

The purpose of this amendment is to answer questions from prospective offeror's, to revise sections B, F, J, L and to extend the due date of proposals.

1. B-1 Supplies or services and Price/Costs is deleted entirely and replaced by the following:

ITEM NUMBER	SUPPLIES OR SERVICES	QTY	UNIT	UNIT AMOUNT	TOTAL AMOUNT
0001	The Contractor shall provide a Vertical Takeoff and Land (VTOL) Ship Launchable Aircraft, GCS and Supporting Hardware in accordance with SOW.	1	LO	\$	\$
0002	Operation and Maintenance Equipment in accordance with SOW.	1	LO	\$	\$
0003	The Contractor shall provide a Vertical Takeoff and Land (VTOL) Ship Launchable Aircraft, GCS and Supporting Hardware in accordance with SOW.	1	EA	\$	\$
0004	The Contractor shall provide Operational System Training in accordance with SOW.	1	LO	\$	\$
0005	The Contractor shall provide Data in accordance with Contract Data Required List (DD1423)	NSP	NSP	NSP	NSP
Option 1					
0006	The Contractor shall provide the Option of a third VTOL, GCS and Supporting Hardware in accordance with SOW.	1	EA	\$	\$

Option 2

0007 The Contractor shall provide 1 EA \$ \$
 Vehicle Operator in accordance
 with SOW.

Option 3

0008 List of Spare Parts/High Probability 1 LO \$ \$
 Parts in accordance with SOW.

Option 4

0009 Contractor support for payload 1 LO \$ \$
 Integration in accordance with
 SOW.

2. F-2 FAR 52.211-8 – TIME OF DELIVERY (JUN 1997)

(a) The Government requires delivery to be made according to the following schedule:

REQUIRED DELIVERY SCHEDULE		
<i>[Contracting Officer insert specific details]</i>		
Item No.	Quantity	Within Days After Date Of Contract
0001	1 EA	NLT 6 months after date of award
0002	1 LO	NLT 6 months after date of award
0003	1 EA	NLT 3 months after del of CLIN 0001
0004	1 LO	NLT 1 month after del of CLIN 0001
0006	1 EA	NLT 6 months after del of CLIN 0001 if exercised.

0007	1 EA	Anytime from date of contract award through end of period of performance if exercised.
0008	1 LO	2 months after date of award
0009	AS NEEDED	Anytime from date of contract award through end of period of performance if exercised.

3. J-1 Attachment (1) - Statement of Work – 12 - Pages, with Exhibit A - DD Form 1423, Contract Data Requirements - 3 Pages (revised see attachments).

4. L-2 INSTRUCTIONS FOR SUBMISSION OF PROPOSALS/OFFERS

Contracting Officer, ATTN: Malisa Mitchell Code: 3230

RFP No. N00173-12-R-MI02

Closing Date: 3/23/2012

Time: 12:00 PM

Naval Research Laboratory

4555 Overlook Avenue, S.W.

Washington, D.C. 20375

5. QUESTIONS FROM PROSPECTIVE OFFERORS

Question 1: Please clarify the required Proposal due date, as the solicitation due date posted on FEDBIZOPPS site lists 2 March 2012, but within the RFP itself is in April.

Answer 1: This solicitation has been extended to March 23, 2012.

Question 2: If a small business utilizes other non-small businesses as subcontractor(s), is there a minimum requirement for the amount of work and/or dollars spent by the subcontractor as part of the projected contract?

Answer 2: See FAR 52.219-14 - Limitations on Subcontracting.

As prescribed in [19.508\(e\)](#) or [19.811-3\(e\)](#), insert the following clause:

Limitations on Subcontracting (Nov 2011)

(a) This clause does not apply to the unrestricted portion of a partial set-aside.

(b) *Applicability*. This clause applies only to--

- (1) Contracts that have been set aside or reserved for small business concerns or 8(a) concerns;
- (2) Part or parts of a multiple-award contract that have been set aside for small business concerns or 8(a) concerns; and
- (3) Orders set aside for small business or 8(a) concerns under multiple-award contracts as described in [8.405-5](#) and [16.505\(b\)\(2\)\(i\)\(F\)](#).

(c) By submission of an offer and execution of a contract, the Offeror/Contractor agrees that in performance of the contract in the case of a contract for --

- (1) *Services (except construction)*. At least 50 percent of the cost of contract performance incurred for personnel shall be expended for employees of the concern.
- (2) *Supplies (other than procurement from a nonmanufacturer of such supplies)*. The concern shall perform work for at least 50 percent of the cost of manufacturing the supplies, not including the cost of materials.
- (3) *General construction*. The concern will perform at least 15 percent of the cost of the contract, not including the cost of materials, with its own employees.
- (4) *Construction by special trade contractors*. The concern will perform at least 25 percent of the cost of the contract, not including the cost of materials, with its own employees.

(End of Clause)

Question 3: Does the government plan to award only one contract for this effort or are multiple contract awards anticipated?

Answer 3: The government is going to award one contract for this effort.

Question 4: Is there any limitation on foreign contractor participation as a subcontractor to a qualified U.S. small business prime?

Answer 4: Refer to FAR 252.225-70101 in the RFP.

Question 5: Section B indicates only 6 CLINS of items to be procured which include air vehicles (CLINS 0001/0002/0005); Operational System Training (CLIN 0003); Data (CLIN 0004); and

Vehicle Operator (CLIN 0006). However, the SOW and related documentation discusses Ground Control Station (GCS), Support and Maintenance equipment (to fit in 40 foot Conex box or equivalent volume) and other equipment/services that would be required to execute the SOW/contract. In addition, spare parts, contractor logistic support services, payload integration support and other items would be necessary to execute an actual flight demonstration program. Does the Government plan to modify the CLIN structure in this RFP or identify alternate methods for procuring such to support an actual test program??

Answer 5:

Yes, the Government modified The CLIN structure in the RFP has been modified.

Delivery of Ground Control Station (GCS) is required.

