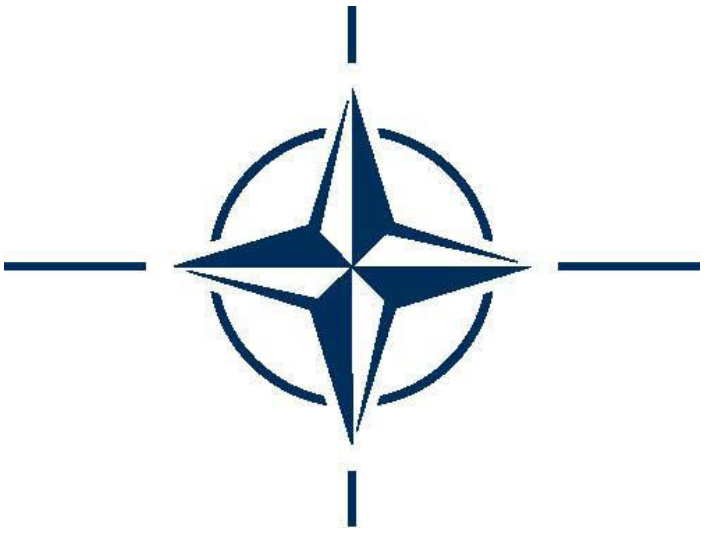
NATO STANDARD

ATP/MTP-57

THE SUBMARINE SEARCH AND RESCUE MANUAL

Edition C Version 2

NOVEMBER 2015



NORTH ATLANTIC TREATY ORGANIZATION

ALLIED/MULTINATIONAL TACTICAL PUBLICATION

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NORTH ATLANTIC TREATY ORGANISATION (NATO)

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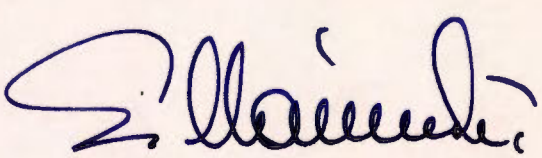
NATO LETTER OF PROMULGATION

25 November 2015

1. The enclosed Allied/Multinational Tactical Publication, ATP/MTP-57, Edition C, Version 2, THE SUBMARINE SEARCH AND RESCUE MANUAL, has been approved by the nations in the Military Committee Maritime Standardization Board and is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 1390.

2. ATP/MTP-57, Edition C, Version 2, is effective upon receipt and supersedes ATP-57; Edition C, Version 1 which shall be destroyed in accordance with the local procedure for the destruction of documents.

4. This publication shall be handled in accordance with C-M (2002)60.



Edvardas MAZEIKIS
Major General, LTUAF
Director, NATO Standardization Office

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS
1-7	TURKEY
2	ESTONIA
1-7	LATVIA

Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Database for the complete list of existing reservations.

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RECORD OF SPECIFIC RESERVATIONS

Nation	Detail of reservation
TURKEY	ATP/MTP-57(C) and ATP-10(D) are agreed in principle. Nevertheless, due to changes will be made when an agreement is reached in accordance with the 1979 Hamburg convention on Maritime Search and Rescue between parties concerned. Having the means and capabilities, Turkey will continue to conduct SAR operations in her maritime Search and Rescue as declared to the IMO and included in IMOs Global SAR Plan.
ESTONIA	EST is ratifying and implementing STANAG 1390 ed8 except Chapter 2, due to composition of Naval Forces and having neither submarines nor SMER assets in service.
LATVIA	STANAG is going to be implemented as far as DISSUB personnel surface abandonment and medical assistance is concerned as regular SAR operation.
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Database for the complete list of existing reservations.	

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RECORD OF CHANGES

Identification of change, reg no. (if any) and date	Date entered	NATO Effective Date	By whom entered (signature; rank, grade or rate; name of Command)

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1.2. PREFACE

ATP/MTP-57, The Submarine Search and Rescue Manual, contains principles and procedures that have evolved as a result of experience and exercises and is used to implement Submarine Search and Rescue (SUBSAR) Operations based on commonality and interoperability of Rescue Elements and Submarines all around the world.

The publication is supplemented by two Standard Related documents:

- ATP/MTP-57.1 – Submarine Search and Rescue – The Background Supplement;
- ATP/MTP-57.2 – Submarine Search and Rescue – The National Data.

The Publication supplements the general principles and procedures set forth in the ATP-10 (SEARCH AND RESCUE), and in the International Aeronautical and Maritime Search and Rescue (IAMSAR) Manual, published jointly by the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO).

ATP/MTP-57 and above mentioned documents, form the basic library for SUBSAR Operations[1][2].

The procedures and information for the Search, the coordination of Multinational Submarine Rescue Elements during their mobilization to the scene of action, the Escape and Rescue phase of a SUBSAR Operation, and the medical aspects for SUBSAR Operations are explained in separate chapters.

1.3. PURPOSE

The purpose of the Submarine Search and Rescue Manual (ATP/MTP-57) is to provide guidance, instructions, information and procedures governing the different phases of a SUBSAR Operation and the command, control and manoeuvring of units during their mobilization to the scene of action, throughout the Escape, Intervention and Rescue stages.

1.4. SCOPE

This manual deals with information related to Submarine Escape and Rescue (SMER) and addresses the techniques and procedures for SUBSAR Operations, on which further expansion of the doctrine may be based. It also provides specialized information needed by authorities engaged in saving lives at sea from a Distressed Submarine (DISSUB).

The manual provides the instructions and procedures required by Headquarters and/or Commanders to issue orders to fulfil their responsibilities and enables subordinates to understand and comply with them. It also gives details of specific duties associated with the mobilization of SMER Resources, and with the execution of associated tasks.

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[1] ATP/MTP-57 (C) takes precedence for the conduct of SUBSAR Operations over ATP-10 (D) and supplements IAMSAR. ATP-10 remains a search and rescue document in general.

[2] See Note at page 1-3 para 1.4

This manual is intended to serve as a guide to worldwide Operational Commands and Commanders that may be assigned responsibility during SUBSAR Operations, and in particular to the On Scene Commander (OSC) and to the Coordinator of Rescue Forces (CRF).

The International Submarine Escape and Rescue Liaison Office (ISMERLO) is the coordination hub which, from the very beginning of a SUBSAR Operation, is responsible for facilitating the rescue response to such an event (www.ismerlo.org).

This manual does not deal with the onboard aspects of submarine escape, but does deal with the recovery of escapees once on the surface.

Note:
As indicated in footnote of ATP-10 (D), Page 3-B-1 Turkey does not accept relative zones in the map, until an agreement is reached. Turkey recognizes her maritime SAR areas as declared in IMO.

1.5. INTRODUCTION TO SUBSAR OPERATIONS

1.5.1. OVERALL PHILOSOPHY OF A SUBSAR OPERATION

The general philosophy for SUBSAR Operations is to provide a reasonable level of assurance for the more likely Submarine accident situations and some, at least, for the less likely, using those elements which are considered the most appropriate in response to the incident worldwide.

While rescue is the preferred method of saving lives after a submarine accident, escape is also possible even though it presents greater risks to the individual. Salvage of the whole submarine is unlikely to be used as a means of saving life as it would probably take too long to accomplish even under favourable circumstances. Some salvage related activities may, however, contribute towards escape or rescue.

1.5.2. SUBSAR OPERATIONS GUIDANCE

The following Documents record the principles, techniques and procedures for SUBSAR Operations on which further expansion of the guidance may be based:

1.5.3. THE INTERNATIONAL AERONAUTICAL AND MARITIME SEARCH AND RESCUE (IAMSAR) MANUAL

It is published jointly by the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO).

The primary focus of the three volumes of this Manual is to assist nations in meeting their own Search and Rescue (SAR) needs, and the obligations they accepted under the Convention on International Civil Aviation, the International Convention on Maritime Search and Rescue (Hamburg 1979) and the International Convention for the Safety of Life at Sea (SOLAS).

