

# **Remotely Controlled Underwater Minefields**

## **Discussion of Draft Safety Requirements**

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# **Remotely Controlled Underwater Minefields**

## **Purpose**

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- **To Introduce a Draft Set of Design Safety Requirements for Remotely Controlled Underwater Minefields to the Fuzing Community**
- **Solicit Comments/Inputs**

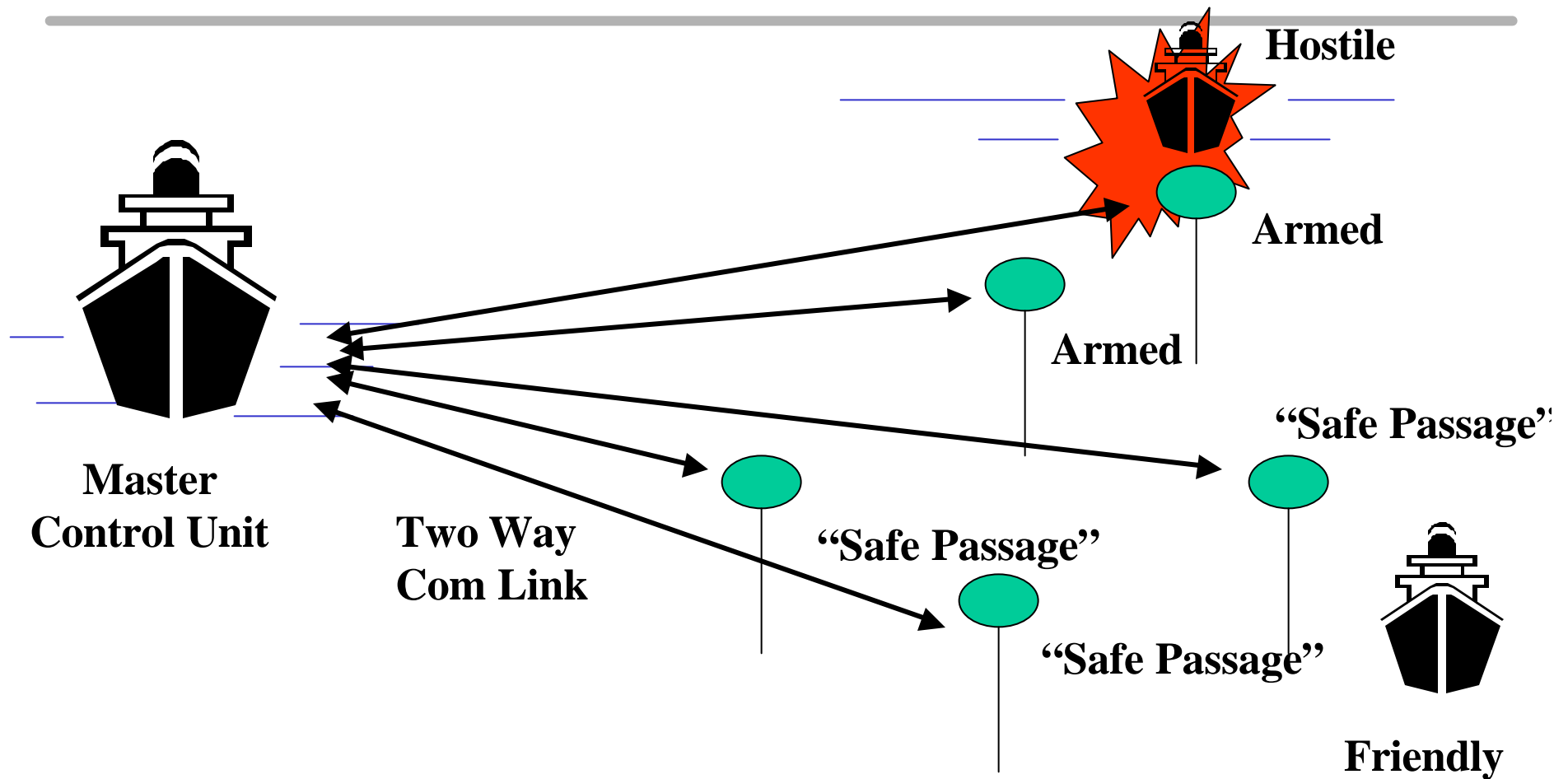
# **Remotely Controlled Underwater Minefields Background**