Support and Maintenance Equipment is vehicle dependant. If the vehicle requires any additional equipment to maintain and operate the vehicle, it should be provided as a system with the delivered vehicles. This deliverable should provide the government with all of the tools that will be necessary to operate and maintain this vehicle system, from a ship or any other location, without contractor support.

Payload Integrations Support: In section 3.0 Autopilot it states that the autopilot should be capable of communicating with the payload through an Ethernet or Serial interface. It also clarifies the information that the payload will be providing the autopilot for continuous waypoint navigation. The offeror should provide the government with the proper format for the autopilot to receive this information. This will allow the government to easily integrate the payload onto the vehicle without support from the contractor. The government recognizes that limited contractor support may still be necessary for payload integration. Because of this, the offeror shall provide a cost for payload integration support on a per man-day basis. It is assumed that this support will be provided through email and telephone communications.

Question 6: The RFP does not elaborate on the period of performance of the flight test program to be conducted using the air vehicles and related products to be procured under this contract. What is the planned schedule for flight testing and how many hours does the government anticipate flying the air vehicles to be procured on a daily/weekly/monthly/annual rate, and what is the overall program schedule for this project?

Answer 6: Although the government anticipates operating these vehicles, it understands that this may not be possible, due to tight schedules. In section 9.0 of the Statement of Work the government is requesting that the offeror provide an estimated cost for contractor operation on a weekly basis.

Question 7: The GFE list provided in the RFP only identifies three heavy fuel engines, one engine core and some future technical documentation. However, there would appear to be additional GFE/GFI requirements to ensure successful project completion. This would include interface control documentation for the payload to be integrated, space/power and electronic connection(s) to integrate ground control station integration into any ship. Will the government provide a more comprehensive and complete list of GFE in this RFP?

Answer 7: Because the government understands the low availability of heavy fuel engines in this size range, they have offered the use of equipment that they have on hand. This is not the preferred option. If the offeror requires the use of these engines it will be incumbent upon the offeror to work with the engine manufacturer to obtain the needed information to operate these engines. Please read section 3.0 Autopilot of the statement of work. The government can use any type of connection that is available on the autopilot to communicate with the payload.

Question 8: What class of ship does the government intend to deploy and test the UAV from?

Answer 8: No formal arrangements have been made. The type of ship could range from the M80 Stiletto to a rented barge. Please see section 2.3 Shipboard Operations of the statement of work.

Question 9: Will the government provide additional data regarding the ship that the UAV will operate/be deployed from for testing and in particular, details on the flight deck and storage areas including dimensions, physical details (location(s) of tie-downs, and/or any other physical characteristics of the deck space)?

Answer 9: No formal arrangements for the use of a ship have been made.

Question 10: The government indicates in RFP SOW that the UAV will need to operate in "Sea State 3 (15 knot) headwind condition." Does this mean that only the "head wind" condition of Sea State 3 is to be complied with or a full "Sea State 3" condition, including waves/rolling deck in accordance with a MIL STD, STANAG or similar specification? Will the government provide the specific reference document that defines this sea state (i.e. Mil Standard, OPNAVINST, NAVAIRINST, or similar)?

Answer 10: Please see section 2.2 Operational Environment of the revised SOW which has been updated to answer this question. In short; a full Sea State 3 condition per the NATO Sea State Numeral Table for the Open Ocean Atlantic, is the requirement.

Question 11: Regarding Past Performance Information, the RFP requests that the offeror provide information regarding "...services similar in nature to this requirement." Will the government provide additional clarification on what it considers "similar services" to what is being requested in this RFP? Since there has been only one type of VTOL UAV deployed on board a US warship to date (Firescout), perhaps the government might consider amending the RFP to provide additional guidance on what it deems "similar services" to that it is requesting in this RFP?

Answer 11: Similar services can be considered as VTOL UAS experience.

Question 12: Would the government consider "self-funded" development efforts, where a contractor or subcontractor has performed similar testing/operations as requested in the RFP/SOW, as valid "past performance" in lieu of customer funded/contracted efforts?

Answer 12: Yes, if the offeror can demonstrate their experience. Evidence to support claims must be included in written form as part of the proposal information.

Question 13: Factor 2: Critical Capability Review – states in part "Must be capable to operate at 50-100 feet over water". Is this required to be accomplished "fully loaded" with payload?

Answer 13: Yes, this is required to be accomplished "fully loaded" with payload.

Questions 14: Factor 2: Critical Capability Review – states in part "4 hours of endurance or greater at 5000 ft MSL on standard day, with full payload". What is the range from the ship at which this is required?

Answer 14: There is no range requirement for this capability. 4 hours of endurance is considered to be the minimum capability for the entire mission.

Questions 15: No EMI/EMC/HERO compatibility requirements are provided that the UAV and/or the GCS need to comply with. However, USN ships present a very challenging electromagnetic environment. Will the government require the system to meet any such requirements and, if so, provide a reference MIL STD or specification or subset thereof to comply with?

Answer 15: It is not envisioned that these test vehicles will operate off of a USN ship. For specifications you may refer to MIL-STD-464C, but the offeror will not be held to these standards, for a research asset. Best industry standards should be used with shielded twisted

pair wires with mil-spec connectors. Adherence to these standards will provide the offeror with the best opportunity to successfully compete for any follow on proposals should they occur.

Questions 16: Factor 3: Non-Critical Capability Review – states “Operable in the rain in Sea State 3 conditions”. Please specify the level of rain desired (inches per hour).

Answer 16: Less than or equal to 0.10 inches per hour.

Question 17: Factor 3: Non-Critical Capability Review – states “Varying payload mount capable”. Would the government specify what types of additional payloads are desirable (i.e. EO/IR, etc.)?

Answer 17: No. For this non-critical capability the vehicle is considered a “truck” and payload is not important. As a “truck” the more versatile it is, as far as locations to mount various light weight payloads, the better it is.

Question 18: The RFP does not make any reference to flight certification other than having to deliver Flight Safety checklist as stated in Paragraph 10.0 “DELIVERABLES”. What is the government’s plan/requirement for accomplishing flight certification and in accordance with what standard?