1.5.4. ATP-10 SEARCH AND RESCUE

The publication provides doctrine, instructions, and procedures governing the command, control, and manoeuvring of NATO units in SAR Operations during peace time. The SAR Working Group of the NATO MC Air Standardization Board (MCASB) has the overall responsibility for this

Publication, which includes a specific chapter dedicated to the Search and Localization of a Submarine in distress.[3] [4]

1.5.5. ATP/MTP-57 THE SUBMARINE SEARCH AND RESCUE MANUAL

The Manual provides guidance, instructions, information and procedures governing the command, control, mobilization and employment of SMER Resources during the SUBSAR Operations. This manual is under the NATO MC Maritime Standardization Board (MCMSB)/SMER Working Group responsibility.

1.5.6. CONCEPT OF OPERATIONS

1.5.6.1. GENERAL

This article briefly describes the different concepts, Authorities, phases and guidance used during SUBSAR Operations.

It is a SAR principle that the appropriate authority may call upon one or more Rescue Coordination Centre (RCC) to assist the operation. A SUBSAR operation does not normally come under the responsibility of a RCC, due to the specific characteristics of a DISSUB, but the relevant RCC must be duly informed of all activities that will be taking place during any phases of a SUBSAR Operation.

ANNEX 1.A contains a summary of applicable NATO Standardization Agreements (STANAGs) related to SMER issues, which may be named through this document.

1.5.6.2. THE ALERT

Indication that a submarine has sunk or is in distress may come from a variety of sources, ranging from merchant ships observing an untoward incident, through warships operating with the submarine, to the Submarine Operating Authority (SUBOPAUTH) realising that the submarine has failed to report as detailed in her orders, or any unit receiving distress signals from the submarine.

1.5.6.3. SUBSAR OPERATIONS PHASES

A SUBSAR Operation can be divided into a number of phases the first of which begins when the alert of a DISSUB is raised. The principal phases are:

- Search and Localization of the DISSUB

- Escape and Rescue

Chapter 5 describes instructions and procedures for the Escape and Rescue phase. This phase may last a number of days dependent upon DISSUB status, weather and sea-state conditions and rescue element capabilities. Although the preference is to rescue the Submarine's crew, an escape may be conducted before or during the rescue, depending on the evolution of the conditions in the DISSUB. The CRF should only advise escape if waiting to be rescued would increase the hazard to the DISSUB personnel.

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[3] ATP/MTP-57 (C) takes precedence for the conduct of SUBSAR Operations over ATP-10 (D) and supplements IAMSAR. ATP-10 remains a search and rescue document in general.

[4] See Note at page 1-3 para 1.4

Transition between the phases is rarely well defined, and because of the change of operational focus, OSC must provide a comprehensive brief to the CRF. During the Escape and Rescue phase, the OSC will provide the appropriate support to the CRF, utilizing those Forces and resources at his disposal.

1.5.6.4. ACTIVATION/MOBILIZATION OF SUBMARINE RESCUE ELEMENTS.

Once the Alert is established, activation of SMER resources should start as soon as possible. All mobilization will take place in accordance with either the requests of the DISSUB's National Authority (NA), or the initiative of those Nations intending to support. This could involve the mobilization of more than one Rescue Element.

While the search is proceeding, the Submarine Search and Rescue Authority/Search Mission Coordinator (SSRA/SMC) will normally coordinate the call-out, embarkation and deployment of the Recovery and Rescue Forces in accordance with the wishes of the NA. The SSRA/SMC should alert ISMERLO in order to obtain information about the availability of Rescue Elements across the world.

Detailed information about the Search and Localization phase can be found at Chapter 3.

ISMERLO is capable of providing a worldwide coordination capability during the mobilization, by monitoring the availability of those elements which can assist a nation facing a DISSUB incident. ISMERLO can also provide advice to the SSRA/SMC if required or as the situation demands.

Chapter 4 describes instructions and procedures to be carried out during the mobilization of the SMER resources.

1.5.6.5. MEDICAL SUPPORT AND ORGANIZATION

Chapter 6 deals with medical aspects of a SUBSAR operation.

1.5.7. DISSUB LIAISON TEAM (DLT)

The DISSUB NA should provide a DLT to support the OSC and CRF. This team should include submarine officers, medical officers (specialized in underwater and hyperbaric medicine), design authorities, SUBSAR specialists, translators and media advisors.

The DLT must have available all applicable technical details of the DISSUB, to adequately advise the OSC and CRF.

The DLT will also identify any requirements for additional manpower during extended operations. Advice on local facilities may also be required from the port area closest to the DISSUB location or used for forward support.

A detailed DLT Check-off list is at ANNEX 4.B.

1.5.8. RECOVERY OF ESCAPEES

Rescue is the preferred method but escape is equally possible, depending on onboard conditions. Crew may indeed be forced to escape before the arrival of any surface assistance or Rescue Elements, in which case the Search Force may come upon escapees already on the surface and in need of treatment.

1.5.9. INTERVENTION

Intervention is the use of external resources to increase survivability. This can be surface or subsurface, and is likely to involve specialist assets for survey, debris clearance and transponder field preparation on and around the DISSUB. During the waiting time between location and rescue, but also during the rescue itself, it may be necessary to maintain conditions on the DISSUB by providing Emergency Life Support Stores (ELSS) either in the "wet re-supply" mode, using pressure tight pods posted into the escape tower by IROV, ADS or Divers, or in the "dry" mode by

a Submarine Rescue Vehicle (SRV) or Chamber (SRC). Some classes of submarine can accept an air supply connection and maintain a breathable atmosphere thereby (Ventilation). Chapter 3 deals with Intervention.

1.5.10. RESCUE OF DISSUB PERSONNEL

If conditions aboard the DISSUB allow, personnel will wait to be rescued. This operation may take several days to stage during which intervention operations may prepare for the arrival of Rescue Elements. This could involve survey, debris removal, tracking preparation, re-supply of ELSS and, if appropriate Element and interfaces are available, the control of the DISSUB atmosphere. Rescue operations should commence once appropriate Rescue Elements arrive at the scene. Note: No two situations will ever be the same. While not very likely, it is possible that lives will be saved by both Escape and Rescue from the same DISSUB.

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ANNEX 1.A. SUMMARY OF SMER APPLICABLE STANAGS

STANAG	TITLE	CUSTODIAN
1372	ALLIED GUIDE TO DIVING OPERATIONS (ADivP-01)	GBR
1390	THE SUBMARINE RESCUE MANUAL (ATP/MTP-57)	MARCOM/ ISMERLO
1432	MULTINATIONAL GUIDE TO DIVING MEDICAL DISORDERS (ADivP-02/MDivP-02)	GBR
1475	MATERIAL INTEROPERABILITY REQUIREMENTS FOR SUBMARINE ESCAPE AND RESCUE (ANEP-MNEP-85)	USA
1476	TECHNICAL AND MEDICAL STANDARDS FOR SUBMARINE ESCAPE AND RESCUE (ANEP-MNEP-86)	MARCOM/ ISMERLO
2879	PRINCIPLES OF MEDICAL POLICY IN THE MANAGEMENT OF A MASS CASUALTY SITUATION	DEU
3552	SEARCH AND RESCUE - (ATP-10)	GBR

Table 1-1 Summary of SMER applicable STANAGs

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CHAPTER 2 - THE DISSUB

2.1. INTRODUCTION

This chapter provides information and guidance for Surface Forces and other Submarine Escape and Rescue resources participating in a SUBSAR operation.

The purpose of this chapter is to give an overview of conditions that may exist in a DISSUB, as well as circumstances and facts that will affect the conduct of the intervention and/or rescue. The chapter also details the information available to the Commander or "Senior Survivor", in order to evaluate the situation.

Information about emergency equipment carried aboard can be found in the ATP/MTP-57.2 – National Data or will be provided by the DLT.

