PRELIMINARY WORKING DRAFT

Note – This working draft is intended to provide a starting point for soliciting industry partner feedback and recommendations to feed the eventual promulgation of a performance specification for the VESON. Once finalized the future performance specification will be part of a competitive solicitation package soliciting proposals for development and procurement of an expendable neutralizer.

20 March 2012

PRELIMINARY WORKING DRAFT

PERFORMANCE SPECIFICATION

FOR

VESON

(Very Shallow Water (VSW) Expendable Standoff Neutralizer)

UNMANNED UNDERWATER VEHICLE

March 2012

DISTRIBUTION STATEMENT A.

Approved for public release;

Distribution is unlimited.

APPROVED: _____ **Date:** _____

Matt Zalesak

Project Manager

PRELIMINARY WORKING DRAFT

Note – This working draft is intended to provide a starting point for soliciting industry partner feedback and recommendations to feed the eventual promulgation of a performance specification for the VESON. Once finalized the future performance specification will be part of a competitive solicitation package soliciting proposals for development and procurement of an expendable neutralizer.

20 March 2012

INTENTIONALLY LEFT BLANK

PRELIMINARY WORKING DRAFT

Note – This working draft is intended to provide a starting point for soliciting industry partner feedback and recommendations to feed the eventual promulgation of a performance specification for the VESON. Once finalized the future performance specification will be part of a competitive solicitation package soliciting proposals for development and procurement of an expendable neutralizer.

20 March 2012

REVISION LOG

Status (Baseline/Revision/ Canceled)	Document Revision	Effective Date	Description

PRELIMINARY WORKING DRAFT

Note – This working draft is intended to provide a starting point for soliciting industry partner feedback and recommendations to feed the eventual promulgation of a performance specification for the VESON. Once finalized the future performance specification will be part of a competitive solicitation package soliciting proposals for development and procurement of an expendable neutralizer.

20 March 2012

INTENTIONALLY LEFT BLANK

PRELIMINARY WORKING DRAFT

Note – This working draft is intended to provide a starting point for soliciting industry partner feedback and recommendations to feed the eventual promulgation of a performance specification for the VESON. Once finalized the future performance specification will be part of a competitive solicitation package soliciting proposals for development and procurement of an expendable neutralizer.

20 March 2012

TABLE OF CONTENTS

1.0 SCOPE 5

1.1 System Overview. 5

2.0 APPLICABLE DOCUMENTS. 6

2.1 General 6

2.1.1 Order of Precedence. 7

3.0 REQUIREMENTS. 7

3.1 Performance/Functionality Characteristics. 7

3.1.1 Navigational Accuracy 7

3.1.2 Neutralization Effectiveness. 8

3.1.3 Neutralization UUV Payload 8

3.1.4 Target Verification. 8

3.1.5 Exercise UUV Data Storage Capacity 8

3.1.6 Exercise UUV Payload. 8

3.1.7 Operational Depth Range. 8

3.1.8 Marker Reacquisition –Identification Depth Range. 8

3.1.9 Range 9

3.1.10 UUV Standoff Range 9

3.1.11 Water Depth Accuracy. 9

3.1.12 Water Altitude Accuracy. 9

3.1.13 Power Sources. 9

3.1.14 Battery Power 9

3.1.14.1 Lithium Battery. 9

3.1.15 Battery Recharge Time. 9

3.1.16 Battery Recharge Cycles. 9

3.1.16.1 Mission Endurance. 9

3.1.17 Battery Discharge 10

3.1.18 Battery State of Charge Display. 10

3.1.19 Open Architecture. 10

3.2 Suitability 10

3.2.1 Obstacle Survivability. 10

3.2.2 Mission Time. 10

PRELIMINARY WORKING DRAFT

Note – This working draft is intended to provide a starting point for soliciting industry partner feedback and recommendations to feed the eventual promulgation of a performance specification for the VESON. Once finalized the future performance specification will be part of a competitive solicitation package soliciting proposals for development and procurement of an expendable neutralizer.

20 March 2012

3.2.3 Pre-Mission Set up Time. 10
3.2.4 Turn Around Time. 11
3.2.5 UUV System Reliability, Availability and Maintainability 11
3.2.5.1 Reliability. 11
3.2.5.2 Availability. 11
3.2.5.3 Maintainability. 11
3.2.6 Human Factors. 11
3.2.6.1 2-Person Portable Vehicles. 12
3.2.6.2 System Operators. 12
3.2.6.3 Cold Weather Clothing. 12
3.2.6.4 Nuclear, Biological, and Chemical Contamination (NBCC). 12
3.3 Operational Parameters 12
3.3.1 Modes of Operation. 12
3.3.1.1 Multiple UUV Operations. 12
3.3.1.2 Sterilize, Scuttle and Self Destruct. 12
3.3.2 Low Visible UUV. 12
3.4 Physical Characteristics 12
3.4.1 UUV Weight. 12
3.4.2 UUV Color. 13
3.4.3 UUV Buoyancy. 13
3.4.4 Shipboard Footprint. 13
3.4.5 Standard Parts. 13
3.4.6 Fuze Design Requirements. 13
3.4.7 Munition Basic Safety and Insensitive Munition Requirements. 13
3.4.8 UUV Handling. 13
3.5 UUV Recovery Visual Aid and Task Completion Alert 13
3.5.1 Nighttime/Darkness. 13
3.5.2 Ease of Use in Darkness. 13
3.5.3 Daylight. 13
3.6 UUV Container 14
3.6.1 UUV Container Size and Weight. 14
3.6.2 Container Design. 14

3.6.3 Material Handling. 14
3.6.4 Marking. 14
3.7 Design Interface 14
3.7.1 Common Operator Interface for Navy-EOD (COIN). 14
3.7.2 Small Craft Interface. 14
3.7.2.1 Launcher System. 14
3.7.2.2 Console Operator Interface. 15
3.8 Command and Control 15
3.8.1 User Console. 15
3.8.1.1 Console Features. 15
3.8.1.2 English/Metric Units. 15
3.8.2 Modes of Navigation. 15
3.8.2.1 Global Positioning System (GPS). 15
3.8.2.2 Ultra-Short Baseline (USBL) Navigation Array. 15
3.8.2.3 Forward Looking Sonar P3I Upgrade Capability. 15
3.8.3 Information Assurance. 16
3.8.3.1 Software Program Protection. 16
3.9 Environmental Conditions 16
3.9.1 Sea State (SS). 16
3.9.2 Vehicle Operating Depth. 16
3.9.2.1 Maximum Water Depth. 16
3.9.2.2 Minimum Water Depth. 16
3.9.3 Current. 16
3.9.4 Salinity. 16
3.9.5 Transportation Altitude. 16
3.9.6 Transportation and Storage Temperature. 16
3.9.7 Operational Temperature. 17
3.9.7.1 Water Temperature. 17
3.9.7.2 Air Temperature. 17
3.9.8 Temperature Shock. 17
3.9.9 Shock and Vibration. 17
3.9.10 Transportation Shock and Vibration. 17

PRELIMINARY WORKING DRAFT

Note – This working draft is intended to provide a starting point for soliciting industry partner feedback and recommendations to feed the eventual promulgation of a performance specification for the VESON. Once finalized the future performance specification will be part of a competitive solicitation package soliciting proposals for development and procurement of an expendable neutralizer.