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- **The User Wants the Ability to Turn the Minefield Off and On, and Allow the Passage of Friendly Forces in the “Off” Mode.**
- **A Navy Program has Asked the WSESRB for Guidance Concerning the Safety Requirements for a Remotely Controlled Underwater Minefield.**
- **The Fuze and Initiation System Technical Review Panel was Tasked to Develop a Draft Set of Safety Requirements.**
- **Design Requirements, Contained in Draft STANAG 4187 Edition 4 Were Used as a Starting Point.**

# Remotely Controlled Underwater Minefields

## A Theoretical Concept



# **Remotely Controlled Underwater Minefields Draft Requirements Structure**

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- **General Requirements**
- **Safety and Arming Device Requirements**
- **Arming Controller and Communication Systems (ACCS) Requirements**

# **Remotely Controlled Underwater Minefields General Requirements (Draft)**

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- **Program Must Advise User of the Inherent Risks, Document Need, and Acceptance of Risk at the ASN Level.**
- **Use of Remotely Controlled Under Water Minefields Will be Limited to Wartime Situations.**
- **Routine Recovery of Remotely Controlled Minefield Shall be Prohibited After Arming. In the Event a Mine must be Recovered the Mine Must be Re-Safed and Sterilized.**
- **Security Associated with Enabling the “Safe Passage Mode” and Re-Arming will be Appropriately Classified by the Program.**

# **Remotely Controlled Underwater Minefields S&A Requirements (Draft)**

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- **Initial Arming of the S&A must comply with STANAG 4187**
  - **This shall be a precondition to enabling the “Safe Passage Mode”**
- **The S&A shall contain at least two independent safety features, each capable of preventing re-arming.**
  - **Verification of the presence of at least one post launch environment shall be required to enable re-arming.**
  - **Stored energy shall not be employed for enabling re-arming when environmentally derived energy can be practically obtained.**

# **Remotely Controlled Underwater Minefields**

## **S&A Requirements (Draft cont)**

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- **The target sensor shall not be active during passage of friendly forces. Prior to arming, the target sensor shall be turned on, if any targets are detected, then the mine shall not arm.**
- **To insure safe separation, the S&A shall not be capable of re-arming when a target is present. The mine location must be known and recognized by the Master Controller, otherwise re-arming is not allowed.**
- **A failure of any part of the S&A related solely to re-arming shall not inhibit/preclude any S&A re-safing, sterilization, self-function, or self-disrupt functions.**



# **Remotely Controlled Underwater Minefields**

## **Arming Controller and Communication System Requirements (Draft)**

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- **Two independent safety features each capable of preventing re-arming, the independence of these safety features shall be carried throughout the system, including requiring inputs from two individual operators to enable re-arming.**
- **Prior to Allowing “Safe Passage” an unambiguous means of determining that the system is not armed is required. Implementation shall include two independent means of verifying that each mine is in the “Safe Passage” position prior to the approval of passage of friendly forces.**
- **A friend or foe feature should be incorporated.**

# **Remotely Controlled Underwater Minefields**

## **Arming Controller and Communication System Requirements (Draft cont)**

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- **Each mine must be able to uniquely identify itself, its location, and its safe/arm status and maintain full time communication of this information to the operators controlling the minefield.**
  - **Loss of communication shall result in returning to the “safe passage mode/condition” at a minimum.**
  - **The communications system which will be transferring the ‘re-arming environments’ shall be secure/uncompromisable.**
  - **The “Safing” command shall override all other commands.**

# **Remotely Controlled Underwater Minefields**

## **Arming Controller and Communication System Requirements (Draft cont)**

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- **The re-arming function shall not be susceptible to single point failures.**
- **The ACCS design shall prohibit premature arming or functioning if any or all electrical safety or energy control features fail in any given state or credible mode.**
- **Electronic logic related to safety functions shall be embedded as firmware or hardware.**
- **The ACCS shall be subjected to the same safety analysis, environmental, and electromagnetic test requirements and procedures required for S&A's.**
  - **Contributions of the ACCS shall be included in projecting the one in a million Safety System Failure Rate requirement.**
  - **The ACCS shall be included in the EOD review.**

# **Remotely Controlled Underwater Minefields**

## **Summary**

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- **The WSESRB has Initiated Development of Requirements For a Under Water Minefield System Which Would Allow Passage of Friendly Forces.**
- **Draft Requirements for Such a System have been Developed.**
- **We Really Want Feedback**
  - **Can This Type of System be Implemented Safely & Practically?**
  - **Have we Overlooked Requirements/Issues?**
  - **For Draft Copy of Requirements email [jack.waller@navy.mil](mailto:jack.waller@navy.mil)**

**We want to know how the fuzing community views this topic**