2.2. GENERAL INFORMATION

2.2.1. CAUSE OF SUBMARINE SINKING

Submarines are designed to be neutrally buoyant when their main ballast tanks are full of water. This allows them to dive and operate safely. Even if all electrical and propulsive power is lost a submarine crew should be able to blow water out of the main ballast tanks, and other compensating tanks, to give the submarine positive buoyancy to get it to the surface. However, if a large quantity of water floods into the pressure hull of a submarine, after a catastrophic accident or due failure of a sea water system which cannot be isolated, a point will be reached during the flooding when no action taken by the submarine crew can compensate for the increased mass of the submarine and it will sink to the bottom.

2.2.2. PHYSIOLOGICAL CONSIDERATIONS OF THE DISSUB CREW.

The DISSUB crew may be exposed to several hazards that limit survivability and directly affect the stay-time prior to escape and/or rescue. The most critical factors are:

- uncontrolled flooding,
- pressure rise,
- toxic atmosphere,
- temperature,
- loss of life support capability.

Where such catastrophic factors do not apply, the stay-time until surface support arrives for escape or rescue will depend on previously mentioned conditions.

It must be noted that if the pressure rises following the incident, the chances of carrying out a safe escape are reduced and that a big proportion of the escapees could suffer from Decompression Illness (DCI). These important factors will affect the crew stay-time on board a DISSUB.

It is likely that a percentage of the DISSUB personnel will suffer from injuries caused by the accident itself or from exposure to the above conditions.

Diving and submarine medical experts are needed to make initial diagnoses of escapees and rescuees.

Detailed information and advice on physiological and medical issues are given in Chapter 6 -.

2.3. POSSIBLE SCENARIOS ON BOARD OF DISSUB

2.3.1. CONDITIONS ON BOARD THE DISSUB

Conditions in the submarine will depend on the severity of the accident that has caused the sinking and the crew's ability to stabilize the situation. Any submarine flooding will result in some internal pressure rise; it is therefore imperative to keep it as near to atmospheric as possible because increased pressure, as well as temperature, atmosphere contamination and the availability of food, will adversely affect crew's performance and reduce their chance of survival.

It can be safely assumed that it is virtually impossible for a submarine to bring itself to the surface should any one of her main compartments be flooded. For there to be any personnel in the DISSUB following an accident at least one of the escape bulkheads must be intact. In the "worst" case all those who have survived the accident will be in one of the escape compartments. The compartment may be partially flooded and/or may have an internal pressure above 1.0 bar (absolute). Each of these possibilities will present different problems to the DISSUB personnel and to the Recovery and Rescue Forces.

The decision on how and when to escape is the sole responsibility of the "Senior Survivor", although as much advice as possible should be provided by surface forces. Ideally escape should take place after Search and Recovery Forces have located the DISSUB and are standing by on the surface to provide assistance. However, conditions in the DISSUB may force the Senior Survivor to start the escape before the arrival of surface forces that may arrive at the datum and find men in the water.

Factors affecting the time of escape will include conditions of current and tidal stream, light, weather and the proximity of surface forces as well as the pressure and atmosphere condition in the DISSUB. Escape will not normally be delayed beyond the limits of pressure or atmosphere sustainability, in order to await rescue, unless the Senior Survivor considers that circumstances justify such a delay, or the depth of the DISSUB is such that successful escape is clearly out of the question. A partial escape to lower the burden on remaining atmosphere control equipment is also to be considered.

2.3.2. SCENARIOS

Scenario within the DISSUB can be conveniently divided into the following categories:

2.3.2.1. DRY UNPRESSURIZED

In this scenario, rescue is the preferred method of saving lives. In the event that the submarine is not located, or some other adverse event or condition exists, escape may be necessary.

2.3.2.2. DRY PRESSURIZED

In this scenario, the major problem for the DISSUB crew is to decide whether to escape or not. In general terms if the pressure rises, an increased likelihood of decompression sickness will occur during escape.

2.3.2.3. WET UNPRESSURIZED

Ambient temperatures will fall more rapidly than in the dry unpressurized compartment and hypothermia will be a major problem.

2.3.2.4. WET PRESSURIZED

All the factors in the dry pressurized compartment apply, except that the rate of fall in ambient temperature will be significantly greater. Hypothermia may again be a major problem.

2.4. SMER FACILITIES ON BOARD THE DISSUB

2.4.1. ESCAPE COMPARTMENTS AND EQUIPMENT

Most nations' submarine escape and rescue policy is based on the concept that, following an accident, if any portion of the submarine is left untouched, it must be one of or either the forward and aft compartments. For this reason these compartments, or a pressure tight room between compartments, are designated Escape Compartments and most SMER equipment and materiel is concentrated in them. In one-compartment submarines, with no internal pressure tight bulkheads, the whole pressure hull represents a single Escape Compartment.

SMER equipment and gear inside escape compartments could consist of some or all of the following:

a. Release gear for Indicator Buoy or Messenger Buoy.
b. Submerged Signal Ejector and stores i.e. smoke candles, grenades and communications buoys.
c. Emergency Underwater Telephone with DISSUB Bleeper.
d. Means of providing oxygen.
e. Means of absorbing Carbon Dioxide (CO2).
f. Atmosphere monitoring equipment, electronically or manual (Draeger pumps and tubes) measuring instruments for monitoring O2, CO2, CO, Cl2 and NOx levels.
g. Thermometer.
h. Absolute pressure gauge.
i. An escape tower with a common rescue seat (see ANEP/MNEP-85) around its upper hatch. Small submarines may not have escape towers in which case only compartment escape is possible.
j. Hood Inflation System (HIS) to provide a supply of air to escapees whilst flooding up in the escape tower immediately prior to escape and/or a built in breathing system (BIBS) to provide air for compartment escape.
k. Sufficient Submarine Escape and Surface Survival Personnel Equipment (SESSPE) or hooded life jackets for everyone on board with a small percentage surplus. (see paragraph 2.4.3 below for details on these elements).
l. Personal Locator Beacons (PLB) to be worn by some or all escapees.
m. Instructions on When and How to Escape.
n. Some submarines can release a life raft, which remains tethered to the DISSUB. The escapees climb into it on reaching the surface.
o. Equipment for receiving ELSS by Pod posting.

The General lay-out and escape equipment fitted on board the different submarines can be found in every Nation’s data contained in ATP/MTP-57.2 – National Data, as well as in the rescue coordination pages of the ISMERLO web page (www.ismerlo.org).

2.4.2. EMERGENCY LIFE SUPPORT STORES (ELSS)

The crew will take every step to reduce their consumption of oxygen (O2) and production of carbon dioxide (CO2) in order to prolong the survival time aboard. The posting of ELSS using pressure tight pods would further increase the waiting time. Nevertheless, morale will be low and every

effort must be made by surface forces to keep spirits on board the DISSUB high, by keeping them well informed of the efforts being made on their behalf.

POD-Posting are carried out by descending pressure tight pods (by a ROV, SRV, ADS or a Diver), from the surface, through an Escape Tower, to the DISSUB. Some submarines have specific devices to receive PODs; other submarines may use the torpedo tubes or the escape trunks for it.

2.4.3. ESCAPE SUITS /LIFEJACKETS USED BY SUBMARINE'S CREW.

A suit that aids escape from a submarine, which meets the requirements of ANEP/MNEP-86 .

The submarine personnel will utilize individual escape suit, life jacket or surface abandonment suit which may have an integral life raft to provide thermal protection and buoyancy for personnel survival on the surface.

2.5. WAYS USED BY THE DISSUB TO REPORT ON HER POSITION

For communications with the Submarine, see also Chapter 5 -. National data concerning communications and ways for the submarine to announce her position can be found in ATP/MTP-57.2 – National Data.

2.5.1. MAIN UNDERWATER TELEPHONE (UWT)

If possible, the DISSUB's crew will use the UWT as a primary source for communicating with the Search and Localization Forces (including the SPAG), as well as with the Escape and Rescue Forces. It is a National responsibility to provide an update to the SMER community with the technical data (e.g, frequencies both radio and UWT), as well as other embarked equipment. These data can be found in ATP/MTP-57.2 – National Data or at the coordination pages in the ISMERLO web site (www.ismerlo.org).