20 March 2012

3.9.11 Operational Shock and Vibration. 17
3.9.12 Electromagnetic Environments. 17
4.0 VERIFICATION 18
4.1 FIRST ARTICLE INSPECTION 18
4.1.1 First Article Testing (FAT) / Prototype Test & Evaluation (T&E). 18
4.1.2 Production Lot Testing. 18
4.2 ACCEPTANCE TESTING. 18
4.2.1 Responsibility for Test/Inspection. 19
4.2.2 Factory Acceptance Testing (FAT). 19
4.2.3 Production Lot Testing. 19
4.3 Contract Verification Matrix 19
5.0 PACKAGING 23
6.0 NOTES 23
6.1 INTENDED USE 23
6.2 ACQUISITIONS REQUIREMENT 23
6.3 QUALIFICATION 23
6.4 ACRYONYMS and ABBREVIATIONS 23

APPENDIX A VSW EXPENDABLE STAND OFF NEUTRALIZER (VESON) CONOP SUMMARY A-1

PRELIMINARY WORKING DRAFT

Note – This working draft is intended to provide a starting point for soliciting industry partner feedback and recommendations to feed the eventual promulgation of a performance specification for the VESON. Once finalized the future performance specification will be part of a competitive solicitation package soliciting proposals for development and procurement of an expendable neutralizer.

20 March 2012

1.0 SCOPE

This performance specification contains the performance requirements for the VESON (VSW Expendable Standoff Neutralizer) Unmanned Underwater Vehicle (UUV). The VESON (hereafter referred to as the UUV System) shall be capable of performing low visible, very shallow water (VSW) target reacquisition and neutralization missions in support of amphibious landings and EOD MCM operations. Vehicles (UUVs) will maneuver autonomously to a previously placed acoustic transponder (marker) next to a target and detonate at a predetermined range and bearing from the marker. Although the VESON system described in this document describes a re-useable exercise neutralizer and a one-time, expendable explosive neutralizer, it is desired that the end system be one neutralizer UUV platform with the ability to be configured with either an exercise or an explosive payload section.

1.1 System Overview.

Note: The following terms are used throughout this paper.

- VESON System: The VESON will be comprised of five major components or subsystems:
  - Expendable Neutralizer unmanned underwater vehicle intended for one time use
  - Exercise Neutralizer unmanned underwater vehicle intended for multiple uses
  - Launch and Handling System (LHS)
  - Operator Control Console
  - Auxiliary Support Equipment

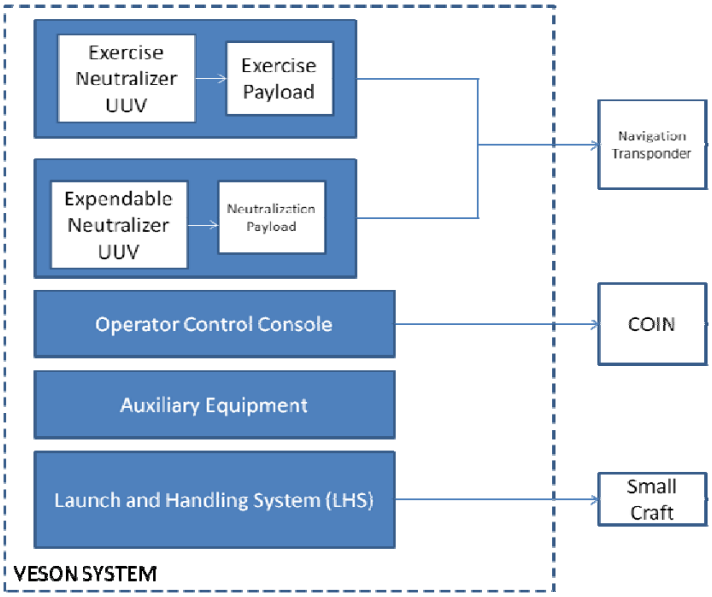


Figure 1. VESON SV-11

All requirements in paragraph 3.0 (including all subparagraphs) are based on the following environmental and threat object criteria unless otherwise stated:

- "Underwater threat objects containing explosives" are referred to in this document as simply "threat objects" (TOs), and include mines and/or UXO targets or simulators in the search area. For initial testing purposes, targets will include glass reinforce plastic and metal encased shapes simulating characteristic threat mines. Bottom test targets will include truncated cone shapes approximately 18" high x 36" diameter at the base, and cylinders approximately 9" diameter x 48" long. Moored test targets will be attached to an anchor with a buoyant sphere approximately 12" in diameter. Underwater objects that are considered to not be a threat object are referred to as NTOs.
- Systems will operate in an area with a Bottom Type A-1 with a uniform gradient and no significant marine growth extending above the bottom. Bottom Type is defined as follows: In an "A-1" Bottom Type, the "A" refers to a Bottom Category, which has a smooth bottom profile, a bottom composition of mud or sand, and where less than or equal to 10% of the Threat Object (TO) case can be buried. The "1" refers to the Clutter Category, which means there are less than 15 Threat Like Object (TLO)s per square nautical mile. More complex bottom categories parallel the descriptions for bottom categories used for MCM planning in the Naval Warfare Publication 3-15 series. Similarly the higher clutter categories used to categorize the number of TLOs in this document parallel the number of non-mine, mine-like bottom objects (NOMBOs) used for clutter category in MCM planning.

2.0 APPLICABLE DOCUMENTS.

2.1 General.

The documents listed in this section are referenced in sections 3, 4, or 5 of this performance specification. While every effort has been made to ensure the list is complete, document users are cautioned that they must meet all specifications requirements of documents cited.

- CNO (N857) Requirements Document for the VESON (VSW Expendable Standoff Neutralizer) dated 3 Jan 2012 – Abbreviated Acquisition Program
- Naval Warfare Publication 3-15 series
- ASTM D3951-95, Standard Practice for Commercial Packaging
- MIL-HDBK-235, Electromagnetic (Radiated) Environment Considerations for Design and Procurement of Electrical and Electronic Equipment, Subsystems and Systems
- MIL-H-46855A, Human Engineering Requirements for Military Systems, Equipments and Facilities
- MIL-STD-1472G, Human Engineering Design Criteria for Military Systems, Equipments and Facilities

- NAVSEAINST 9310.1B of 13 Jun 91
- NAVSEA Technical Manual S9310-AQ-SAF-010, "Batteries, Navy Lithium Safety Program Responsibilities and Procedures" of 19 Aug 04.
- DoD Directive 3222.3, Electromagnetic Environmental Effects (E3) Program
- MIL-STD-461F, Requirements for the control of Electromagnetic Interference Emissions and Susceptibility
- NAVSEA OP3565 Volume 2, Electromagnetic Radiation Hazards (Hazards to Ordnance) MIL-STD-464C, Electromagnetic Environmental Effects Requirements for Systems
- MIL-STD-1316E, Fuze Design, Safety Criteria For
- MIL-STD-1331C, Fuze and Fuze Components, Environmental and Performance Tests For
- MIL-STD-2105D, Hazard Assessment Tests for Non-Nuclear Munitions
- MIL-STD-648D, Specialized Shipping Containers
- MIL-STD-882D, Standard Practice for System Safety
- MIL-STD 1385B, General Requirements for Preclusion of Ordnance Hazards in Electro-magnetic Fields.
- MIL-STD-2073-1E, Standard Practices for Military Packaging.
- MIL-STD-1366E, Interface Standard for Transportability Criteria

2.1.1 Order of Precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. In the event of a conflict between the text of this document and the contract, the contract takes precedence. Nothing in this document, however, supersedes applicable laws and regulations, unless a specific exemption has been obtained.

3.0 REQUIREMENTS.

3.1 Performance/Functionality Characteristics.

3.1.1 Navigational Accuracy. The transit navigational system for deployment from small craft to marker reacquisition will be composed of GPS fixes when the vehicle is on the surface, and dead reckoning with heading sensor and water speed indicator (i.e. propeller turns) while submerged. A USBL homing array will interrogate a prepositioned acoustic transponder (marker) with known range & bearing to allow for the final navigation sequence. Once the UUV has located the transponder it will proceed on a known bearing to the target and detonate at the appropriate range, bearing and altitude. The UUV shall be capable of navigating to within 1 meter RMS (spherical) of the centroid of the target.

