

Title: **Advanced Power Source** (Battery/Fuel Cell/Renewable Energy)

Operational Requirement:

The requirement for this submission is for a power source primarily for land-based unattended sensors but may have applicability to a marine-based sensor power source requested in a separate submission. Power for unattended sensors is currently provided by batteries, most commonly the BA-5590 Li/SO₂ battery. This battery is rated at 7.2 Ah at 70 degF and 5.6 Ah at -20 degF. With a nominal 200 mA drain in typical use, the battery could provide 28 hours of operation at the minimum temperature. The batteries are reliable and newer versions provide up to 250 Watt-hrs/kg but are unsuitable for providing power for extended periods. Operations for long periods require either the emplacement of many batteries, which may not be possible because of counterdetection or transport capacity of personnel, or frequent battery resupply and disposal, which may not be possible depending on the sensor location. Special Operations Forces require advanced power sources to provide greater power density and/or ease of resupply for extended operations.

- Improvements to a chemical battery-type system would be limited to increased power density.
- A fuel cell-type system could be considered beneficial even if the basic system does not exceed the power density of 250 Watt-hrs/kg if the resupply of fuel or reactants were easier than battery resupply and disposal. Scalable fuel or reactant reservoirs may also improve power density of the system.
- A renewable energy system could be considered beneficial given sufficient power delivery or if coupled with an energy storage system with sufficient power delivery.

Desired Deliverable: Fieldable Prototype

The Advanced Power Source will have the following attributes:

- Interfaces, controls, and protection devices identical to the BA-5590.
- Waterproof at sea level.
- One-man transportable
- Safe to transport and operate

The following capabilities are not required for the prototype but must be attainable:

- Low probability of detection (visibility, noise, radiated heat, discharge)
- Able to meet requirements for transport within submarines.
- Operable under a wide range of climatic conditions.
- Operable when buried.

The following attributes are desired but not required:

- Waterproof and operational at seawater depths to 300ft
- Waterproof for transport to seawater depths to 300ft

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Requesting Activity: Naval Special Warfare Group THREE

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