2.5.2. EMERGENCY UWT

Some submarines are equipped with an emergency UWT, usually located at the Escape compartments. These sets generally operate at 8 KHz and are power independent. Their primary purpose is for communication between the DISSUB's personnel and the surface forces once the submarine has been located.

In addition some sets, typically sonar locator beacons, are able to transmit on additional frequencies (details can be found in ATP/MTP-57.2 – National Data) to assist Search Forces in location or to enable SRVs to vector themselves on top of the DISSUB (especially in case of very poor visibility conditions).

2.5.3. SUBMARINE INDICATOR BUOYS

Some submarines are fitted with indicator buoys. They can be released from inside the escape compartments or the compartments adjacent to them. They are usually tethered to the submarine.

The buoys consist of an inflatable collar to support a radio unit that transmits on international distress frequencies, (121.5, 243 or 406 MHz). They can be fitted with a flashing light. Because they have a low margin of buoyancy they are not easily visible in any appreciable sea state except at short range; it is also possible that they may not be seen in a strong tideway.

Some Indicator buoys transmit a unique 3-figure serial number. National Authorities hold up to date lists of the indicator buoy numbers of all their submarines. Some nations, although allocated indicator buoy numbers, have buoys which have no means of transmitting the allocated number.

Some buoys also transmit on the COSPAS/SARSAT frequencies. These buoys, named SEPIRB (Submarine Emergency Position Indicator Radio Buoy), are normally floating. They transmit a string containing a certain number of data such as the position coordinates (typically fixed once the buoy gets activated), the time and an ID string identifying the single submarine. The information is received and automatically routed to the COSPAS/SARSAT ashore station, automatically decoded by the NA owning the submarine and in some cases automatically sent directly to the Subopauth for subsequent actions.

2.5.4. MESSENGER BUOYS

Submarines fitted for rescue by SRC may have a so called “messenger” buoy by each rescue seat. The buoy is released from the escape compartment and carries a thin wire to the surface. This wire is used to winch the SRC down onto the seat. Messenger buoys do not carry radio units.

2.5.5. OTHER COMMUNICATIONS BUOYS

Other communication buoys which could be used by the DISSUB for Escape and Rescue purposes are:

a. Submarine Launched One-way Tactical buoy (SLOT Buoy). These buoys are similar to JEZEBEL sonobuoys and can be released from the submarine signal Ejector at depths down to 300 metres or more. A short voice/CW message recorded on tape is transmitted on a pre-set VHF channel. Frequencies available are numbers 25, 27, 29 and 31 of the normal JEZEBEL channels.

b. Expendable Communications Buoys (ECB). They can be released from the Submarine Signal Ejector (SSE) and, in the emergency mode, transmit a pre-recorded message on 121,5 MHz, 243.0 MHz or 406.0 MHz.

More exhaustive and educational information about typical configuration and equipments available aboard of a DISSUB is available in ATP/MTP-57.1 - Background Supplement.

2.6. EGRESS OF DISSUB PERSONNEL

2.6.1. THE DECISION ON HOW AND WHEN TO ESCAPE IS THE SOLE RESPONSIBILITY OF THE "SENIOR SURVIVOR"

There are 4 different ways to evacuate the DISSUB:

2.6.1.1. RESCUE

A SRV or a SRC mates with the DISSUB and equalizes the pressure between them. Thereafter hatches separating them are opened and personnel are transferred, from the DISSUB to the SRV or SRC and thence to a MOSHIP or a place of safety.

Some Rescue Elements are capable of TUP operations enabling therapeutic decompression of personnel who have been exposed to raised pressure.

Due to their complicated logistic requirements Rescue Elements may take several days to get to the scene of an accident. For this reasons most submarine operating nations continue to fit appropriate escape systems.

2.6.1.2. ESCAPE

There are two methods of escape known as Tower Escape and Rush Escape:

a. Tower Escape. One or more men in turn, dressed with an escape and survival suit (SESSPE), climb into an escape tower. Once the lower hatch has been shut the tower is rapidly flooded and pressurized while the escapee is kept supplied with air to breath and his suit is inflated to give it positive buoyancy. Once the pressure between the tower and the outside water column is equalized, the upper hatch opens and the escapee makes a rapid ascent to the surface.

b. Compartment or Rush escape. Some submarines, particularly those with a single compartment pressure hull, rely on compartment escape. The system requires the whole compartment being flooded, pressurized and equalised, at which point an escape hatch can be opened and each man in rapid succession makes an ascent to the surface. Some submarines fitted with the tower escape system can revert to the rush escape method, which is similar to the compartment escape except that it is only used if accident has caused the escape compartment to flood uncontrollably or the escape tower to be unserviceable. The major disadvantage of this system is that in water deeper than 30 m (100 Ft) the number of casualties caused by prolonged time under pressure will increase with depth. The likely maximum depth from which such an escape can be performed is 70 m (230 Ft), with a survival rate of only a few escapees.

2.6.1.3. SUBMARINE ESCAPE CAPSULES

A small number of submarines are fitted with an escape capsule which the whole (or a proportion) of the crew can climb into. Once released from the DISSUB, the capsule floats to the surface.

2.6.1.4. SURFACE ABANDONMENT

Surface Abandonment is accomplished by egressing the submarine using main deck or sail/fin hatches. This evolution is difficult from a submarine, especially in higher sea states and unlike surface ships, submarines are normally not fitted with large life rafts. Therefore, it is anticipated that numerous individuals will require extraction from the sea. Submariners who have abandoned ship are unlikely to have experienced DCI.

2.7. OPTIONS FOR THE CREW

Once on the sea bed the options available to the crew will depend on the depth in which the submarine has sunk:

a. <u>BELOW SUBMARINE COLLAPSE DEPTH.</u>

The submarine will implode and there will be no survivors;

b. LESS THAN SUBMARINE COLLAPSE DEPTH BUT DEEPER THAN MAXIMUM ESCAPE DEPTH.

Rescue may be conducted dependent upon:

1. DISSUB being fitted with a mating seat which meets the requirements of ANEP/MNEP-85. (submarine details in ATP/MTP-57.2 – National Data)
2. DISSUB being shallower than maximum mating depth of available rescue submersibles (capabilities of rescue submersibles in ATP/MTP-57.2 – National Data)
3. Air purification capacity onboard the DISSUB being capable of maintaining air purity within safe limits whilst awaiting arrival of rescue forces which could take several days. This period could be extended by posting ELSS in pressure tight pods through an Escape Tower, but this is limited to the depth capability of the escape tower.
4. Internal bulkheads being able to withstand the sea pressure.

c. LESS THAN MAXIMUM ESCAPE DEPTH.

Rescue is still the safest means of recovering the crew of the DISSUB; however, if conditions in the submarine are deteriorating and the crew cannot risk waiting for rescue forces to arrive, they may have to take the decision, based on instructions onboard the submarine, to make an escape. Advices on making this decision can be given by escape and rescue experts on the surface but in the final analysis it remains the senior survivor's decision.

2.8. ADVANTAGES OF RESCUE

Rescue has the advantage that the DISSUB's crew are transferred, to the MOSHIP without being exposed to an increased pressure. In certain circumstances, it is possible to transfer men, who have been "saturated" at pressure, to a facility for slow decompression to atmospheric pressure. Not all rescue systems are capable of achieving this and surface decompression techniques may have to be used with their inherent risks.

2.9. DISADVANTAGES OF RESCUE

The major and only disadvantage of using rescue submersibles is that it may take several days for the submersibles and their mother ships (MOSHIPs) to get to the scene of the accident. For this reason most submarine operating nations, particularly those whose submarines spend a large proportion of their operating cycle in water in which escape would be possible, continue to fit appropriate escape systems.

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CHAPTER 3 - SEARCH AND LOCALISATION OF A DISTRESSED SUBMARINE

3.1. INTRODUCTION

3.1.1. GUIDANCE FOR USE.

This chapter contains information to enable Operational Commanders to assemble the forces and equipment needed to search and locate a DISSUB, and establish communication with her. Guidance is also given to units engaged in the search for the DISSUB and in particular to the On Scene Commander (OSC). In SUBSAR Operations, the Search and Localisation Phase begins transition to the rescue phase when either the submarine or escapees from her crew are located. The treatment of pressure related injuries suffered by the DISSUB's crew are covered in Chapter 6 -.