3.1.2 Neutralization Effectiveness. Neutralization effectiveness is the probability that the neutralization charge will neutralize a target mine deploying one Neutralizer against that target. Neutralization effectiveness is dependent on successful Reacquisition of the marker, navigation to the target, and Arming and Firing. Successful neutralization includes High Order, Low Order, Disruption of the Firing Train, or rendering the target inoperable.

$$P_{ne} = \frac{\text{Number of successful neutralizations}}{\text{Number of intended neutralizations}}$$

In water depths from 10 to 60 FSW, the UUV System shall be capable of providing a neutralization effectiveness of 0.72 (Threshold) at 0.80% confidence factor in a bottom type A-1.

3.1.3 Neutralization UUV Payload. The expendable neutralizer shall carry a neutralization payload with a TNT equivalent of 28 Pounds C-4. This payload also includes the Safe and Arming Unit (SAU) and firing module for charge initiation. This payload shall be modular and assembled into the UUV during pre-mission checkout. The SAU shall have at least three arming stages prior to final arming to include a hard pin pull during deployment and safe standoff stage to ensure the UUV is at a safe range prior to final arming. The final arming can be accomplished by detection of acoustic marker. Upon detection of marker, final arming and detonation may be based on range, bearing and altitude from marker for bottom and moored targets.

The Government is currently exploring the possibility of providing the SAU, Fuze and Warhead (at Government cost) as GFE to this program. If this action is implemented, full Interface Control Documentation shall be provided to the vendor.

3.1.4 Target Verification. It is desirable that the neutralizer shall provide a means of informing the operator that the neutralizer successfully acquired the programmed acoustic marker commensurate with initiation of the final Safe and Arming and terminal homing sequence (e.g., release of buoyant communication device upon final approach to target).

3.1.5 Exercise UUV Data Storage Capacity. The on-board UUV data storage capacity for the exercise UUV shall be capable of storing all data collected during a 5-hour mission. The minimum data required to be collected is as follows – Time stamped UUV position data (Lat. & Long.) with each of the following: Forward looking Sonar Imagery(if incorporated), Water Depth ,Altitude, Water Temperature, Internal Temperature, Marker ID and Range, Target ID and range , Vehicle Performance Data (i.e., Prop turns, heading, depth, battery usage) and SAU modes.

3.1.6 Exercise UUV Payload. The exercise UUV shall carry a payload with a functional SAU mechanism as well as a data acquisition module. The data recording module shall have the ability to record distance and bearing data to two distinct acoustic transponders. One transponder will be placed at the target marker; the other will be placed on the target for range information at time of detonation.

3.1.7 Operational Depth Range. The UUV shall have the capability to perform reacquisition and neutralization functions in water depths from 10 to 60 FSW.

3.1.8 Marker Reacquisition –Identification Depth Range. The UUV shall have the capability to perform Reacquisition of the acoustic markers while operating in water depths from 0 to 60 FSW. Marker Reacquisition-Identification depth range is defined as the range of depths

that a single UUV can operate in the water column to reacquire and identify markers. An appendix will be included in future version of this document with details of the marker.

3.1.9 Range. The UUV shall have a Mission Range of greater than or equal to 15 nautical miles with no current. Range is defined as the minimum distance that a single UUV must be able to operate on its own power in performance of a mission.

3.1.10 UUV Standoff Range. The UUV shall have a minimum Standoff Range of 5 nm. UUV Standoff Range is defined as the distance between the seaward edge of the UUV objective area and the launch point of the UUV. The UUV shall have the required navigation accuracy to locate, maneuver to, and successfully acquire the objective target area and properly initiate the pre-programmed submerged search for the acoustic marker.

3.1.11 Water Depth Accuracy. The UUV shall have a Water Depth Accuracy of 0.5 m rms. Water Depth Accuracy is the error between the UUV determined depth of the water and the actual depth.

3.1.12 Water Altitude Accuracy. The UUV shall have a Water Altitude Accuracy of 0.5 m rms. Water Altitude Accuracy is the error between the UUV determined height off the bottom and the actual height.

3.1.13 Power Sources. The UUV System shall be capable of using standard foreign and domestic 50 Hz/60 Hz AC power sources.

3.1.14 Battery Power. The battery used to power the UUV may be primary or rechargeable.

3.1.14.1 Lithium Battery. Due to certification and handling logistics and costs, lithium batteries are not the desired option, unless size, weight, volume and energy density attributes make this the only viable option. If Lithium Batteries are used to power any subsystem or component of the UUV System (not including the User Console/laptop computer), they shall be approved for use by the Navy in accordance with NAVSEAINST 9310.1B of 13 Jun 91 and NAVSEA Technical Manual S9310-AQ-SAF-010, “Batteries, Navy Lithium Safety Program Responsibilities and Procedures” of 19 Aug 04. In addition, rechargeable lithium batteries shall be approved for shipment under the provisions of 49 CFR Section 173.185.

3.1.15 Battery Recharge Time. If a rechargeable battery is used, a full recharge from a 90% discharged state shall be accomplished in less than or equal to 5 hours.

3.1.16 Battery Recharge Cycles. If a rechargeable battery is used to power the UUV, the battery shall be rechargeable for a minimum of 200 cycles, after which the battery shall still be capable of meeting the performance requirements of this specification including paragraphs 3.1.16.1 Mission Endurance, 3.7.7.1 Water Temperature, and 3.7.7.2 Air Temperature.

3.1.16.1 Mission Endurance. The Exercise and Expendable UUV shall have a mission endurance of greater than 5 hours. Mission Endurance is defined as the minimum time that a single UUV must be able to operate on its own power in performance of a mission when operating at an average speed of 4kts with no current. This includes mission time as well as pre and post (for Exercise UUV) mission time when the vehicle is not connected to external power.

3.1.17 Battery Discharge. If a rechargeable battery is used, the battery shall have a discharge feature (i.e., prior to shipment) that shall be capable of automatic cutoff when the battery reaches the appropriate safe low level. It shall be possible to rapidly discharge the UUV battery without running the vehicle propulsion system.

3.1.18 Battery State of Charge Display. The UUV System shall accurately display the state of charge of the UUV batteries in the console during pre-mission checkout. If it is necessary to perform a procedure to periodically re-calibrate the display or re-condition batteries to preserve display accuracy, the procedure shall be provided.

3.1.19 Open Architecture. The VESON shall conform to Navy Open Architecture standards, as documented by Chief of Naval Operations (OPNAV) letter 9010, Ser N6N7 / 5U916276 of 23 Dec 05, *Requirement for Open Architecture (OA) Implementation* . An open system is defined as a system that implements sufficient non-proprietary specifications for interfaces, services, and supporting formats to enable properly engineered components to be utilized across a wide range of systems with minimal changes, to interoperate with other components on local and remote systems, and to interact with users in a style that facilitates portability. The attributes of an open system include the following:

- Use of public, consensus-based standards
- Adoption of standard interfaces and protocols to facilitate new or additional systems capabilities for diverse applications
- Adoption of standard services and defined functions
- Use of product types supported by multiple vendors
- Selection of stable vendors with broad customer base and large market share
- Interoperability with minimal integration requirements
- Ease of scalability and upgradeability
- Portability of applications

3.2 Suitability

3.2.1 Obstacle Survivability. The UUV shall have the capability to survive non-explosive obstacles in its path, while operating at a forward speed of 4 knots, by surviving an impact with the obstacle or avoiding the obstacle. The fin material shall be sufficiently resilient to minimize the risk of damage to the fins, fin shafts, and internal fin control mechanics during impact.

3.2.2 Mission Time. Mission Time is defined as the time from load out onto a small craft to the time of detonation.

3.2.3 Pre-Mission Set up Time. The Pre-Mission Set-up Time shall not exceed 1 hour. Pre-Mission Set-up Time is defined as the amount of time required to attain a “mission ready state”, including planning, programming, and uploading the missions and checking out the UUV System.