Answer 18: This planned procurement is for a research vehicle to perform a demonstration in a controlled environment. Full Flight Certification is not required at this time. However, a Safety of Flight Interim Clearance may be required when operating with US Navy ships. This requires that a safety checklist and documentation of subsystems operation, failure modes, recovery from system/subsystem failures, and system/subsystem redundancy be provided.

Question 19: The Compliance Matrix, Row 2, states “Deliverable by September 2012”. However, the stated requirement in the RFP is CLIN 0001 (first VTOL UAS air vehicle) is 6 months ARO, and the second one (CLIN 0002) is 9 months ARO (or 3 months after CLIN 0001). Shouldn’t the Compliance Matrix be modified to reflect this (i.e. state IAW with required CLIN delivery schedule) versus “September 2012”?

Answer 19: The Time Delivery Schedule is in Section F-2 of the RFP.

Question 20: Is an ICD for the Payload interface to the autopilot available?

Answer 20: No, an ICD does not yet exist for the payload. The offeror is requested to provide the government an ICD to the autopilot along with a detailed description of the communication protocol that is required to communicate with the autopilot as described in section 3.0 of the SOW.

Question 21: In section 3 of attachment 1, it states that the pilot input device should be of control-stick type. Are high level commands also acceptable?

Answer 21: Control-stick steer could be considered high level control. This requirement is intended to answer the question of what if a pilot needs to take control of the vehicle. A pilot must be able to simply control the vehicle with up, down, left, right, forward, backward commands, while looking at the vehicle, without taking his or her eyes off of the vehicle. It should be intuitive control.

Question 22: In section 7 of attachment 1, it says that it must be possible to change communication link frequency. Does this mean Government Furnished Equipment (GFE) radio and antenna or shall this capability be provided by the contractor via for example change of radio modem?

Answer 22: This requirement is to allow the government to change the radio and antenna as needed to suit the required missions and comply with Demonstration RF spectrum requirements, and it is preferred that the offeror provide easy access to the radio. It would be beneficial if the offeror could provide the location of their current radio, the available volume around it, voltage and power available, and the weight range allowed for balance. This also requires that the autopilot not be dependent on a specific radio. It should be able to receive standard communication protocol through either Ethernet or RS232. It is also requested that the offeror provide the location and details of the communication antenna(s).

Question 23: What are the non-controlled frequencies in the area for the demonstration?

Answer 23: Frequencies to be considered are the commercial bands such as 900MHz and 2.4GHz.

Question 24: Is it possible to have the details for the GFE engine?

Answer 24: It is an AR 801R liquid cooled rotary engine produced by UAV Engines L 1imited (UEL). NRL's experience with the engine showed that it would produce about 42 hp at 7000

RPM. At 5000 ft density altitude it is estimated to have about 85% of that power. The website of the manufacturer and more information can be found at:

<http://www.uavenginesltd.co.uk/index.php?id=403>

Question 25: What is the expected deck material (expected to be steel)?

Answer 25: The ship has not been selected. The deck could be made of any of the standard materials such as steel, aluminum or a composite material.

Question 26: Will there be any obstacles on the 25ftx25ft pad?

Answer 26: No, there will not be any obstacles on the 25ft X 25ft pad.

Question 27: Will there be any obstacles surrounding the 25ft x 25ft pad?

Answer 27: It is possible that there could be obstacles on at least one side of the pad.

Question 28: Are there attachment points for a latching mechanism in the landing pad?

Answer 28: It can be assumed that there will be a way to anchor your support equipment to the deck of the ship. Because the ship has not been selected yet, it is impossible to answer this question to completion. It is possible that some type of interface between your support equipment and the deck of the ship will need to be created.

Question 29: Are there known sources of electrical noise under or around the landing pad (such as electric motors, generators) which might interfere with the GCS or flight control system?

Answer 29: The government is unable to answer this question because the ship has not yet been selected. It should be assumed that there will be some electrical equipment in the vicinity of the flight deck. Best industry standards should be implemented to reduce the interference that could arise from such equipment. This could include mil-spec connectors with shielded twisted pair cables.

Question 30: What is the desired interaction between the operator, GCS, and the payload when the UAS is in 'operator approved payload control'?

Answer 30: Please see the updated Autopilot and GCS sections of the Statement of Work.

Question 31: In the communication section, it is required that an antenna for the payload must be mounted on the vehicle. Is it required that the supplied GCS be able to communicate directly with the payload? What is required for the payload antenna in terms of size, ground plane, or mounting points?

Answer 31: It is not required for the GCS to communicate directly with the payload. The payload antenna will be a blade antenna not to exceed 4 inches in length and will require a 3.5inch ground plane. The question about mounting points is vehicle specific. It is desired to have the antenna on the underside of the vehicle in a location that will allow the greatest amount of coverage.

Question 32: What are the anticipated payment terms on this project? Number of days, allowed frequency of progress billings?

Answer 32: These terms are negotiable.

Question 33: When does the government anticipate an award?

Answer 33: After the closing of this solicitation and evaluating all the proposals received. Approx May 2012.

Question 34: Do foreign VTOL UAS businesses that sell their VTOL UAS through a US small business meet the small business set-aside criteria of this solicitation?

Answer 34: Please refer to FAR 52.219-6. Notice of Total Small Business Set-Aside.

As prescribed in [19.508\(c\)](#), insert the following clause:

Notice of Total Small Business Set-Aside (Nov 2011)

(a) *Definition.* “Small business concern,” as used in this clause, means a concern, including its affiliates that is independently owned and operated, not dominant in the field of operation in

which it is bidding on Government contracts, and qualified as a small business under the size standards in this solicitation.

(b) *Applicability.* This clause applies only to--

- (1) Contracts that have been totally set aside or reserved for small business concerns; and
- (2) Orders set aside for small business concerns under multiple-award contracts as described in 8.405-5 and 16.505(b)(2)(i)(F).*

(c) *General.*

(1) Offers are solicited only from small business concerns. Offers received from concerns that are not small business concerns shall be considered nonresponsive and will be rejected.