3.1.2. PURPOSE

The purpose of this chapter is to:

a. Standardise SUBSAR operational procedures for the Search and Localisation of a DISSUB.

b. Provide basic information to all those who may be confronted with a submarine rescue scenario, either a distressed submarine on the surface or on the seabed

c. Serve as a guide for all Operational Commanders responsible for SUBSAR operations.

3.1.3. AIM

The aim of the SUBSAR organisation is to save lives by ensuring the earliest possible localisation of the DISSUB and the recovery of her crew. Due to the relatively limited amount of equipment immediately available to cope with a submarine disaster, offers of assistance are likely to be received from many nations and much of them will be needed to ensure that as many lives as possible are saved. Naturally this will complicate the problems of assembling and coordinating all suitable units and equipment to the scene of the accident.

Therefore while SAR is in principle a national responsibility, it is for the sake of simplicity and speed of response that the SUBSAR organisation will be the same in war as in peace, whether it be in a NATO exercise/operation or not. This is achieved by providing a procedure for the prompt alerting of forces to take part in the search while Rescue Elements mobilise toward the scene of action and other vessels prepare more specifically for the rescue or the recovery and treatment of survivors.

The procedure for the prompt alerting and search is applicable to any SUBSAR operation whether the DISSUB is assigned to NATO or not. Immediate establishment of an alert on the ISMERLO web site should be considered as soon as it is suspected that a submarine is distressed on the seabed or on the surface.

3.2. DEFINITIONS

Definitions contained in this paragraph are those specific SAR terms exclusively used during SUBSAR Operations. They supplement other SAR terms and definitions contained in different related documents.

3.2.1. CHECK ARRIVAL REPORT

A signal transmitted by a submarine immediately upon its arrival in port. This signal may be required by the Submarine Operational Authority (SUBOPAUTH).

3.2.2. SURFACING SIGNAL

A signal transmitted by a submarine to indicate the completion of a dived period as covered by a Diving signal. Alternatively it concludes a passage or a leg of a passage as required by the SUBNOTE and thereby cancels any extant Diving Signal or concludes any preceding series of Subchecks Reports

3.2.3. AUTHORITIES

The following are the specific Authorities and Command and Control (C2) definitions for a SUBSAR operation:

a. National Authority (NA). The State or Command Authority that has sovereignty over the DISSUB.

b. Alerting Authority (AA). Typically the Commander (SUBOPAUTH) who has operational control of the DISSUB. It is responsible for initiating the Submarine Safety Communications Check (COMCHECK) procedure, as well as the Operation SUBLOOK/SUBMISS/SUBSUNK procedures (see paragraph 3.7). The SUBOPAUTH is the Naval Authority responsible for the safe routeing of a submarine under his Operational Control (OPCON).

c. Submarine Search and Rescue Authority/Search and Rescue Mission Coordinator (SSRA/SMC). The Naval Authority designated by the NA (OPCOM) responsible for the planning and conduct of Submarine Search, Escape and Rescue operations (IAMSAR Vol. II article 1.2.3 refers).

The SSRA/SMC may be a national or NATO Maritime Component Commander or appointed Maritime Commander, depending upon the requirements of the NA or the Authority which establishes the submarine OPCON. The SSRA/SMC will operate in coordination with the relevant RCC.

The DISSUB's NA should seek prior agreements with concerned national or NATO Commands. The SSRA/SMC is to be nominated either in an (EX)OPORD or in the relevant tasking documents. Its responsibilities may be passed to or from the relevant National/NATO Authorities.

d. Support Authority (SA). Any authority that provides assistance to the NA and/or to the SSRA/SMC.

e. On Scene Commander (OSC). The Commander of the military unit which first reaches the vicinity of an accident or datum is to act as OSC until relieved or confirmed by SSRA/SMC.

In the event that the first unit on the scene is an aircraft, the aircraft Commander will retain control of SAR operations until the arrival of a surface unit Commander, which then will assume the duties of OSC. In all other cases, in order to maintain continuity of command, the Officer who subsequently may arrive on the scene is not to assume command by reason of seniority unless or until:

1. Ordered to do so by the SSRA/SMC, or
2 In his judgement, a change of command is essential.

f. Coordinator Rescue Forces (CRF). The Officer with responsibility for coordinating and controlling the recovery of escapees and/or the rescue of the crew from the DISSUB. He is designated by the SSRA/SMC.

During multinational rescue responses takes advice of the Rescue Element Commanders (REC) or National Rescue Coordinators (if assigned) to develop and task the REC to execute the rescue plan.

The CRF may or may not be subordinated to the OSC; in case he is not subordinated, the CRF will take the lead on the rescue operations and the OSC will support the CRF as far as it is needed, sanitizing the area and providing help with available resources. Anyway, close coordination between CRF and OSC is paramount for the success of the rescue operation.

g. National Rescue Coordinator (NRC). Subordinate to the CRF within the Rescue operation. Frequently provided during multinational operations by a nation providing rescue elements. (Could likely be a CRF if responding to his own Nations distressed submarine.) Would provide the CRF advice and recommendations on the best utilization of his/her nations assigned rescue capabilities.

h. Rescue Element Commander (REC). Subordinate to the CRF within the Rescue operation. In command of the Rescue Element (rescue or intervention or both) with responsibility for conducting either the rescue of the crew, the recovery of the escapees or the intervention as indicated and directed by the CRF. Responsible to his/her own NA for the operation of assigned systems. During multinational operations provides the CRF advice and recommendations on the best utilization of his/her assigned rescue capabilities.

When an NRC is assigned would follow national procedures with respect to command and control relationship with the CRF.

3.2.4. SUBMARINE ESCAPE AND RESCUE SPECIALISTS

During SMER operations, the headquarters of the SSRA/SMC should be provided with the following specialists (liaison officers):

a. qualified in submarine operations (preferably a Commanding Officer and an Engineering Officer of the same class as the DISSUB)

b. public affairs

c. diving and underwater medicine

d. diving operations

Prior to the DISSUB localization (Search and Localisation phase), as well as on the scene of action (during the Rescue Phase), experts mentioned above should also be provided to the OSC and/or to the CRF. Diving and underwater medical specialists might be sent to any recompression therapy centre which could help during the operation.

3.3. INTERNATIONAL SUBMARINE ESCAPE AND RESCUE LIAISON OFFICE (ISMERLO)

The International Submarine Escape and Rescue Liaison Office (ISMERLO), established in 2004 by Supreme Allied Command for Operations has organizationally transitioned from Allied Submarine Command (ASC), Norfolk, VA (USA) to NATO Maritime Command (MARCOM), Northwood (UK) on 01 December 2012 and has been relocated in Northwood (UK) in late 2015. This office provides a worldwide coordination capability and monitors the availability of Escape and Rescue Elements which may assist any nation facing a submarine disaster. The capability is built from a small group of people, civilian and/or military, provided by different nations to work in the area of SMER. As a global response organisation, focused on humanitarian objectives to contribute on saving lives at sea, the ISMERLO is encouraged to pursue the involvement of all submarine-operating nations. The office provides coordination through its web site management system on Internet at www.ismerlo.org or at www.subrescue.org as backup.