3.2.4 Turn Around Time. The Turnaround Time for Exercise UUVs shall not exceed 8 hours. Turnaround time is defined as the amount of time between completion of a mission and completion of UUV System preparation, upload for a subsequent mission, and battery charging time.

3.2.5 UUV System Reliability, Availability and Maintainability

3.2.5.1 Reliability. [Key Performance Parameter for expendable unit and Key System Attribute for exercise UUV.] The UUV System shall have a system reliability of 0.90 with a confidence factor of 80%. Reliability is defined as the probability of performance under stated conditions (Mission Reliability (R)) without an operational mission failure (OMF). An OMF prevents the system from completing its mission. Compute as reliability point estimate (R). The time frame for Reliability starts from the time of load out onto a small craft and ends at the time of detonation.

$$\text{Reliability (R)} = \frac{\text{\# of Missions without an OMF}}{\text{Total \# of Missions}}$$

3.2.5.2 *Availability*. [Key Performance Parameter for expendable unit and Key System Attribute for exercise UUV.] The UUV System shall have a system availability of 0.85 at 80% confidence factor. Availability is defined as the number of times the VESON & Ancillary Equipment is available to start a mission divided by the number of times the VESON & Ancillary Equipment is required to start a mission. A failure results from a delay of more than two hours in a mission start. The time frame for Availability starts when the neutralizer is retrieved from ship's storage and ends at the time of load out onto a small craft.

Availability (A_O) =

$$\frac{\text{Number of times the VESON \& Ancillary Equipment is available to start a Mission}}{\text{Number of times the VESON \& Ancillary Equipment is required to start a Mission}}$$

3.2.5.3 Maintainability. The UUV System shall have a Mean Corrective Maintenance Time for Operational Mission Failures (MCMTOMF) of 5 hours. MCMTOMF is the total number clock hours of corrective, on-system, active repair time which is used to restore failed systems to a mission capable status after OMFs occur divided by the total number of OMFs. Corrective maintenance is the Organizational Level Repair Time during which one or more personnel are repairing a UUV system and includes preparation, fault location/isolation, correction, adjustment/calibration, and follow-up checkout time. Corrective Maintenance Time does not include off-board logistic delay times.

$$\text{MCMTOMF} = \frac{\text{\# of hours of repair}}{\text{\# of OMFs}}$$

3.2.6 Human Factors. The vehicle, computer, software, file management, navigation equipment, operator to vehicle communications, shipping case, displays/controls, labels, illumination, tools, launch/recovery equipment, accesses, batteries and battery charger, documentation and all auxiliary equipment shall be designed with good Human Factors Engineering practices and shall be compatible with the operational environment, the intended use, and the users requirements. UUV System preparation including data upload, post mission

data download, data reduction and decision making aids shall be compatible with users requirements and their knowledge, skills and abilities. Personnel will be selected from technical ratings that complement the technical aspects of the mission and system support. The performance of all sub-systems having a user interface shall be assessed with a human user serving their normal role to determine total system performance.

3.2.6.1 2-Person Portable Vehicles. Individual UUV size will remain small such that ideally one, but not more than two, person(s) can easily handle the vehicles for launch of Expendable or Exercise UUVs and recovery of Exercise UUVs.

3.2.6.2 System Operators. The VESON system shall be operable by no more than three individual system operators.

3.2.6.3 Cold Weather Clothing. The design of the UUV System shall provide for personnel wearing cold weather protective clothing to operate the required UUV System controls and switches for final pre-mission preparation and checkout, launch, (recovery of an exercise) UUV from a 11 meter RHIB, including access to mate, demate, and secure all electrical connections on the outside of the UUV.

3.2.6.4 Nuclear, Biological, and Chemical Contamination (NBCC). The design of the UUV System shall provide for personnel wearing NBCC protective gear and clothing to operate the required UUV System controls and switches for final pre-mission preparation and checkout, launch, (recovery of an exercise) UUV from an 11 Meter RHIB.

3.3 Operational Parameters

3.3.1 Modes of Operation.

3.3.1.1 Multiple UUV Operations. The UUV System shall provide for a minimum of 160 vehicles, simultaneously operating in assigned sub-areas within the planned objective area for UUV operations without degrading the capabilities of any of the UUVs. Each USBL system shall be capable of receiving up to 200 distinct acoustic marker identification signals with the ability to track and process two acoustic marker signals simultaneously during a mission.

3.3.1.2 Sterilize, Scuttle and Self Destruct. The SAU shall be capable of rendering the Expendable UUV safe through a sterilize feature after a fault is detected in the SAU or after a loss of power for over 10 seconds is sensed. In addition, the SAU shall cause the UUV to scuttle (flood) the SAU mechanism following the sterilize function. If two failed attempts have been made to prosecute the target, on the third attempt the UUV shall detonate at the closest approach to the target. If the vehicle fails to detonate after 10 seconds, the SAU will initiate the sterilize and scuttle function.

3.3.2 Low Visible UUV. The UUV shall be capable of performing low visible operations during ingress when operating in the VSW region. A low visible operation is defined as an operation that is performed with no continuous profile above the water surface.

3.4 Physical Characteristics

3.4.1 UUV Weight. The UUV shall weigh 60 pounds or less, in air, when in a mission ready state.

3.4.2 UUV Color. The predominant color on the body of the UUV shall be non-gloss black. The color scheme of the Expendable UUV shall facilitate identification of the asset as an explosive loaded device with a yellow band on the exterior of the warhead section. The color scheme of the Exercise UUV shall facilitate relocation and identification of the asset as a non-explosive loaded recoverable device in addition to a light blue band around the payload section.

3.4.3 UUV Buoyancy. The Expendable neutralizer shall be 1.0 +/- 0.5 pounds negatively buoyant in water with salinity up to 45 PPT. The Exercise UUV shall be 1.0 +/- 0.5 pounds positively buoyant in water with salinity down to 0 PPT.

3.4.4 Shipboard Footprint. The shipboard footprint of the UUV System shall not exceed the size of three 8' X 8' X 20' Military Vans (MILVANs). Shipboard footprint is defined as the area of deck space required for the UUV System, ancillary equipment, and support equipment required for operation and maintenance, when configured for shipboard operations. This does not include the explosives payload.

3.4.5 Standard Parts. Standard parts and fittings should be used whenever they are suitable for the application. When nonstandard parts or materials are used, their performance should be better than that of standard parts or materials. Used or damaged parts shall not be used. The vendor's part selection should minimize the risk of parts obsolescence or non-availability.

3.4.6 Fuze Design Requirements. The fuze (e.g. Safety and Arming Unit) of the Expendable UUV shall meet the requirement of MIL-STD-1316. The fuze design shall be reviewed by the WSESRB and compliance with MIL-STD-1316 requirements shall be subject to WSESRB concurrence.

3.4.7 Munition Basic Safety and Insensitive Munition Requirements. The Expendable UUV containing munitions, shall meet the basic safety and insensitive munitions (IM) requirements of MIL-STD-2105. Compliance with these requirements will be subject to WSESRB and IM Office concurrence.

3.4.8 UUV Handling. The UUV shall be outfitted with a means to enhance safe handling (e.g., folding handles, detachable handles) while preparing for launch of Expendable UUVs and recovery of Exercise UUVs from a small craft.

3.5 UUV Recovery Visual Aid and Task Completion Alert

3.5.1 Nighttime/Darkness. The Exercise UUV shall be designed to include two external holders for chemical lights or strobe lights. The rearmost holder shall support a method of indicating to the operator the end of the vehicle where the propeller is located.