(2) Any award resulting from this solicitation will be made to a small business concern.

(d) *Agreement.* A small business concern submitting an offer in its own name shall furnish, in performing the contract, only end items manufactured or produced by small business concerns in the United States or its outlying areas. If this procurement is processed under simplified acquisition procedures and the total amount of this contract does not exceed \$25,000, a small business concern may furnish the product of any domestic firm. This paragraph does not apply to construction or service contracts.

(End of Clause)

6. All other terms and conditions remain unchanged.

NEXT GENERATION COUNTER MEASURES FUTURE NAVAL CAPABILITY

1.0 INTRODUCTION:

The Next Generation Counter Measures Future Naval Capability (NGCMFNC) study requires an airborne test vehicle to demonstrate the capabilities of the payload hardware that emerges from the study. Although the platform attributes of the NGCMFNC study is complementary to NAVSEA's Advanced Offboard Electronic Warfare (AOEW) countermeasures program, it is not required that this test vehicle meet all of the requirements as outlined in AOEW's active EW program. For this demonstration a Vertical Takeoff and Land Unmanned Aerial System (VTOL UAS) is required.

2.0 SCOPE:

2.1 Timeline:

The demonstration for the NGCMFNC will occur in the spring of fiscal year 2014. The test vehicle must be delivered to the Naval Research Laboratory no later than 6 months after date of award.

2.2 Operational Environment:

The demonstration is expected to occur in a controlled environment. Although efforts will be made to plan the demonstration around predicted weather where there will be little to no precipitation with light to moderate winds, it should be assumed that the conditions will be rainy (less than or equal to 0.10 inches per hour) with winds and waters up to and including a Sea State 3 condition, as defined by NATO Sea State Numeral Table for the open Ocean North Atlantic (Sustained Winds from 11-16 knots, 1.6 – 4.1 foot wave heights).

It is required that the VTOL vehicles will take off autonomously from a ship, as described below, while at sea. They will then fly to a preconfigured location where the payload will take control of the vehicle. Continuous waypoint updates will be sent to the autopilot from the payload. At least two vehicles operated from the same Ground Control Station will be used for the demonstration. These vehicles will fly within 1 km of naval vessels.

2.3 Shipboard Operations:

The volume of space available for the storage of 3 vehicles and equipment is ship dependant. The maximum volume available will be equivalent to a standard 40 foot conex box with approximate minimum internal dimensions of 39 feet long, 7.5 feet wide and 7.5 feet tall. Depending on the demonstration vessel, these dimensions may change, but the volume will remain unchanged, and the height will not go below 6.5 feet. As an example; the M80 Stiletto will not allow for a 40 foot conex box, but the volume available on the Stiletto is equivalent to the described volume of a 40

foot conex box, with a height of about 6.5 feet. This available volume is spread throughout the hull of the Stiletto. All servicing of and preparation of the vehicles for flight will occur within this volume of space. The Ground Control Station (GCS) will be located in a separate room, or volume of space. The available space for the GCS will be a small table with a minimum area of 2 feet x 4 feet, and the floor volume below the table.

2.3.1 Flight Preparation: For deployment of the vehicle, it will be rolled from its storage/flight preparation space to the flight pad. The flight pad will have a minimum square area of 25 feet x 25 feet. The vehicle must clear the flight pad within a maximum of 5 minutes from the time the engine is started. To minimize the time on the flight deck, the operator shall conduct as many preflight checks as possible before the vehicle is rolled onto the flight deck. The ship may or may not be stationary for these takeoff and landing operations. It should be assumed that the ship will be traveling at 15 knots while the UAS is taking off and landing. All actions will be coordinated with the ships Air Officer. Any support equipment must be removed from the flight deck as soon as the vehicle is in transition to its first waypoint, unless it will be followed immediately by another vehicle, as directed by the Air Officer.

2.3.2 Vehicle Landing: When the vehicle returns for landing it will be commanded to a predetermined flight waypoint, electronically tethered to the commanding ship, or enter into a predetermined flight profile, to await the land command from the Air Officer. Once the Air Officer grants approval for landing the vehicle, it may be commanded to fly over the flight pad and enter into its landing sequence. The vehicle must have a positive latching device that connects the vehicle to the ship, to keep it from moving or sliding, once it lands. If required, hardware may be placed on the flight pad prior to landing the vehicle to aid in this latching capability. Once the vehicle has landed and its engine has been powered down, the vehicle and any supporting hardware should be removed from the flight deck as soon as possible, unless the support equipment is needed for another recovery, as directed by the Air Officer.

Take off and landings must be fully autonomous, with the option of piloting the vehicle if necessary.

3.0 Autopilot:

The autopilot must be capable of safely controlling the vehicle at all times. It must be able to receive commands from the payload, through an Ethernet (objective) or serial (threshold) communication interface. These commands from the payload will allow it to have autonomous control of the vehicle. The GCS operator must maintain capability, at all times, to manually override the use of the autonomous payload control. When this occurs the autopilot should return to standard operational control with its own internal navigation and control. Also, when the GCS operator overrides the autonomous payload control, the vehicle must make

a smooth transition between the two modes of operation. For example; the vehicle could put itself into a level hover, or a preprogrammed default waypoint could be set up to make this transition, or a new waypoint could be sent to the autopilot by the GCS operator where the autopilot calculates the flight path required to smoothly transition to this waypoint.

The autopilot must be able to receive the commands from the payload, evaluate them, calculate a flight profile to meet the command and then confirm that the commands do not require the vehicle to exceed its flight envelope capabilities. It would then execute the commands as received. If the required flight profile exceeds the flight envelope capabilities of the vehicle the autopilot shall ignore the command and send an alert to the GCS operator that clearly informs them of the vehicle's inability to meet the payload commands, with a description of the issue.

