

Amendment 0001
Solicitation Number ONRBAA11-016
“Long Endurance Undersea Vehicle Propulsion”

The purpose of Amendment 0001 is to amend the BAA and respond to questions submitted prior to 13 APR 2011. Tables 1 & 2 contained within BAA 11-106 have been revised to reflect updated information based on questions received and are contained within the question and answer section below. Questions received after that 13 APR 2011 and before the deadline for submissions of questions will be addressed in a subsequent amendment.

BAA 11-016 is hereby amended as follows:

1. Questions and Answers are provided as follows:

1. Question:

What is the nominal power level for the stored energy metrics (kWh) given in Table 1?

Answer:

Refer to Appendix A, pages 29-30 of BAA 11-016. The nominal power level can be determined from the data provided within Appendix A.

2. Question:

Should the nominal power density for the objective metric in Table 1 become 17.2 W/L (68 kWh/132 L/30 hrs)?

Answer: Yes; updated table below

	Threshold	Objective
Nominal Power Density (Watts/liter)	10.6	17.2
Energy Section Length	76.2 cm (30’')	76.2 cm (30’')
Energy Volume (liter) 47.0 cm (18.5’’) (ID) x 76.2 cm (30’')	132	132
Energy Mass (kg) w/o hull & bulkhead	132 (neutrally buoyant)	132 (neutrally buoyant)

Energy (kWh) This value includes an additional 10% energy for reserve; this reserve is above and beyond the energy required to perform the Power Profile defined in Appendix A.	42	68
Duration (hrs)	≥30	≥30

Table 1. Threshold and Objective Metrics

3. Question:

Should the system energy density listed in Table 2 range from 300 to 515 Wh/L, given the total energy stored ranges from 42 to 68 kW-hr?

Answer:

System Energy Density listed in Table 2 should be 318 to 515 Wh/l. Update table below.

Specification	Metric
Platform Diameter Size	53.3 cm (21'')
Energy Density	318-515 Wh/liter, neutrally buoyant (calculation based on 18.5'' diameter)
Endurance	≥ 30 hours
Start/Stop Cycles	3-5
Refuelability	Yes, without breaking the hull ¹
Scalable	Yes, up to 91.4 cm (36'')
Open vs. Closed Cycle	Closed ²
Operating Depth	152.4 M (500') (depth independent desirable and assume operation at depth). Proposers must note any depth restrictions inherent in their proposal
Power Profile	See Figures 1 and 2
Peak Power	See Figures 1 and 2
Orientation: Roll, Pitch	± 45 Degrees
Refueling Turn-around Time	2 hour threshold/ 1 hour objective
Maintenance Specifications	Corrective maintenance tasks: < 5 hours threshold; < 2 hrs objective. Depot level maintenance: > 180 days or >300 hours operating hours threshold; > 360 days or > 600 operating hours objective

Safety	See Section 11, Other Information
Key Interfaces	24-48VDC (bus voltage); conduit for vehicle cable pass-through; health/remaining energy monitor. Systems need to provide conversion to electrical power on demand at the bus voltage.
<ol style="list-style-type: none"> 1. Refueling may be accomplished via panels or ports installed in the UUV hull. However, refueling solutions that involve sectioning or disassembly of the UUV will not be considered. 2. Open systems will be considered. For both closed and open systems, proposers must describe all observables, emissions and signatures of the system. Neutral buoyancy must be maintained and effluence is prohibited during peak power operations. 	

4. Question:

What is the g loading requirement (not noted in vibration standards)?

Answer:

Refer to Table 3 Environmental Metrics, page 8 of BAA 11-016. The relevant specifications for this program are contained in the MIL-STD-1366E guidance.

5. Question:

What is the rate of roll and pitch?

Answer:

The rate of roll and pitch is beyond the scope of BAA 11-016.

6. Question:

Can welding to the ONR provided hull be done as long as we can document the strength and integrity of design?

Answer:

Yes, welding to the ONR provided hull is an allowed procedure as long as strength and integrity of design are documented.

7. Question:

What are the communications standards (e.g. RS-485, etc.)?

Answer:

Developers can propose any suitable, non-proprietary commercial or military communication standards.

8. Question:

What are the requirements for electrical connectors?

Answer:

Internal connectors shall incorporate positive locking features to prevent loosening during shipment and usage aboard ship. Pre-manufactured commercial off-the-shelf (COTS) cables (and associated connectors) shall be allowed, however, where a press-fit only connector is provided (e.g., USB) an external mechanism to retain the connector in the mated position shall be provided.

All vehicle connectors shall use unique mechanical keying to prevent incorrect cable connections, shall use a stainless steel body, shall utilize gold-plated pins and sockets, and shall provide continuation of the overall cable shield to the pressure vessels. Vehicle connectors used to penetrate pressure vessels/air-tight spaces shall be hermetically sealed.