3.5.2 Ease of Use in Darkness. Any latches, hold-down mechanisms, or controls that must be manipulated by the operator during launch, recovery, or UUV stowage shall be designed so that it is easy to use in darkness.

3.5.3 Daylight. The Exercise UUV shall be outfitted with a means to enhance its visibility when on the surface during daylight hours (e.g., international orange/fluorescent yellow bands fore and aft around the body).

3.6 UUV Container

3.6.1 UUV Container Size and Weight. The individual neutralizer UUVs and/or ancillary equipment (excluding the explosive payloads and Launch and Handling system) shall be capable of shipment in one or more shipping container(s) to allow shipment by overnight common carriers. Container Size: Maximum length – 119 inches, Maximum length plus girth* – 165 inches; Loaded Container Weight: Maximum of 150 lbs. *"length plus girth" = length plus twice the height plus twice the width.

3.6.2 Container Design. The container(s) shall be rugged to provide protection from physical damage during transport and storage, and shall be provided with a means to lock the container(s). The container(s) shall have a means of being secured to the deck of a boat, while still allowing access to the containers' contents. All hardware on the container(s) shall be of non-rusting materials and sufficiently rugged to withstand repeated use in a small-boat environment. If it is necessary to orient the UUV into a preferred position in the container(s), appropriate marking shall be provided to aid the operator in orienting the UUV. The containers shall support PHS&T requirements to the maximum possible. The containers should not be design to store and transport the explosive payload. See paragraph 3.4.13 for rechargeable lithium battery packaging/shipping requirements.

3.6.3 Material Handling. The Container(s) shall be provided with integrated material handling attribute(s) (e.g., wheels, attachable dollies) to facilitate ease of moving when in the loaded configuration.

3.6.4 Marking. Each major component of the UUV System shall be uniquely serialized using a permanent marking method. The UUV System will not be marked with any other identifying information. Item marking shall meet Department of Defense (DoD) requirements for Unique Identification (UID) in accordance with MIL-STD-130M, and shall meet ISO Standard 15434 requirements for syntax and formatting.

3.7 Design Interface

3.7.1 Common Operator Interface for Navy-EOD (COIN). The UUV System shall be interoperable with a version of COIN as identified in the requirements which will be provided as an appendix at a later date.

3.7.2 Small Craft Interface. The UUV System, when configured for an operational mission, will interface with small craft (i.e. 11 meter RHIB). This includes the storage/transportation container(s) or rack, if used to transport the UUV's to the launch point. The configuration shall allow three operators to complete final pre-mission preparation and launch of Expendable UUVs and recovery and stow of Exercise UUVs, for safe transit without extensive handling equipment at sea. Capability to perform these functions without any handling equipment is desirable. An appendix with applicable specifications of the 11 meter RHIB will be provided at a later date.

3.7.2.1 Launcher System. The VESON system shall provide a launcher system for both the Exercise and Expendable UUVs. The launcher shall hold each neutralizer secure, and will allow monitoring of the UUV system status lights, removal and replacement of UUVs with fault

status light, and programming of the replacement UUV. The launcher shall be capable of command launch of up to 60 neutralizers. Upon entry into the water, the launcher shall be capable of extracting a launch pin from the UUV.

3.7.2.2 Console Operator Interface. The console design shall support operator ease of use, including indication of UUV direction of travel during mission planning, operator-friendly mission programming and post-mission data download, and automated directory structure creation during mission download.

3.8 Command and Control

3.8.1 User Console. The UUV System user console shall be intuitive and simplify pre-mission set up, pre-launch checkout, mission operation, and Exercise UUV post mission data download and analysis. During pre-mission set up the user console shall include an indicator(s) that all subsystems are functioning correctly and are "mission ready". The user console shall include a report generator that creates a report with a graphical representation of the Exercise UUV sensor data collected during the mission and all vehicle/mission data.

3.8.1.1 Console Features. The User Console shall include a high-resolution display screen, an internal CD/DVD writer, provisions to connect an external mouse/trackball, a USB 2.0 interface, and provisions (e.g. hood) for nighttime concealment and daytime use in bright sunlight. Minimum console battery life shall be three hours under normal use conditions.

3.8.1.2 English/Metric Units. The UUV System software shall be designed with either English or Metric Units of Measure and shall provide a user-friendly capability for conversion of those units to the other.

3.8.2 Modes of Navigation. The transit navigational system for deployment from small craft to marker reacquisition will be composed of GPS fixes when the vehicle is on the surface, and dead reckoning with heading sensor and water speed indicator (i.e. propeller turns) while submerged. A USBL homing array will interrogate a prepositioned acoustic transponder (marker) to allow for the final navigation sequence. Once the UUV has located the transponder it will proceed on a known bearing to the target and detonate at the appropriate range, bearing and altitude. The UUV shall be capable of navigating to within 1 meter RMS (spherical) of the centroid of the target.

3.8.2.1 Global Positioning System (GPS). The GPS receiver shall be a military P-code capable receiver with a Selected Availability Anti-Spoofing Module (SAASM). An L1/L2 antenna that is mounted on the vehicle shall support the GPS receiver.

3.8.2.2 Ultra-Short Baseline (USBL) Navigation Array. The UUV shall be capable of reacquiring a previously placed acoustic transponder (marker) and navigating to the marker using a USBL navigation array (an appendix with marker specifications will be provided at a later date). The operating range between the UUV and a navigation transponder shall extend to at least 500 m with the vehicle at the surface and operating on a Bottom Type A-1. (See paragraph 1.0 for description of bottom type.)

3.8.2.3 Forward Looking Sonar P3I Upgrade Capability. The UUV shall have a capability to integrate forward looking sonar capable of detecting a moored target 1 foot in

diameter at a range of 50 meters. The Neutralizer UUV shall have the power and communications interface capability for the sonar as well as a microprocessor capable of processing algorithms capable of allowing/facilitating the UUV to home in on the target autonomously without the need for an acoustic transponder.

3.8.3 Information Assurance. The VESON shall incorporate measures to prevent unauthorized access to both the operating software and collected data as required by OPNAVINST 5239.1B, DODD 5200.28, and DODINST 5200.40. Vehicle status, targeting data, post mission data shall be transferred via hard cable using RS-232 serial interface.

3.8.3.1 Software Program Protection. The UUV on-board software shall incorporate measures to prevent unauthorized access to both the operating software and collected data.

3.9 Environmental Conditions

The UUV System shall be tested for environmental suitability in a manner representative of its likely mission profile. For a discussion of a typical mission scenario for the UUV System, refer to Appendix A.

3.9.1 Sea State (SS). The UUV shall be capable of being transported, deployed/launched, operated, and recovered in sea states up to SS 3. SS shall be measured at the 40-foot curve. SS 3 is defined as wind velocity of 11-16 knots (knots) with small waves 0.5m to 1.25m high, becoming longer; numerous whitecaps.

3.9.2 Vehicle Operating Depth. Maximum and minimum vehicle operating depths are the depths in FSW that the UUV must be capable of operating at, from the time that it is deployed until recovered.

3.9.2.1 Maximum Water Depth. The UUV shall be able to operate at water depths of up to 60 FSW.

3.9.2.2 Minimum Water Depth. The UUV shall be able to transit and maneuver at the surface of the water.

3.9.3 Current. The UUV System shall be able to operate in a current less than or equal to 2 knots flowing in any direction.

3.9.4 Salinity. The UUV and all other components intended for in-water operations shall be able to operate in water having a salinity level of 0 to 45 ppt. It shall not be necessary to remove or add any item to the UUV, with exception of normal ballast weights, in order to meet this requirement.

3.9.5 Transportation Altitude. The UUV System shall withstand the rigors (e.g., vibration, low temperature and pressure) of being transported by civilian or military aircraft/helicopters (pressurized and non-pressurized) to altitudes of less than or equal to 39,000 feet.