Continuous waypoint updates will be sent to the autopilot from the payload. The information provided to the autopilot from the payload will be either 1. latitude, longitude, altitude and vehicle heading or 2. course over ground, speed over ground, altitude and vehicle heading (which way the nose should point). The autopilot shall be capable of receiving both of these modes of operation. The contractor shall provide a detailed description of the communication protocol that is required to communicate with the autopilot allowing the payload to send the continuous waypoint updates to the autopilot as described above. The payload will be configured to communicate with the autopilot; this requires that the contractor provide the government with an ICD for the Autopilot.

It is envisioned that the vehicle will have 4 modes of operation:

1. Internal navigational control for operations where the payload is locked out and unable to take control of the vehicle. This would occur during take-off and landing modes of operation and during GCS manual control. The GCS operator will put the vehicle into this mode if he or she desires to manually override the autonomous payload control. It is also in this mode where joystick control can be activated. Telemetry data is still being transmitted to the payload.
2. Payload control through latitude, longitudinal, altitude and heading commands sent to the autopilot from the payload. Flight telemetry data is transmitted from the autopilot to the payload.
3. Payload control through course over ground, speed over ground, altitude and vehicle heading commands sent to the autopilot from the payload. Telemetry data is transmitted from the autopilot to the payload.
4. Payload control through GCS operator. This mode incorporates either mode 2 or mode 3, but the autopilot requires operator approval before accepting commands from the payload. See section 4.0 Ground Control Station (GCS) for further information. Telemetry data is transmitted from the autopilot to the payload.

The autopilot shall provide telemetry data to the payload through the Ethernet or serial interface at a minimum data rate of 20 Hz.

The autopilot should be capable of controlling the vehicle heading as well as its flight trajectory. For example; it may be necessary to fly the vehicle sideways, or even backwards while maintaining the virtual tether with the moving ship depending on the flight vector, wind vector and the heading command.

The autopilot must be capable of fully autonomous takeoff and landings; however it is required to have the capability for a pilot with limited training to control the vehicle. Any pilot controls should be control-stick steer type of control. This requirement is intended to answer the question of what if a pilot needs to take control of the vehicle. A pilot must be able to simply control the vehicle with up, down, left, right, forward, backward commands, while looking at the vehicle, without taking his or her eyes off of the vehicle. It should be intuitive control. If the pilot lets go of the controls the vehicle will maintain its current location in a straight and level hover.

The autopilot must be capable of communicating with the GCS through two separate redundant communication links. Although not required, it is desirable to have extra bandwidth in the GCS link to allow additional information to be transmitted on the same communication link.

It is desirable to have the autopilot easily removable from its mounting hardware to allow for inspection and environmental protection.

Even with a detailed description of the communication protocol, and the ICD for the autopilot, the government recognizes that limited contractor support may still be necessary for payload integration. Because of this, the offeror shall provide a cost for payload integration support on a per man-day basis. It is assumed that this support will be provided through email and telephone communications.

4.0 Ground Control Station (GCS):

The GCS should occupy as little space as possible, while still maintaining adequate monitoring and control of the vehicles. The GCS should be capable of controlling multiple vehicles, in the air, at the same time. The configuration of the GCS should allow for one person to monitor the health status of at least 3 flying vehicles at the same time. When the payload issues a command to the autopilot, a notice must be displayed on the GCS to alert the operator that the vehicle is changing its position, or orientation. The GCS must have an option where the operator can choose to allow the payload to control the vehicle autonomously or require GCS operator approval before the command is executed. During mode 4 where operator approval is required the payload will send a command to the autopilot, this command will be sent to the GCS for operator approval before it can be acted upon by the autopilot. The GCS should visually show what commanded location and flight profile is being

proposed by the payload and allow the GCS operator a one click motion to accept, or reject, the proposed action. If the GCS operator accepts the proposed action the autopilot executes the command. If the GCS operator rejects the proposed action the autopilot ignores the new command and maintains current vehicle status.

5.0 Payload Requirements:

- Weight: 90 lb (threshold)
 - 30 pound additional internal payload capacity
 - Mounting possibilities:
 - 2 pods at 30 pounds each (threshold), 40 pounds each (objective)
 - 1 belly pod at 60 pound (threshold), 80 pound (objective)
- Power Required:
 - 1kW minimum, regulated at 28VDC +/- 10% dedicated for payload
 - on/off control via a TTL signal capability is preferred
- Payload Size:
 - 10 inch diameter pod with a maximum length of 5 feet
- Payload Mounting: Payload has not yet been finalized. Some of the considered options are:
 - 2 pods externally mounted on the sides of the vehicle
 - Single pod mounted on the belly of the vehicle
- Payload Ground Clearance:
 - The vehicle must allow for a ground clearance sufficient enough for a belly pod that extends a minimum of 12 inches from the belly of the aircraft in addition to the clearance that will be necessary for landing gear deflections during landing operations.

6.0 Vehicle Requirements:

- Must be capable of traveling up to 30 knots into a Sea State 3 (11-16 knot) wind condition. This would require operation, including sideways flight, in winds as high as 46 (30+16) knots. Higher wind capability is preferred.
- Should be capable of heading control to point the nose in any direction, independent of flight vector, while maintaining electronic tether (continuous waypoint update) as defined above, in paragraph 3 of the Autopilot section.
- Vehicle must be stable in hover, slow speed and high speed flight
- Should have fuselage side and belly payload mount capability
 - Multiple locations for mounting payloads are preferred, but not required, to allow for varying payloads, e.g., rotor head mount
- Aircraft and its support equipment should be maneuverable by a maximum of 2 people
 - If additional equipment is required for maneuvering the vehicle, it should be easily installed and removed to allow for quick placement and removal of vehicle from the flight pad
- Vehicle should be constructed of materials and hardware that will not corrode with salt water spray, or that have been treated to protect against corrosion, according to MIL-STD-7179A

- It is desired that the engines run on heavy fuel (JP5, JP8). This is not a requirement for this demonstration, but it will be an advantage to the proposing company during the selection process.
- Altitude requirement:
 - 5000 ft MSL fully loaded hover threshold, higher altitude capability is preferred
 - Capable of continuous operation (hover) at a 100 feet MSL threshold with an objective of 50 feet.
- Must have at least 4 hours of endurance while fully loaded at 5000 ft Mean Sea Level (MSL) on a standard day (threshold) ; with a goal of 6 hour, or better, endurance(objective)
- Vehicle should be capable of being serviced to return it to operational status within 2 hours after landing

