. Calibration data from the newly plugged in probe will also be used for the calculation of dose and dose rate.

A7.2 Performance

The HSGP must:

A7.2.1 Display (through the BU) readings of count rate (cpm, cps).

A7.2.2 Detect gamma radiation between at least 50keV and 1.5MeV.

A7.2.3 Have an energy sensitivity of at least 110 cpm/µrad of Cs-137, and not less than 10 cpm/ µrad across the energy range (50keV – 1.5MeV).

A7.2.4 Detect a beta dose rate between 50nSv/h and 50mSv/h (the operational range).

A7.2.5 Display/record a count rate between 0 and 999kcpm.

A7.3 Weight

A7.3.1 The HSGP must weigh no more than 1.0 kg.

A8.0 APPENDIX 8: FIDLER PROBE TECHNICAL SPECIFICATIONS

A8.1 General

The FIDLER Probe must:

A8.1.1 Be Hand-Held (one hand):

- Possessing a gripping surface.

A8.1.2 Be capable, without modification, of being powered:

- By batteries; or
- Indirectly from the Base Unit.

A8.1.3 Be supplied with a shoulder strap, or similar weight distribution mechanism.

A8.1.4 Be equipped with an adjustable carry handle to allow the user to customize the height above the ground.

A8.1.5 Maintain specified radiation detection performance, under normal conditions of use (i.e. not exceeding the conditions defined in this document), for at least 12 months without the need for recalibration.

A8.1.6 Meet IP54 (protection against dust penetration and water spray).

A8.1.7 While the preferred component colour is either black or olive drab, each probe must be of any colour except Yellow, Orange, Red or Blue.

A8.1.8 Be capable, without modification, of being setup, equipped and operated by personnel wearing complete CAF CBRN Personnel Protective Equipment including gloves.

- The intent of this requirement is twofold: to ensure all knobs, latches, closures, fasteners, dials, switches, buttons and other design elements can be manipulated or controlled, as required, by personnel wearing protective CBRN gloves; and to ensure there are no sharp parts or tools that could inadvertently breech personal protective clothing.

- This requirement extends to all support equipment required to setup, equip and operate the base unit and probes.

A8.1.9 Have all battery caps, protective covers or otherwise removable components be held captive by lanyards, chains or other appropriate mechanisms to prevent loss.

A8.1.10 Be connected to the Base Unit via cable(s) at least one meter (1m) long;

- If multiple probes are used, multiple cables may be employed, but they must either be interchangeable between probes, or made in such a way that it is physically disallowed to connect a probe with the wrong cable.

- Cables must be of the coil variety to minimize hindrance.

A8.1.11 Communication must be through wires and not accomplished wirelessly.

- If wireless is an option, there must be a means of disabling it.

A8.1.12 Be interchangeable and “hot swappable” with any other FIDLER Probe. This means that without powering down the Base Unit, any probe may be unplugged from the Base Unit and any FIDLER Probe may be plugged in. The Base Unit will automatically detect what probe is attached and adjust display/recording appropriately. Calibration data from the newly plugged in probe will also be used for calculations.

A8.2 Performance

The FIDLER probe must:

A8.2.1 Be capable, without modification, of displaying (through the H-H BU) readings of count rate (cpm, cps).

A8.2.2 Have a display range between at least 0 and 1,500,000 cpm.

A8.2.3 Possess the following detection “windows”:

Table 5 FIDLER Detection Windows

	Energy	To Detect	Minimum Sensitivity	Accuracy
A8.2.3A	17 keV	L x-rays	1.25 cps/kBq Am^{241} at 25cm	±35%
A8.2.3B	59-60 keV	Americium-241	2.5 cps/kBq Am^{241} at 25cm	±35%
A8.2.3C	186 keV	Uranium-235	65 cps/kBq U^{235} at 1cm	±35%
A8.2.3D	Sum or Gross Counts	--	5 cps/kBq Am^{241} at 25cm	±35%

A8.3 Weight

A8.3.1 The FIDLER must weigh no more than 3.5 kg.

A9.0 APPENDIX 9: NEUTRON PROBE TECHNICAL SPECIFICATIONS

A9.1 General

The Neutron Probe (NP) must:

A9.1.1 Be Hand-Held (one hand):

- Possessing a gripping surface,

A9.1.2 Be capable, without modification, of being powered:

- By batteries; or
- Indirectly from the Base Unit.

A9.1.3 Maintain specified radiation detection performance, under normal conditions of use (i.e. not exceeding the conditions defined in this document), for at least 12 months without the need for recalibration;

A9.1.4 Meet IP54 (protection against dust penetration and water spray);

A9.1.5 While the preferred component colour is either black or olive drab, each probe must be of any colour except Yellow, Orange, Red or Blue;

A9.1.6 Be capable, without modification, of being setup, equipped and operated by personnel wearing complete CAF CBRN Personnel Protective Equipment including gloves;

- The intent of this requirement is twofold: to ensure all knobs, latches, closures, fasteners, dials, switches, buttons and other design elements can be manipulated or controlled, as required, by personnel wearing protective CBRN gloves; and to ensure there are no sharp parts or tools that could inadvertently breech personal protective clothing; and

- This requirement extends to all support equipment required to setup, equip and operate the base unit and probes.

A9.1.7 Have all battery caps, protective covers or otherwise removable components be held captive by lanyards, chains or other appropriate mechanisms to prevent loss;

A9.1.8 Be connected to the Base Unit via cable(s) at least one meter (1m) long;

- If multiple probes are used, multiple cables may be employed, but they must either be interchangeable between probes, or made in such a way that it is physically disallowed to connect a probe with the wrong cable; and

- Cables must be of the coil variety to minimize hindrance

A9.1.9 Communication must be through wires and not accomplished wirelessly.

- If wireless is an option, there must be a means of disabling it.

A9.1.10 Be interchangeable and “hot swappable” with any other Neutron Probe. This means that without powering down the Base Unit, any probe may be unplugged from the Base Unit and any Neutron Probe may be plugged in. The Base Unit will automatically detect what probe is attached and adjust display/recording appropriately. Calibration data from the newly plugged in probe will also be used for the calculation of dose, dose rate and count rate.

A9.2 Performance

The NP must:

A9.2.1 Be capable, without modification, of displaying (through the H-H BU) readings of count rate (cpm, cps),

- If dose rate (rad/hr, Gy/hr, rem/hr, Sv/hr) and total dose (rad, Gy, rem, Sv) are provided, the weighting factors must be based on the International Commission on Radiological Protection (ICRP) Publication Report 103; and

- It must be possible for an advanced user to manually override these weighting factors.

A9.2.2 Possess a neutron energy detection range of thermal (0.03eV) to 10MeV.

A9.2.3 Minimum neutron sensitivity of 5 counts per minute per µSv/hr;

A9.2.4 Have a measurement range of 0.1 µSv/h to 100 mSv/h; and

A9.2.5 Have a gamma rejection factor of at least 5000:1.

A9.3 Weight

A9.3.1 The NP must weigh no more than 6.0 kg.