3.4. TERMINOLOGY FOR SUBSAR OPERATIONS

3.4.1. DEFINITIONS AND TERMS SHOWN IN TABLE 3-1 BELOW ARE USED DURING SUBSAR OPERATIONS.

TERM	DEFINITION
COMCHECK	The signal originated by SUBOPAUTH when the safety of a submarine is in doubt.
Datum	Last known position of DISSUB. Used as the starting point for all search plans. It will be updated and marked when true position is known.
Distressed Submarine (DISSUB)	As it is stated in AAP-6, a DISSUB is a distressed submarine on the seabed unable to surface. For the purpose of alert and possible mobilization of submarine Escape and Rescue Elements, the Submarine Escape and Rescue community also calls DISSUB to a surfaced submarine needing assistance due to a diving/safety emergency.
Diving Signal	A signal transmitted by a submarine before it dives, indicating the date and time of dive, date and time of completion, position and reason for diving.
Emergency Life Support Stores (ELSS)	Items of stores for use by the personnel in the DISSUB to enable them to survive whilst awaiting rescue. Stores include such items as CO2 absorbent, O2 candles and medical stores for emergency treatment of casualties.
Escape	Any method by which a man leaves a DISSUB and makes his way to the surface without direct assistance from outside Rescue Elements. A man who makes an escape is known as an 'escapee'.
Escape Gear Ship (EGS)	Any ship nominated by the SSRA/SMC to carry medical stores and equipment to facilitate the recovery and treatment of escapees on reaching the surface.
Submarine Expendable Communications Buoy (ECB)	A communications buoy which can be launched by a DISSUB from a Submerged Signal Ejector (SSE). When on the surface it operates on a predetermined UHF frequency and when released in the emergency mode transmits an emergency DF beacon which can be detected by satellites or other receivers.
ISMERLO	International Submarine Escape & Rescue Liaison Office (ISMERLO). Multinational coordinating office for Submarine Escape and Rescue related issues. The office provides coordination through its web site management system on Internet at www.ismerlo.org or at www.subrescue.org as backup
MOSHIP	A ship used to carry a Submarine Rescue Element to the scene of the submarine accident.

TERM	DEFINITION
Moving Havens (MHN)	The Moving Haven (MHN) is the normal method by which submarines are routed. The standard MHN is an area 20 Nautical Miles (NM) ahead, 30 NM behind, and 5 NM on either side of the submarine's planned position. The MHN should be reduced in size in restricted waters. In peacetime, the shape of an MHN may be varied to suit the operational requirements. The size of the MHN is stated in the SUBNOTE.
On Scene Commander (OSC)	Responsible for the conduct of the search with the assets allocated by the SSRA/SMC. The OSC will also carry out the peripheral activities required, among them force protection, after the DISSUB has been located leaving the CRF free to concentrate on saving lives.
Personal Locator Beacons (PLB)	Small radio transmitters in a container capable of withstanding pressure equivalent to the maximum escape depth of the DISSUB. PLBs are worn by escapees (though not normally carried by all) and when switched on transmit an emergency DF beacon. Most recent models are Satellite based.
SMASHEX	The Codeword of an exercise which may be executed to test any or all of the procedures and practices required in a submarine disaster. SMASHEX may exercise specific parts of the SUBLOOK/SUBMISS/SUBSUNK sequence as follows: - SMASHEX ZERO equates to COMCHECK - SMASHEX ONE equates to SUBLOOK - SMASHEX TWO equates to SUBMISS - SMASHEX THREE equates to SUBSUNK
SUBCHECK Report	The signal transmitted by a submarine at specified intervals to ensure the SUBOPAUTH of her continued safety. No other signal received from a submarine may replace a SUBCHECK REPORT. Non-receipt of other anticipated signals should not normally give rise to undue concern although in such circumstances it may be appropriate to initiate a SUBMARINE SAFETY COMCHECK.
SUBLOOK (Format at ANNEX 3.B)	The Codeword of the procedures initiated by the SUBOPAUTH when the safety of a submarine is in doubt, or when a Surfacing Signal, Check Arrival Report or SUBCHECK Report from a submarine under his operational control becomes one hour overdue.
Submarine Escape and Rescue Assistance Team (SMERAT)	A team of Submarine Escape and Rescue experts augmented by medical specialists who are available to provide advice and assistance to the SSRA/SMC, OSC and CRF.
Submarine Launched One-way Tactical (SLOT) Buoy	A communications buoy that can be launched by a DISSUB from a Submerged Signal Ejector. When on the surface it operates on one of a number of predetermined VHF frequencies (compatible with `Jezebel' Passive Sonobuoy monitoring channels). Although normally used to pass operational data, the buoy could be also used by a Submarine in Distress (DISSUB).

TERM	DEFINITION
Submarine Rescue Chamber (SRC)	A bell that can mate with the NATO common rescue seat but in addition has to be fitted with special securing arrangements. Tipically capable of rescuing up to 6 personnel at a time.
Submarine Rescue Vehicle (SRV)	Any submersible craft which may be used for the recovery of personnel from a DISSUB.
SUBMISS (Format at ANNEX 3.B)	The Codeword used for an operation that will be executed in order to initiate a fully coordinated search for a submarine that is believed to be missing. The SUBOPAUTH will normally originate a signal with this codeword when a Surfacing signal, SUBCHECK Report or a Check Arrival Report of a submarine is 6 hours overdue, or for one-compartment submarines 3 hours overdue. These periods are not mandatory and will depend on the situation or national policy.
Submarine Notice (SUBNOTE)	As stated in AAP-6, a SUBNOTE is a message report originated by a submarine operating authority providing operational and movement instructions for submarines in peace and war, including transit and patrol area information. The SUBNOTE accurately defines the route that the centre of the Submarine MHN will follow.
SUBSUNK (Format ANNEX 3.B)	The Codeword used for an operation that will be executed in order to initiate a fully co-ordinated search for a submarine that is known to have sunk. The codeword is also used by any authority or unit to signal when having positive information that a submarine has sunk (eg, when submarine has been located).
Submarine Parachute Assistance Group (SPAG)	A team of escape and rescue experts, augmented by medical specialists, available at short notice to parachute into the water to rescue survivors and give first aid medical treatment before the arrival of surface rescue ships.
Surfacing Signal	A signal transmitted by a submarine to indicate the completion of a dived period as covered by a Diving Signal or SUBNOTE
Survivor	The term survivor is only to be used for personnel who have escaped or been recovered from the DISSUB and, in the opinion of a medical expert, are deemed likely to live.

TERM	DEFINITION
SURFACING and ARRIVAL ZERO TIME	The time at which the SUBOPAUTH must have received a Surfacing Signal or a Check Arrival Report from a Submarine. A SURFACING ZERO (SZER) TIME is used when a submarine dives on a diving signal or for the last port in a SUBNOTE. The ARRIVAL ZERO (AZER) TIME is used in SUBNOTES only for intermediate port visits. The meaning of AZER and SZER in terms of submarine safety as described in this publication is equal. SURFACING and ARRIVAL ZERO TIME also designates the time to execute: a. SUBMARINE SAFETY COMCHECK (at SURFACING or ARRIVAL ZERO TIME). b. SUBLOOK (at SURFACING or ARRIVAL ZERO TIME plus one hour). c. SUBMISS (at SURFACING or ARRIVAL ZERO TIME plus 6 hours, or 3 hours for one-compartment submarines).
Underwater Communications Guard	This duty should be assumed automatically by the first ship or submarine arriving in the datum area and capable of communicating with or intercepting messages from a DISSUB. A suitably fitted helicopter may temporarily assume this duty until the arrival of the first Underwater Telephone (UWT) fitted ship or submarine.
Submarine Rescue Element	Any asset or system used for a SUBSAR Operation.
Vessel of opportunity (VOO)	Any vessel (normally civilian) potentially available to carry onboard a Submarine Rescue Element to the DISSUB area. When the VOO is selected to embark an Element, it is called MOSHIP.

Table 3-1 Submarine SAR Terminology

3.5. RESPONSIBILITIES FOR SUBSAR OPERATIONS

3.5.1. NATIONAL AUTHORITY (NA)

The NA is responsible for the Sovereignty, National Administration and National Operations outside the immediate search area and for arranging National and NATO support to the SSRA/SMC. By reason of financial responsibility, the NA will normally initiate the request to other nations for logistic submarine SAR support (submarine rescue vehicles, commercial submersibles, diving equipment, SUBSUNK stores, etc). The NA may delegate the coordination of support to the SSRA/SMC conducting the SAR operation.