3.9.6 Transportation and Storage Temperature. The UUV System shall perform satisfactorily after being transported and/or stored in a non-standby mode in temperatures from -28° F (-33° C) to 160° F (71° C).

3.9.7 Operational Temperature.

3.9.7.1 Water Temperature. The UUV System shall be capable of operating in water temperatures from 32° F (0° C) to 90° F (32° C). Operational Water temperature is defined as the water temperature while the UUV and the auxiliary equipment intended for use in/underwater are deployed for the UUVs required endurance.

3.9.7.2 Air Temperature. The UUV System shall be capable of operating in air temperature (protected from direct sunlight) from -25° F (-32° C) to 120° F (49° C). Operational Air Temperature is defined as the air temperature while the UUV system is deployed during the UUV transit, target reacquisition and neutralization. For UUVs and any other components intended for in-water operations, this is the in-air operating temperature prior to and subsequent to the in-water portion of the mission for a maximum of 30 minutes while protected from the direct sunlight.

3.9.8 Temperature Shock. The UUV System shall be operable after encountering thermal shock associated with exposure to temperature extremes of-25°F (-32° C) to 120°F (49°C) (air) and 90° F (32° C) to 32° F (0° C) (in-water).

3.9.9 Shock and Vibration. The UUV System shall be tested for shock and vibration suitability in a manner representative of its likely mission profile.

3.9.10 Transportation Shock and Vibration. The UUV System, when packed in its shipping containers, shall perform satisfactorily after being exposed to shock and vibration conditions which may be encountered during transportation over highways and secondary and tertiary roads, as well as by aircraft and sea vessels.

3.9.11 Operational Shock and Vibration. The UUV System, while in a mission-ready state and packed as representative of transiting to the operation area, shall perform satisfactorily after exposure to shock and vibration that may be encountered during transportation from the staging vessel/area to the deployment area via small craft in a rugged marine environment at SS up to and including SS 3.

3.9.12 Electromagnetic Environments. The UUV System must withstand the adverse effects of electromagnetic environments (EMEs) that will be encountered during operations aboard surface ships. Therefore, the UUV System shall meet the Electromagnetic Interference requirements of MIL-STD-461E as follows:

- Test Method RE101, Radiated Emissions, magnetic field, 30 Hz to 100 kHz.
- Test Method RE102, Radiated Emissions, electric field, 10 kHz to 18 GHz.
- Test Method RS101, Radiated Susceptibility, magnetic field, 30 Hz to 100 kHz.
- Test Method RS103, Radiated Susceptibility, electric field, 2 MHz to 40 GHz.

4.0 VERIFICATION

Verification section shall include all inspections to be performed to determine that the system conforms to the requirement in section 3 of the specification. Verification includes inspection, demonstration, analysis and testing or any combination thereof.

4.1 FIRST ARTICLE INSPECTION

First article inspection shall be performed using the UUV System (vehicle plus auxiliary equipment), manufacturer engineering drawings and any other applicable design document. This inspection will verify the production system conforms to all UUV System configuration requirements.

4.1.1 First Article Testing (FAT) / Prototype Test & Evaluation (T&E). If specified in the contract, First Articles and/or prototype systems will undergo Requirements Compliance Testing and Evaluation (RCT&E) (conducted by the Government) in accordance with the following, as appropriate.

- RCT&E
  - Hardware Phase.
    - The UUV System will undergo the Hardware phase of RCT&E that includes Engineering Evaluation, User Evaluation, and Environmental Testing to determine the extent of compliance with the requirements of the VSW MCM UUV Performance Specification.
  - Documentation Phase.
    - The Technical/Logistic Documentation will undergo the Documentation phase of RCT&E that will be performed to determine the extent of compliance with the applicable Contract Data Requirements.

4.1.2 Production Lot Testing. The Government shall perform production lot testing of each UUV System within 30 days after delivery at the VSW MCM Detachment, San Diego, CA. Testing will be conducted following successful completion of the on-site training of the VSW MCM operators and at least one in-water vehicle operational mission.

4.2 ACCEPTANCE TESTING.

Testing shall be performed using the UUV System (vehicle plus auxiliary equipment, software and hardware components). This inspection will verify the capability of the system conforms to all UUV System requirements. Acceptance validation and verification criteria consist of the following:

- Inspection of UUV System conformance. An element of verification that is generally nondestructive and typically includes the use of sight, hearing, smell, touch, and taste; simple physical manipulation; and mechanical and electrical gauging and measurement.

- Demonstrations of UUV System conformance. An element of verification that involves the actual operation of an item to provide evidence that the required functions were accomplished under specific scenarios. The items may be instrumented and performance monitored.
- Testing of UUV System conformance. An element of verification in which scientific principles and procedures are applied to determine the properties or functional capabilities of items.
- Analysis of UUV System conformance. An element of verification that uses established technical or mathematical models or simulations, algorithms, charts, graphs, circuit diagrams, or other scientific principles and procedures to provide evidence that stated requirements were met.

4.2.1 Responsibility for Test/Inspection. Unless otherwise specified in the contract, the supplier is responsible for the performance of all specified tests and inspections. The government reserves the right to witness or separately perform tests on all of the specification requirements.

4.2.2 Factory Acceptance Testing (FAT). The contractor shall test the system before delivery to verify correct operation in accordance with its standard practice.

4.2.3 Production Lot Testing. The Government shall perform production lot testing of each UUV System within 30 days after delivery at the VSW MCM Detachment, San Diego, CA. Testing will be conducted following successful completion of the on-site training of the VSW MCM operators and at least one in-water vehicle operational mission.

4.3 Contract Verification Matrix

The following verification matrix below will be conformance criteria to determine compliance with the UUV System requirements specified in section 3. Deviations noted from the specifications shall be considered a failure of the inspection.

Section 3 Requirement	Title	Assessment Summary
3.1	**Performance/Functionality Characteristics**	
3.1.1	Navigational Accuracy	
3.1.2	Neutralization Effectiveness	
3.1.3	Neutralization UUV Payload	
3.1.4	Target Verification	
3.1.5	Exercise UUV Data Storage Capacity	
3.1.6	Exercise UUV Payload	

PRELIMINARY WORKING DRAFT

Note – This working draft is intended to provide a starting point for soliciting industry partner feedback and recommendations to feed the eventual promulgation of a performance specification for the VESON. Once finalized the future performance specification will be part of a competitive solicitation package soliciting proposals for development and procurement of an expendable neutralizer.

20 March 2012

Section 3 Requirement	Title	Assessment Summary
3.1.7	Operational Depth Range	
3.1.8	Marker Reacquisition	
3.1.9	Range	
3.1.10	UUV Standoff Range	
3.1.11	Water Depth Accuracy	
3.1.12	Water Altitude Accuracy	
3.1.13	Power Sources	
3.1.14	Battery Power	
3.1.14.1	Lithium Battery	
3.1.15	Battery Recharge Time	
3.1.16	Battery Recharge Cycles	
3.1.16.1	Mission Endurance	
3.1.17	Battery Discharge	
3.1.18	Battery State of Charge Display	
3.1.19	Open Architecture	
3.2	**Suitability**	
3.2.1	Obstacle Survivability	
3.2.2	Mission Time	
3.2.3	Pre-Mission Set up Time	
3.2.4	Turn Around Time	
3.2.5	UUV System Reliability, Availability and Maintainability	
3.2.5.1	Reliability	
3.2.5.2	Availability	
3.2.5.3	Maintainability	
3.2.6	Human Factors	
3.2.6.1	2-Person Portable Vehicles	
3.2.6.2	System Operators	
3.2.6.3	Cold Weather Clothing	