7.0 Communication

- Vehicle should have a communication range of 5 nm with zero altitude difference between receivers at 100 ft AGL altitude
- Vehicle must be capable of supporting a change of communication frequencies which would require radio and antenna changes.
- Robust redundant dual frequency capability is required for command and control communication
- For the Demonstration, non-controlled frequencies must be used; the commercial bands of 900MHz or 2.4GHz are examples of possible frequencies.
- Payload must communicate with the onboard autopilot via hardwired Ethernet or serial connection
- Payload will communicate with ship based ground control via payload radio and antenna that must be mounted on the vehicle
- Antenna placement and coordination must allow for full communication, independent of vehicle orientation with respect to the ship based receivers.

8.0 TRAINING:

The contractor shall provide operational system training. Training description must be included in the proposal and shall include as separate costs, required days and per person cost, for a team of 6 trainees. Training shall occur no later than 1 Month after delivery of the first system at a date and location designated by the Government. In the case of unsuitable weather or other contingency that prevents training to be conducted within the 1 month period after delivery, training may be re-scheduled to occur within the following 30 day period.

9.0 OPTIONS:

The Government may require Contractor operation of the UASs prior to and /or during the demonstration. The contractor shall provide a description of weekly costs for

vehicle operations and travel expenses to be incurred by the contractor. For planning purposes the contractor can assume that testing will occur at Dam Neck Virginia.

10.0 DELIVERABLES

10.1 Reports-

- i. 6 copies of Training Documentation
 - a. The contractor shall furnish all documentation necessary for completing flight and maintenance training. Documentation must be delivered to Technical Manager at time of training, or upon delivery of the second vehicle, whichever comes first.
- ii. 1 copy of Operation and Maintenance Manuals per vehicle delivered
 - a. The contractor shall furnish one copy of operation and maintenance manuals per vehicle delivered. These manuals shall be delivered to the Technical Manager with the delivery of each vehicle.
- iii. 3 copies of Flight Safety checklists
 - a. The contractor shall furnish all flight safety and flight preparation checklists for the vehicle and ground control station. These checklists shall be delivered to the Technical Manager at the same time as the delivery of the first vehicle.
- iv. 1 copy of Documentation for detailed autopilot communication protocol
 - a. The contractor shall provide a detailed description of the communication protocol required to communicate with the autopilot and the autopilot's ICD as described in section 3.0 Autopilot of the SOW. This protocol shall be delivered to the TM 2 months after award of contract, on CD or DVD.
- v. 1 copy of Spare parts list
 - a. The contractor shall provide a list of parts that are commonly replaced during maintenance schedules and those parts that have a higher probability of failure during normal use. This list shall be delivered on a Compact Disk or DVD, 2 months after award of contract.
- vi. 1 copy of detailed communication radio location
 - a. Contractor shall provide the location of their current radio, the available volume around it, voltage and power available to the radio, and weight range allowance, to account for weight and balance. This shall be delivered to the Technical Manager 2 months after award of contract, on CD or DVD.

10.2 Software-

- i. Flight simulator Interface Control Document (ICD) to enable modification of flight plan by "customer provided" software.
 - a. Flight simulator Interface Control Document (ICD) to enable modification of flight plan by "customer provided" software. ICD shall

be delivered to the Technical Manager on CD or DVD 2 months after award of contract.

- ii. Flight Simulator to aid in the simulation of the autopilot receiving commands from the payload.
 - a. The contractor shall provide a flight simulator. This flight simulator must be capable of receiving commands to be able to simulate the waypoint commands from the payload. This software shall be delivered to the Technical Manager 2 months after award of contract, on CD or DVD.
- iii. 3 Dimensional CAD drawings of vehicle
 - a. The contractor shall provide 3 dimensional CAD drawings, in SolidWorks format, to the Technical Manager 2 months after award of contract. If SolidWorks is not possible it shall be delivered in .STEP or .IGES surface file formats. They shall be delivered to the Technical Manager on a Compact Disk or DVD. 3D Drawings must include:
 - i. Top Level systems locations
 - ii. Detailed payload bay
 - iii. Detailed payload mounting locations and hardware

10.3 Hardware-

The Government requires delivery of at least two, with an option for a third, VTOL UASs and one GCS with all required support hardware needed to complete the demonstration as outlined above, This delivery should include all hardware that is necessary to operate the vehicles and complete the demonstration without contractor support. All systems are different, so an exhaustive list of required hardware is not feasible. Each offeror knows their system. If something is required to operate their system; that item should be included in the proposal.

- i. Unit one shall be flight tested and delivered to NRL, along with the GCS and supporting hardware, no later than 6 months after date of award.
- ii. Unit two shall be flight tested and delivered to NRL no later than 3 months after delivery of the first unit, along with any required supporting hardware.
- iii. Unit three, and supporting hardware, shall be flight tested and delivered to NRL no later than 6 months after delivery of the first unit."

11.0 GOVERNMENT FURNISHED EQUIPMENT/DATA:

The following Government property will be furnished to the contractor, upon request,

for use in performing the contract by implementing them into the delivered vehicles.