3.5.2. ALERTING AUTHORITY (AA)

The AA is responsible for initiating the SUBSAR Operation, using the SUBLOOK/SUBMISS/SUBSUNK procedures (see paragraph 3.7). If the position of the DISSUB is unknown, the AA will advise the SSRA/SMC and the OSC on the extent of the Submarine Search and Rescue Zone and, if possible, the most likely position of the submarine. The AA will

normally establish the alert on the ISMERLO web site. The Alert can be created by any person having access to the web site as soon as it is known that a Submarine is in distress.

3.5.3. SUBMARINE SEARCH AND RESCUE AUTHORITY (SSRA/SMC)

On receipt of a SUBLOOK, SUBMISS or SUBSUNK signal initiated by the AA, the SSRA/SMC will:

a. Nominate or confirm the OSC and other search units.

b. Establish or confirm the search datum and provide the OSC with the “rescueable water” concept information.

c. Call upon one or more RCCs to assist with all means available.

d. On request by the NA, coordinate the logistic support for the submarine SAR operation.

e. Be responsible for the overall conduct of the search and rescue including provision of Search Forces. The SSRA/SMC is also to coordinate the makeup of the Rescue Force, subject to overriding NA approval of financial outlay.

f. Keep all appropriate involved authorities informed (including MODs/CHODs), about the progress of the SUBSAR operation and any requirements for additional support.

g. Coordinate with the NA the release of information to the media.

3.5.4. SUPPORT AUTHORITY

In submarine accidents other Commands and supporting nations shall make available rescue capabilities to the NA and/or SSRA/SMC. Format message at paragraph 3.B.7 (National SMER Assistance Available) should be released on receipt of a SMER Alert without waiting for a formal Request for Assistance signal from the N.A. or the SSRA/SMC.

3.5.5. ON SCENE COMMANDER (OSC)

The OSC will:

a. assume responsibility for the SUBSAR Operation at the scene of the accident.

b. organize and take control of Search Force.

c. send Situation Reports (SITREPs) which will serve to keep his own forces, the SSRA/SMC and NA informed on the progress of the search. These SITREPs will be sent by the OSC on arrival at the datum and at three-hourly intervals thereafter.

d. provide, with the arrival of the CRF, overarching control of the force and support to the CRF to execute the rescue operation.

In general terms and in accordance with military chain of command the OSC must control all the non Submarine Escape and Rescue activities in order to allow the CRF the freedom of action to perform a speedy intervention and rescue. A check off list of required information is at paragraph 3.A.1– SSRA/SMC CHECK-OFF LIST.

3.5.6. COORDINATOR OF RESCUE FORCES (CRF)

The CRF will:

a. act as the coordinating authority to direct the rescue mission including the activities of the individual RECs.

b. report the status of the rescue operation to the OSC, NA and SSRA/SMC to enable the best possible support for successful completion of the rescue effort.

c. take the input from the deployed NRC/s (if provided) and REC/s on their respective capabilities, DISSUB's status and environmental conditions (i.e. sea state, depth, weather, current etc) at the DATUM, to develop the rescue plan.

3.5.7. NATIONAL RESCUE COORDINATOR (NRC)

The NRC:

a. is nominated by a SN, if desired;

b. represents the SN when its own Rescue Element is deployed and employed should the CRF have a different nationality;

c. guarantees the Liaison between the SN and the CRF and acts as his consultant regarding the optimum and safest employment of the Supporting Nation Rescue Element/s;

d. advises the CRF on proper employment of own Nationality Rescue Elements should safety issues arise or to resolve potential differences between National regulations/operating procedures and operational requirements on the scene.

3.5.8. RESCUE ELEMENT COMMANDER (REC)

The REC:

a. is the Commander of the Rescue Element tasked to support the Rescue/Intervention Operation;

b. is assigned to the SSRA/SMC and reports to the CRF regarding the development of the operation;

c. receives tasking from the CRF yet is responsible for the safe conduct of the operation of assigned equipment in line with his/her own National regulations.

3.5.9. INTERNATIONAL SUBMARINE ESCAPE AND RESCUE LIAISON OFFICE (ISMERLO)

3.5.9.1. THE ISMERLO WEBSITE (WWW.ISMERLO.ORG)

It is an official government password protected website originally hosted by Allied Submarine Command (ASC), Norfolk, VA (USA) and transitioned to NATO Maritime Command (MARCOM) Northwood (UK) in August 2015. The website is for rescue coordination, including advice and recommendations and not for the operational command of the rescue operation itself, whose responsibility lays on National Authorities and Rescue Element Commanders. However, users should be aware that using the website is for official purposes. During actual alerts the use of the alert pages and chat is to provide information essential in a rescue response. This office assists in coordinating the support of submarine search and rescue efforts of the various submarine operating nations and other national organizations.

The ISMERLO has also a password protected backup website (www.subrescue.org), to use in case of crash down of the primary site. The data contained on the primary website are mirrored to the backup one monthly, or in case of a real alert or when required by Nations during their main SMER exercises. All the ISMERLO members can have access to subrescue.org using the same credentials of the primary website.

3.5.9.2. RELEASE OF INFORMATION

As ISMERLO is an official government site, the release of information on the site is governed by NATO and SMERWG overarching public affairs guidance. Specifically, the content and the record of an Alert page, including the chat pages, are available for the use of Official Government/Military Agencies only. The further distribution of them to the public (media, press) is subject to the Policy

dictated by the Nation owning the submarine in distress, which requires the NA permission for their release. In addition, alert notification, although unclassified, should not be further distributed outside official government channels and media queries should be referred to the Nation whose submarine is in distress without further comment. Allied Submarine Command and ISMERLO will not release information to the public but will refer and/or forward requests to the appropriate NA for action. ISMERLO acts as the hub to facilitate rapid exchange of information in the event of an accident.

ISMERLO provides invaluable assistance in any SMER operation or exercise. Expert assistance in any rescue operation could dramatically reduce the time to get Rescue Elements in position and thereby improve the chance of successful submarine rescues and reduce the potential for loss of life.

3.5.9.3. THE ALERTS

Any ISMERLO web site member from any nation can activate an alert (real or exercise alert). When activating a real alert, the system automatically sends an SMS to those responsible for Submarine Rescue Elements and SMER experts from Nations all over the world, facilitating the rapid response of countries and people which could help during a Submarine Rescue Operation.

When specifically requested by the activating nation, Alerts can be generated without global notification and access.

Further information on specific use of the rescue coordination pages will be included in a future annex.

3.5.9.4. ISMERLO WEBSITE USERS REQUIREMENTS

The main purpose of the ISMERLO website is to provide a focal point for a co-operative international response to a submarine rescue event.

Within the website are several databases that are integral to the co-ordination of the rescue effort. It is important that these are kept up to date and periodically reviewed to ensure that all the information is correct and any changes in personnel etc have been made. It is an individuals and nation's responsibility to keep their information up to date:

a. Lessons Learnt Data base

To allow all SM operating nations gain the benefits from national and international SMER exercises; Nations shall include their key lessons identified into the LL Database whenever they have accomplished a national or international exercise.

b. SMERWG

The SMERWG forum is maintained as an area where SMER related issues are discussed. To ensure the continued success of this meeting it is essential that Nations provide their input to the SMERWG.

c. Exercises

Most nations plan and run SMER exercises. To help engender International co-operation it is important to provide key information of upcoming planned exercises to help and inform the SMER community. This will lead to greater participation during an exercise and is

essential to developing knowledge and striving for success. Nations shall upload their planned exercises to the calendar and events section of the website and upload (if the classification allows) all relevant documentation used to support the exercises. If following a planned script a copy should be sent to ISMERLO who will upload it on completion of the exercise.

d. National Contacts

This data base allows all ISMERLO users to view nations SMER representatives and their contact details. National coordinators should annually review their National contacts, ensuring that the personnel listed and their contact details are correct, removing any personnel that have left that nations SMER department. The National Coordinator shall notify ISMERLO personnel of users whose accounts should be removed.

e. Country Specific Data

This data is important to allow rescue system planning and for nation to formulate their dormant rescue plans therefore it is important that this information is kept up to date. The National Coordinator shall once a year review the Country Specific Data and include any changes or updates that have been made. This information will be used to update SRD ATP/MTP-57.2 – National Data.