Section 3 Requirement	Title	Assessment Summary
3.2.6.4	Nuclear, Biological, and Chemical Contamination (NBCC).	
3.3	**Operational Parameters**	
3.3.1	Modes Of Operation	
3.3.1.1	Multiple UUV Operations	
3.3.1.2	Sterilize, Scuttle and Self Destruct	
3.3.2	Low Visible UUV	
3.4	**Physical Characteristics**	
3.4.1	UUV Weight	
3.4.2	UUV Color	
3.4.3	UUV Buoyancy	
3.4.4	Shipboard Footprint	
3.4.5	Standard Parts	
3.4.6	Fuse Design Requirements	
3.4.7	Munition Basic Safety and Insensitive Munition Requirements	
3.4.8	UUV Handling	
3.5	**UUV Recovery Visual Ais and Task Completion Alert**	
3.5.1	Nighttime/Darkness	
3.5.2	Ease of Use in Darkness	
3.5.3	Daylight	
3.6	**UUV Container**	
3.6.1	UUV Container Size and Weight	
3.6.2	Container Design	
3.6.3	Material Handling	
3.6.4	Marking	
3.7	**Design Interface**	
3.7.1	Common Operator Interface for Navy-EOD (COIN)	
3.7.2	Small Craft Interface	
3.7.2.1	Launcher System	

PRELIMINARY WORKING DRAFT

Note – This working draft is intended to provide a starting point for soliciting industry partner feedback and recommendations to feed the eventual promulgation of a performance specification for the VESON. Once finalized the future performance specification will be part of a competitive solicitation package soliciting proposals for development and procurement of an expendable neutralizer.

20 March 2012

Section 3 Requirement	Title	Assessment Summary
3.7.2.2	Console Operator Interface	
3.8	**Command and Control**	
3.8.1	User Console	
3.8.1.1	Console Features	
3.8.1.2	English/Metric Units	
3.8.2	Modes of Navigation	
3.8.2.1	Global Positioning System (GPS)	
3.8.2.2	Ultra-Short Baseline (USBL) Navigation Array	
3.8.2.3	Forward Looking Sonar P31 Upgrade Capability	
3.8.3	Information Assurance	
3.8.3.1	Software Program Protection	
3.9	**Environmental Conditions**	
3.9.1	Sea State (SS)	
3.9.2	Vehicle Operating Depth	
3.9.2.1	Maximum Water Depth	
3.9.2.2	Minimum Water Depth	
3.9.3	Current	
3.9.4	Salinity	
3.9.5	Transportation Altitude	
3.9.6	Transportation and Storage Temperature	
3.9.7	Operational Temperature	
3.9.7.1	Water Temperature	
3.9.7.2	Air Temperature	
3.9.8	Temperature Shock	
3.9.9	Shock and Vibration	
3.9.10	Transportation Shock and Vibration	
3.9.11	Operational Shock and Vibration	
3.9.12	Electromagnetic Environments	

Note – This working draft is intended to provide a starting point for soliciting industry partner feedback and recommendations to feed the eventual promulgation of a performance specification for the VESON. Once finalized the future performance specification will be part of a competitive solicitation package soliciting proposals for development and procurement of an expendable neutralizer.

20 March 2012

5.0 PACKAGING

Packaging is the processes and procedures used to protect material from deterioration, damage, or both. It includes cleaning, drying, preserving, packing, marking, and unitization. The packaging requirements shall be as specified in the contract IAW MIL-STD 2073-1E and MIL-STD-1366E; ASTM D3951-95 should be used as guidance.

6.0 NOTES

6.1 INTENDED USE

The UUV System will be used for performing low visible, very shallow water (VSW) target reacquisition and neutralization missions in support of amphibious landings and EOD MCM operations. The VSW zone extends from 10 to 60 FSW. This system will be operated by members of the EOD Mobile Unit One, comprised of Navy EOD personnel, and will utilize integrated sensors and navigation technology.

6.2 ACQUISITIONS REQUIREMENT

Acquisition documents should specify the following:

a. Title, number, and date of the specification

b. When qualification inspection is required

c. Packaging requirements

6.3 QUALIFICATION

Contractors are encouraged to ensure that any product they offer to the government meets the requirements in this specification.

6.4 ACRYONYMS and ABBREVIATIONS

ASTM	American Society of Testing and Materials
ATF	Amphibious Task Force
C	Degrees Centigrade
C^4I	Command, Control, Communication, Computer, and Intelligence
CAD/CAC	Computer Aided Detection and Classification
CLA_{dc}	Contact Localization Accuracy for Detection and Classification
CRRC	Combat Rubber Raiding Craft
drms	Distance Root Mean Square
EIA	Electronics Industries Alliance
EME	Electromagnetic Environment

EMV	Electromagnetic Vulnerability
ESD	Electrostatic Discharge
F	Degrees Fahrenheit
FSW	Feet Sea Water
hr	Hour
IER	Information Exchange Requirement
UIS	Underwater Imaging System
Kg	Kilogram
Km	Kilometer
kts	Knots
LBL	Long Baseline
m	Meter
MCM	Mine Countermeasures
MCMTOMF	Mean Corrective Maintenance Time for Operational Mission Failures
MEDAL	Mine Warfare and Environmental Decision Aids Library
MILVAN	Military Van
MMS	Marine Mammal System
MOP	Measure of Performance
MSW	Meters Sea Water
NAVSEA	Naval Sea Systems Command
NAVSEAINST	NAVSEA Instruction
NBCC	Nuclear, Biological, and Chemical Contamination
nm	Nautical Mile
NOMBO	Non-Mine, Mine-like Bottom Object
NWP	Naval Warfare Publication
OMF	Operational Mission Failure
P-code	Precision code
P_dP_{cmm}	Probability of Detecting and Classifying a Mine as Mine-like
P_dP_{cxm}	Probability of Detecting and Classifying a Non-Mine-like contact as Mine-like
PEO (MUW) INST	Program Executive Officer, Mine and Undersea Warfare Instruction

PMS-EOD	Program Management Office, Explosive Ordnance Disposal
ppt	Parts per Thousand
RHIB	Rigid Hull Inflatable Boat
R-I	Reacquisition - Identification
rms	Root Mean Square
S-C-M	Search-Classify-Map
SS	Sea State
SZ	Surf Zone
UID	Unique Identification Device
UJTL	Universal Joint Task List
ULA	UUV Localization Accuracy
UUV	Unmanned Underwater Vehicle
UXO	Unexploded Ordnance
VSW	Very Shallow Water

PRELIMINARY WORKING DRAFT

Note – This working draft is intended to provide a starting point for soliciting industry partner feedback and recommendations to feed the eventual promulgation of a performance specification for the VESON. Once finalized the future performance specification will be part of a competitive solicitation package soliciting proposals for development and procurement of an expendable neutralizer.

20 March 2012

APPENDIX A
VSW EXPENDABLE STAND OFF NEUTRALIZER (VESON) CONOP SUMMARY

Mission Overview: The objective of this mission is to neutralize bottom and moored mines in the landing lanes in the Very Shallow Water (VSW) area (10 to 60 Feet of Seawater [FSW]) in support of an amphibious assault. This mine neutralization must be conducted to the extent practical, without alerting hostile forces to the intentions or precise location of the amphibious landings. As such, VESON operations will minimize observable actions to include launch, mine reacquisition and verification, charge delivery, and periods leading up to charge detonation.

Mission Planning and Interoperability: On a host platform (Ship), Explosive Ordnance Disposal (EOD) forces will enter the recorded locations of the neutralization target, obtained from multiple possible sources, into VESON, using the Common Operator Interface for Navy (COIN). COIN is a program that resides on a dedicated laptop computer for bi-directional mission planning If available, additional localization data and environmental data (e.g., high-fidelity bottom profiles) will be utilized by VESON to improve system accuracy. Target verification and detonation will be based upon reacquisition of acoustic transponders, previously placed near the target by other EOD assets. These precursor EOD missions will provide the geodetic locations, altitude, range and bearing from marker to target. Each transponder will have a unique acoustic signal, keyed to each neutralization target.