1. Three functional 42 hp UEL, water cooled, heavy fuel rotary engines and available transmission parts
2. One engine core
3. Details on engines will be provided upon request

knots into a 16 knot wind, resulting in a net 46 knot sideways flight								
Conditions	NA	NM	LC	DV	DM	GFE	Y/N	Brief description/or refer to paragraph(s)
2 person portable								
Salt spray corrosion resistant								
Fuel requirement (JP5, JP8)								
*Capable of 5000 ft MSL; fully loaded								
*50 ft to 100 ft operating altitudes over water								
*4 hours of endurance or greater at 5000ft MSL on standard day, with full payload								
2 hour standard maintenance limit between flights								
5 nm communication at 100 ft altitude.								
*Dual frequency redundant comms								
*Capable of receiving GFE radios and antennas								
*System operation and maintenance training available – Define training and time required								
GCS communication bandwidth allows for extra information to be transmitted								
*The vehicle must allow for a ground clearance sufficient enough								

CONTRACT DATA REQUIREMENTS LIST

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A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY: TDP _____ TM _____ OTHER _____
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D. SYSTEM/ITEM	E. CONTRACT/PR NO. 57-1101-11	F. CONTRACTOR
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1. DATA ITEM NO. 001	2. TITLE OF DATA ITEM Training Documentation	3. SUBTITLE
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4. AUTHORITY (Data Acquisition Document No.) N/A	5. CONTRACT REFERENCE Deliverables - Reports	6. REQUIRING OFFICE NRL Code 7140
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7. DD 250 REQ NO	9. DIST STATEMENT REQUIRED	10. FREQUENCY ONE/R	12. DATE OF FIRST SUBMISSION See Block16	14. DISTRIBUTION		
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8. APP CODE N/A	11. AS OF DATE N/A	13. DATE OF SUBSEQUENT SUBMISSION N/A	a. ADDRESSEE	b. COPIES		
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16. REMARKS The contractor shall furnish all documentation necessary for completing flight and maintenance training. Documentation must be delivered to Technical Manager at time of training, or upon delivery of the second vehicle, whichever comes first.	TM	0	6	0
15. TOTAL → 0 6 0				

17. PRICE GROUP
18. ESTIMATED TOTAL PRICE

1. DATA ITEM NO. 002	2. TITLE OF DATA ITEM All Manuals	3. SUBTITLE
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4. AUTHORITY (Data Acquisition Document No.) N/A	5. CONTRACT REFERENCE Deliverables - Reports	6. REQUIRING OFFICE NRL Code 7140
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7. DD 250 REQ NO	9. DIST STATEMENT REQUIRED	10. FREQUENCY ONE/R	12. DATE OF FIRST SUBMISSION See Block16	14. DISTRIBUTION		
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8. APP CODE N/A	11. AS OF DATE N/A	13. DATE OF SUBSEQUENT SUBMISSION N/A	a. ADDRESSEE	b. COPIES		
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16. REMARKS The contractor shall furnish one copy of operation and maintenance manuals per vehicle delivered. These manuals shall be delivered to the Technical Manager with the delivery of each vehicle.	TM (See Block 16)	0	1	0
15. TOTAL → 0 1 0				

17. PRICE GROUP
18. ESTIMATED TOTAL PRICE

1. DATA ITEM NO. 003	2. TITLE OF DATA ITEM Flight Safety Checklists	3. SUBTITLE
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4. AUTHORITY (Data Acquisition Document No.) N/A	5. CONTRACT REFERENCE Deliverables - Reports	6. REQUIRING OFFICE NRL Code 7140
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7. DD 250 REQ NO	9. DIST STATEMENT REQUIRED	10. FREQUENCY ONE/R	12. DATE OF FIRST SUBMISSION See Block16	14. DISTRIBUTION		
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8. APP CODE N/A	11. AS OF DATE N/A	13. DATE OF SUBSEQUENT SUBMISSION N/A	a. ADDRESSEE	b. COPIES		
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16. REMARKS The contractor shall furnish all flight safety and flight preparation checklists for the vehicle and ground control station. These checklists shall be delivered to the Technical Manager at the same time as the delivery of the first vehicle.	TM	0	3	0
15. TOTAL → 0 3 0				

17. PRICE GROUP
18. ESTIMATED TOTAL PRICE

1. DATA ITEM NO. 004	2. TITLE OF DATA ITEM Flight Simulator Interface Control Document	3. SUBTITLE
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4. AUTHORITY (Data Acquisition Document No.) N/A	5. CONTRACT REFERENCE Deliverables - Software	6. REQUIRING OFFICE NRL Code 7140
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7. DD 250 REQ NO	9. DIST STATEMENT REQUIRED	10. FREQUENCY ONE/R	12. DATE OF FIRST SUBMISSION See Block16	14. DISTRIBUTION		
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8. APP CODE N/A	11. AS OF DATE N/A	13. DATE OF SUBSEQUENT SUBMISSION N/A	a. ADDRESSEE	b. COPIES		
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16. REMARKS Flight simulator Interface Control Document (ICD) to enable modification of flight plan by "customer provided" software. ICD shall be delivered to the Technical Manager on CD or DVD 2 months after award of contract.	TM	0	1	0
15. TOTAL → 0 1 0				

17. PRICE GROUP
18. ESTIMATED TOTAL PRICE

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
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A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY: TDP _____ TM _____ OTHER _____	
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D. SYSTEM/ITEM	E. CONTRACT/PR NO. 57-1101-11	F. CONTRACTOR
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1. DATA ITEM NO. 005	2. TITLE OF DATA ITEM Flight Simulator	3. SUBTITLE
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4. AUTHORITY (Data Acquisition Document No.) N/A	5. CONTRACT REFERENCE SOW 10.2 Software -Deliverables	6. REQUIRING OFFICE NRL Code 7140
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7. DD 250 REQ NO	9. DIST STATEMENT REQUIRED N/A	10. FREQUENCY ONE/R	12. DATE OF FIRST SUBMISSION See Block16	14. DISTRIBUTION			
8. APP CODE N/A		11. AS OF DATE N/A	13. DATE OF SUBSEQUENT SUBMISSION N/A				a. ADDRESSEE
16. REMARKS The contractor shall provide a flight simulator. This flight simulator must be capable of receiving commands to be able to simulate the waypoint commands from the payload. This software shall be delivered to the TM 2 months after award of contract, on CD or DVD.				TM	0	1	0
				15. TOTAL →			0