9. Question:

Phase I Base Objective, bullet one states "System reliability should be demonstrated by conducting several starts/stops without refueling." We request a detailed definition of "starts/stops". Is this a cycle while the UUV is in the field and going into a standby mode where the fuel cell is still active powering any hotel loads? Is it a cycle prior to deployment where the system is completely shut-down including the fuel cell but the system is fueled?

Answer:

Start/stop cycles are defined by complete shut-down, followed by restart from the state of the system prior to initial start-up (system at time = zero).

10. Question:

Phase I Deliverables and Table 2 states "Neutral buoyancy must be maintained and effluence is prohibited during peak power operations." This statement prompts 3 questions:

a. Is this a desired or mandatory metric? Table 2 lists neutral buoyancy as a "Desired Metrics", however Phase I Deliverables requires a table describing all observables, emissions, and signatures of the system and states "Neutral buoyancy must be maintained and effluence is prohibited during peak power operations."

b. Does the statement "Neutral buoyancy must be maintained and effluence is prohibited during peak power operations." imply that both neutral buoyancy and no effluence are required ONLY

during peak operation and all other operational conditions are suitable for changing buoyancy and effluence?

c. If there are effluence and buoyancy changes, will those changes be accommodated at the system level or does the energy section have to make provisions for these variations?

Answer:

- a. Neutral buoyancy is a requirement.
- b. Neutral buoyancy is required at all times. Effluence is not permitted during peak operation. (Refer to Table 2, note 2, page 7 of BAA 11-016)
- c. The energy section must make provisions for any buoyancy and effluence changes.

11. Question:

Phase I Base requires a "TRL 4 system level demonstration" that meets "at a minimum the Table 1 threshold metrics". Included in the Table 1 Threshold matrix are, among other metrics, energy section volume and mass of 132 L and kg, respectively. Does the "TRL 4 system level demonstration" require the demonstration system be packaged into 132 L volume and weigh 132 kg, or are those metrics demonstrable through design of the Phase 2 system?

Answer:

The TRL 4 demonstration is expected to be at a minimum a breadboard or brassboard demonstration. The weight and volume metrics should at a minimum be demonstrated in the 3D solid model deliverable.

12. Question:

What is the maximum duration between fueling and deployment? What is the maximum fueled/unfueled storage duration?

Answer:

The developer should identify any restrictions the technology has on stand-by waiting in a fueled condition. The system should be capable of at least six months storage in the unfueled condition.

13. Question:

If the proposer were to respond to the request in Table 2 of BAA 11-016 for a description of "all observables, emissions and signatures of the system," would limits to the frequency range for estimates of underwater self and radiated noise of 10 Hertz to 100 KiloHertz for the energy section be acceptable? If not, what frequency range would ONR consider acceptable?

Answer:

A frequency band of interest for radiated noise will not be provided by ONR.

14. Question:

Is a preliminary radiated noise model for the entire 21-inch UUV available to ONR so that a tentative radiated noise allocation for the energy section can be provided to proposers of BAA 11-016?

Answer:

ONR will not provide a preliminary radiated noise model.

15. Question:

I am looking for some direction into the specifications of the energy system; total power deliverable to the system at what rate from the power source, recharge rate or refuel limitations, etc. Is this available and if so may I see those specs?

Answer:

Refer to Tables 1, 2, and 3, Figures 1 and 2, and Appendix A pages 2, 5-8, and 29-30 of BAA 11-016 for the energy systems specifications.

16. Question:

Does ONR have a preferred fuel and/or oxidant source? For instance, is LNG (liquefied natural gas) an applicable fuel or would you prefer a military spec fuel such as JP-5? Are there any disallowed oxygen sources, such as hydrogen peroxide?

Answer:

ONR has no preferred fuel or oxidant sources for BAA 11-016.

17. Question:

Is space available between the ribs of the UUV shell for heat exchangers, pumps, cold plates, etc., since this would be the most effective use of the UUV shell?

Answer:

Yes, there is space available between the ribs of the UUV shell for heat exchangers, pumps, cold plates, etc.

18. Question:

BAA 11-016 Section I paragraph 6.2 Phase II (up to 30 months) states, "A full scale UUV Energy Section hull and interface documentation will be provide as GFE/GFI." Would ONR consider providing the interface documentation during Phase I?

Answer:

GFE/GFI information pertaining to "A full scale UUV Energy Section hull and interface documentation," will be provided to the performers continuing on to the Phase I option of the effort.

19. Question:

BAA 11-016 Section IV, Paragraph 1, states; "Full Proposals shall be mailed to the technical point of contact listed above in Section I.7." Section IV, Paragraph 3. "Address for Submission of Full Proposals" states: "All hard copies of full proposal shall be mailed or hand delivered to the Technical Point of Contact located in Section I.7 above." Does the latter direction supersede the requirements of Paragraph 1's directions?

Answer:

All hard copies of proposals shall be mailed or hand delivered to the Technical Point of Contact stated in Section I.7, page 11 of BAA 11-016.