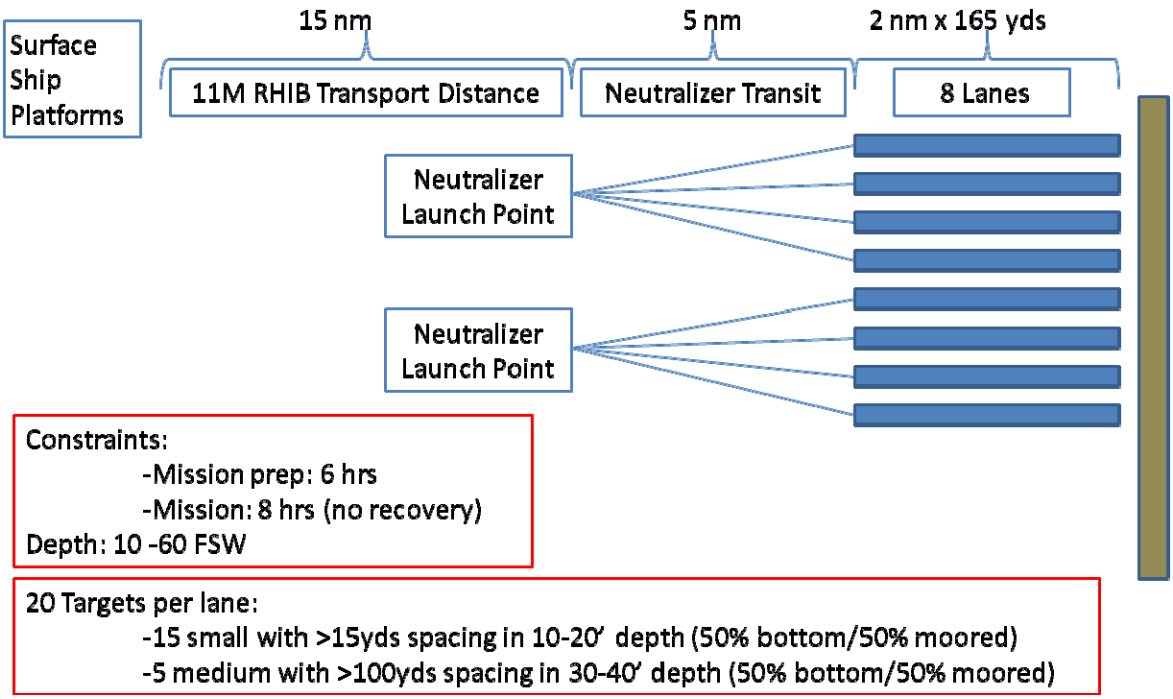
Suitability: The VESON neutralizer will be a man-portable UUV, including an explosive payload. The payload will be comprised of a Safe and Arming Unit, a fuze, and standard USN Insensitive Munitions qualified cast charge. The payload will be stored aboard ship in the magazine separate from the neutralizer until such time as the neutralizer has been programmed with targeting information in preparation for load-out aboard an11-meter rigid-hull inflatable boat (RHIB). The VESON system shall include a Launch and Handling System (LHS) that will support a minimum of 60 neutralizers aboard an11-meter RHIB. The LHS with 60 neutralizers and an Operator Console shall weigh no more than 6000 lbs.

Delivery: The VESON will be transported to the VSW zone in an EOD low-profile boat (11-RHIB). The launch point for the neutralizer should be, at a minimum, seven nautical miles from the shore. This is based on the visual horizon distance from the shoreline and the vertical dimensions of the delivery craft; and is intended to prevent detection and preserving mission operational security. From this launch-point, the neutralizer will be capable of self-propelling and navigating to the pre-planned Mine Danger Area (MDA) to commence target reacquisition. The launching of the VESON neutralizers will be conducted by one or two qualified EOD operators by use of a launcher system capable of launching multiple neutralizers. Upon launch, an arming pin will be removed from the VESON neutralizer for the first stage of arming. If a fault is detected at any time during the transit to the target are (i.e. SAU function, low battery) the VESON will sterilize and scuttle.

Target Reacquisition and Verification: Upon arrival at the designated geographic reference point via GPS, the neutralizer will reacquire the mine based on precise navigation and reacquisition of the acoustic transponder. Once the pre-programmed target verification criteria

have been met and verified, the neutralizer will autonomously initiate its arming and neutralization protocol.

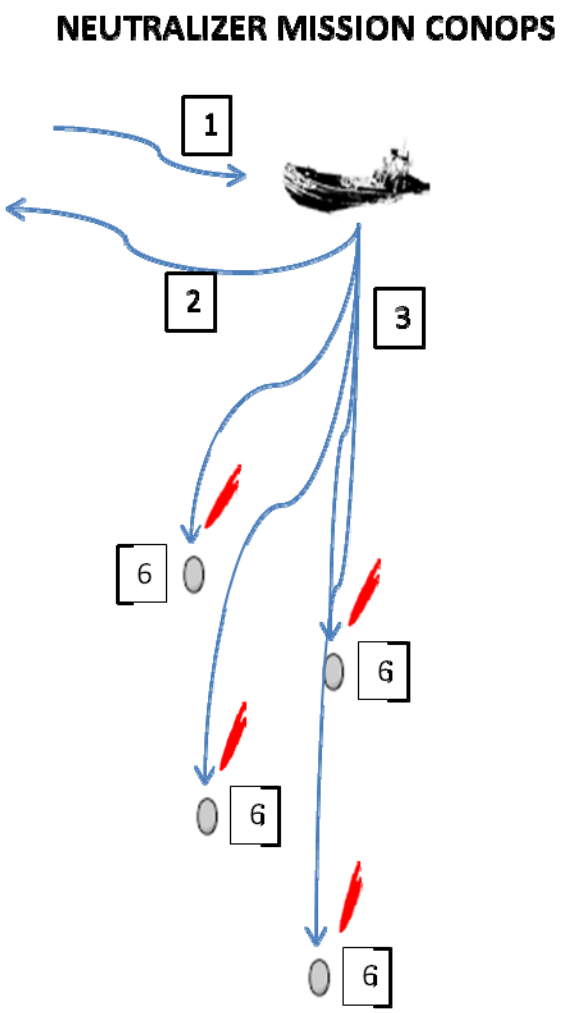
Detonation: Neutralizers will detonate when all delay-arming protocols have been met and the target has been verified. Detonation will occur at a predetermined proximity to the target upon arrival. If two failed attempts have been made to prosecute the target, on the third attempt the UUV shall detonate at the closest approach to the target. If the vehicle fails to detonate after 10 seconds, the SAU will initiate the sterilize and scuttle function.



PRELIMINARY WORKING DRAFT

Note – This working draft is intended to provide a starting point for soliciting industry partner feedback and recommendations to feed the eventual promulgation of a performance specification for the VESON. Once finalized the future performance specification will be part of a competitive solicitation package soliciting proposals for development and procurement of an expendable neutralizer.

20 March 2012



PHASE	STEP/DESCRIPTION	ELAPSED TIME
Deploy at Standoff point	1. Op Team Deploys preprogrammed VESON neutralizers in a logical order (5 miles from minefield)	60
Extract	2. Ops Team return to host vessel (team should commence extract prior to first detonation)	60
Reacquire and Neutralize targets	3. Each VESON neutralizer swims to a search area near its designated target (GPS hopping)	90
	4. Upon reaching search areas, neutralizers reacquire markers using USBL sensor	
	5. Using USBL navigation, neutralizers swim toward the marker on a path that flies directly over target	
	6. Upon passing over target, the neutralizer detonates.	

Figure A-1. VESON CONOP Summary