17. PRICE GROUP
18. ESTIMATED TOTAL PRICE

1. DATA ITEM NO. 006	2. TITLE OF DATA ITEM 3D CAD Drawings	3. SUBTITLE
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4. AUTHORITY (Data Acquisition Document No.) N/A	5. CONTRACT REFERENCE SOW 10.2 Software -Deliverables	6. REQUIRING OFFICE NRL Code 7140
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7. DD 250 REQ NO	9. DIST STATEMENT REQUIRED N/A	10. FREQUENCY ONE/R	12. DATE OF FIRST SUBMISSION See Block16	14. DISTRIBUTION			
8. APP CODE N/A		11. AS OF DATE N/A	13. DATE OF SUBSEQUENT SUBMISSION N/A				a. ADDRESSEE
16. REMARKS The contractor shall provide 3 dimensional CAD drawings in SolidWorks format. If SolidWorks is not possible it shall be delivered in .STEP or .IGES surface file formats. They shall be delivered on a Compact Disk or DVD, 2 months after award of contract.				TM	0	1	0
				15. TOTAL →			0

17. PRICE GROUP
18. ESTIMATED TOTAL PRICE

1. DATA ITEM NO. 006	2. TITLE OF DATA ITEM 3D CAD Drawings CONTINUED	3. SUBTITLE
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4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE SOW 10.2 Software -Deliverables	6. REQUIRING OFFICE
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7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION			
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION				a. ADDRESSEE
16. REMARKS 3D Drawings must include: Top Level systems locations, detailed payload bay, and detailed payload mounting locations and hardware. This software shall be delivered to the Technical Manager 2 months after award of contract, on CD or DVD.				TM	0	1	0
				15. TOTAL →			0

17. PRICE GROUP
18. ESTIMATED TOTAL PRICE

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE
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4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
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7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION			
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION				a. ADDRESSEE
16. REMARKS				TM	0	0	0
				15. TOTAL →			0

17. PRICE GROUP
18. ESTIMATED TOTAL PRICE

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
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A. CONTRACT LINE ITEM NO.	B. EXHIBIT	C. CATEGORY: TDP _____ TM _____ OTHER _____
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D. SYSTEM/ITEM	E. CONTRACT/PR NO. 57-1101-11	F. CONTRACTOR
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1. DATA ITEM NO. 007	2. TITLE OF DATA ITEM Detailed Autopilot Communication Protocol and ICD	3. SUBTITLE
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4. AUTHORITY (Data Acquisition Document No.) N/A	5. CONTRACT REFERENCE Deliverables - Reports	6. REQUIRING OFFICE NRL Code 7140
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7. DD 250 REQ NO	9. DIST STATEMENT REQUIRED N/A	10. FREQUENCY ONE/R	12. DATE OF FIRST SUBMISSION See Block 16	14. DISTRIBUTION			
8. APP CODE N/A		11. AS OF DATE N/A	13. DATE OF SUBSEQUENT SUBMISSION N/A	a. ADDRESSEE	b. COPIES		
					Draft	Final	
						Reg	Repro

16. REMARKS The contractor shall provide a detailed description of the communication protocol required to communicate with the autopilot and it's ICD as described in 3.0 Autopilot of the SOW. This info shall be delivered to the TM 2 months after award of contract, on CD or DVD.	TM	0	1	0
	15. TOTAL	0	1	0

1. DATA ITEM NO. 008	2. TITLE OF DATA ITEM Spare Parts List (option)	3. SUBTITLE
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4. AUTHORITY (Data Acquisition Document No.) N/A	5. CONTRACT REFERENCE Deliverables - Reports	6. REQUIRING OFFICE NRL Code 7140
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7. DD 250 REQ NO	9. DIST STATEMENT REQUIRED N/A	10. FREQUENCY ONE/R	12. DATE OF FIRST SUBMISSION See Block 16	14. DISTRIBUTION			
8. APP CODE N/A		11. AS OF DATE N/A	13. DATE OF SUBSEQUENT SUBMISSION N/A	a. ADDRESSEE	b. COPIES		
					Draft	Final	
						Reg	Repro

16. REMARKS The contractor shall provide a list of parts that are commonly replaced during maintenance schedules and those parts that have a higher probability of failure during normal use. This list shall be delivered on a Compact Disk or DVD. 2 months after award of contract.	TM	0	1	0
	15. TOTAL	0	1	0

1. DATA ITEM NO. 009	2. TITLE OF DATA ITEM Detailed communication radio & antenna(s) location	3. SUBTITLE
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4. AUTHORITY (Data Acquisition Document No.) N/A	5. CONTRACT REFERENCE Deliverables - Reports	6. REQUIRING OFFICE NRL Cod 7140
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7. DD 250 REQ NO	9. DIST STATEMENT REQUIRED N/A	10. FREQUENCY ONE/R	12. DATE OF FIRST SUBMISSION See Block 16	14. DISTRIBUTION			
8. APP CODE N/A		11. AS OF DATE N/A	13. DATE OF SUBSEQUENT SUBMISSION N/A	a. ADDRESSEE	b. COPIES		
					Draft	Final	
						Reg	Repro

16. REMARKS Contractor shall provide the location of their current radio, the available volume around it, voltage and power available to the radio, and weight range allowance. This shall be delivered to the Technical Manager 2 months after award of contract, on CD or DVD.	TM	0	1	0
	15. TOTAL	0	1	0

1. DATA ITEM NO.	2. TITLE OF DATA ITEM	3. SUBTITLE
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4. AUTHORITY (Data Acquisition Document No.)	5. CONTRACT REFERENCE	6. REQUIRING OFFICE
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7. DD 250 REQ	9. DIST STATEMENT REQUIRED	10. FREQUENCY	12. DATE OF FIRST SUBMISSION	14. DISTRIBUTION			
8. APP CODE		11. AS OF DATE	13. DATE OF SUBSEQUENT SUBMISSION	a. ADDRESSEE	b. COPIES		
					Draft	Final	
						Reg	Repro

16. REMARKS	TM	0	0	0
	15. TOTAL	0	0	0

G. PREPARED BY	H. DATE	I. APPROVED BY	J. DATE
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17. PRICE GROUP
18. ESTIMATED TOTAL PRICE

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