f. Rescue Element Status

As the name suggests this is important information for the whole SMER community. Therefore Nations that own rescue systems shall update the system information every time there is a change in location or if the system is out of service due to maintenance or repair. Data validation should occur not less than every 60 days.

g. Submarine Data

This is used as a reference library for planning purposes and during a rescue event would provide important information for the rescue effort. The National Coordinator shall once a year review the Submarine Data and include any changes that have been made.

h. Airport/Sea port combination

Each nation is responsible for reviewing their Airport/Seaport combinations and uploading a completed Airport/Seaport survey checklist to provide information about their selected national Airports and Seaports once a year.

i. MOSHIP/VOO Database

Nations should update the Moship database whenever they experience a need or if they find a new Moship that will meet the mobilisation requirement of an air portable rescue system.

j. Publications/Docs

This is the area where all SMER related documents can be found, including ATP/MTP-57, STANAGS and National SMER documents that have been authorized to be shared with the wider SMER community. It is important that all the information held here is relevant and up to date. The national coordinator is responsible for updating the Publication/Docs Database with their national SMER documentation ensuring that all contained there is relevant and up to date.

k. Update Your Details

Everyone who is registered with an ISMERLO account should maintain their details and use the website with sufficient frequency to support global submarine rescue response. Accounts will be deleted if there is no visible activity within 9 months.

Below is a check list to help nations ensure that their national responsibilities to keep their information up to date:

Check list to help nations ensure that their national responsibilities to keep their information up to date:

What	Who	When	Date done
Lessons Learnt Data base	Everyone who has participated	At the end of every Exercise or Alert	
SMERWG	All invited SMERWG Nations	When the calling notice is issued	
Exercises	Nation planning the exercise	When the dates for the Exercise have been confirmed	
National Contacts	National coordinator	Periodical, once a year and when major staff changes	
Country Specific Data	National coordinator	Annually	

Rescue Element Status	Rescue Element Representatives	Whenever the is a change in location or readiness state	
Airport/Sea port combination	National Authority	Annually	
MOSHIP/VOO Database	Rescue Element Representatives	Whenever a new vessel is identified and assessed	
Publications/Docs	National Coordinator and Relevant Document Custodians	Annually	
Update Your Details	All ISMERLO Users	Every Six Months	

Table 3-2 ISMERLO Checklist

3.6. SUBMARINE SAFETY SIGNALS

3.6.1. SAILING AND ROUTING OF SUBMARINES

Submarines are routed by means of SUBNOTEs. The SUBNOTE is to indicate details, when applicable, of the time at which the SUBOPAUTH will change

3.6.2. GENERAL INSTRUCTIONS FOR CHECK ARRIVAL REPORT

A Check Arrival Report is sent by the submarine once in port. It cancels the prior part of her SUBNOTE and has to be sent by the submarine and received by the SUBOPAUTH before the "Arrival Zero Time" expires.

It is to be used if ports occur in a SUBNOTE and should be repeated for every port visit in the SUBNOTE. After the Check Arrival Report the submarine will finish sending SUBCHECK messages (if being used). Note that after a SZER (Surface Zero) Time the submarine can continue with a surfaced transit during which a 'SUBCHECK' report could still be required.

3.6.3. GENERAL INSTRUCTIONS FOR DIVING SIGNALS

Except when operating in accordance with a SUBNOTE, a Diving Signal is always to be made before a submarine dives, whether an attendant vessel is present or not. The Submarine is not to dive until this signal has been cleared. One Diving Signal may cover a series of dives in any specific exercise. Format for the Diving Signal is at paragraph 3.B.1.

3.6.4. GENERAL INSTRUCTIONS FOR SURFACING SIGNALS

A Surfacing Signal is transmitted by a submarine to indicate the completion of a dived period as covered by a Diving Signal or SUBNOTE. The Surfacing Signal must be transmitted in sufficient time to ensure its receipt by the SUBOPAUTH prior to the expiry of the Diving Signal or SZER time given in the SUBNOTE.

3.6.5. GENERAL INSTRUCTIONS FOR SUBCHECK REPORTS

In order that they can be assured of the continued safety of submarines under their control, SUBOPAUTHs will instruct submarines to make SUBCHECK Reports at intervals specified in SUBNOTEs, Exercise or Operation orders. SUBCHECK Reports may be waived at the discretion of the SUBOPAUTH with national approval.

3.6.6. SUBCHECK REPORT INTERVAL.

The time interval between consecutive SUBCHECK reports. The allowed interval is at the discretion of the SUBOPAUTH. It is measured from:

a. ETD as promulgated in the SUBNOTE; or

b. Time of diving as stated in the Diving Signal, or

c. DTG of the last SUBCHECK Report;

Whichever is the latest.

3.6.7. SAFETY IN EXERCISES

In advanced exercises, the Officer Scheduling the Exercise (OSE), with prior approval of national SUBOPAUTHS, may waive requirements for Diving or Surfacing Signals and SUBCHECK Reports. This waiver must be included in the Exercise or Operation Order.

3.7. COMCHECK/SUBLOOK/SUBMISS/SUBSUNK PROCEDURES

3.7.1. CIRCUMSTANCES INDICATING THE POSSIBILITY OF A SUBMARINE DISASTER

A submarine accident must be considered a possibility under any of the following circumstances:

a. A submarine fails to surface or communicate promptly following a positive or possible accident reported by any source.

b. Contact with a submerged submarine has been lost by participating units for a period of 2 hours, when such loss of contact has not been planned or anticipated as part of the exercise or operation.

c. There is reason to believe that a submarine has suffered some form of breakdown and requires assistance.

d. A SUBCHECK Report, Surfacing Signal or a Check Arrival Report is overdue.

3.7.2. INDICATION OF A SUBMARINE ACCIDENT

Initial indication of a submarine accident may be given by one of the following:

a. A vessel reports collision with an unknown object in an area where submarine(s) operate(s).

b. Escapees or Survivors may be sighted.

c. The sighting of wreckage, diesel fuel or air bubbles on the surface in an area where a submarine is known to have been operating.

d. The sighting of red grenades or flares. The unexpected sighting of smoke candles or grenades (of any colour) or a patch of fluorescent green dye on the surface may also be evidence that a submarine accident has occurred.

e. A SUBCHECK Report, Surfacing signal or a Check Arrival Report is overdue.

f. Sighting or interception of radio signal of a Submarine Emergency Position Indicator Radio Buoy (SEPIRB) or Submarine Indicator Buoy, which can be from the receipt of a SAR satellite alert.

g. Emergency HF or UHF transmission from a submarine prior to sinking or if sunk from a Communications Buoy, an Expendable Communications Buoy or Personal Locator Beacons.

h. Interception of a distress message from a submarine, on Underwater Telephone (UWT) or a transmission of a sonar distress pinger.

i. Failure of a submarine to surface when ordered during specific exercises with anti-submarine forces.

3.7.3. SUBMARINE SAFETY COMCHECK PROCEDURE

A Submarine Safety COMCHECK is to be initiated when:

a. A submarine's SUBCHECK Report, Surfacing Signal or a Check Arrival Report is due. (Format at ANNEX 3.B).

b. A SUBOPAUTH requiring urgent communication with a submarine, or in any doubt as to its safety, may initiate a Submarine Safety COMCHECK at any time. This is not a forewarning that a SUBLOOK/SUBMISS/SUBSUNK operation will soon be initiated. In most cases time must be allowed for the submarine's ordered broadcast reception interval to pass before escalation is considered.

c. The SUBOPAUTH initiating Submarine Safety COMCHECK is to inform the submarine by every available means of its initiation.

3.7.4. SUBSAR PROCEDURES SUBLOOK/SUBMISS/SUBSUNK

Specific execution of (SUBLOOK/SUBMISS/SUBSUNK) is conducted with due regard of three major factors: last confirmed contact with the missing submarine, predicted onboard survivability of the submarine, and initial estimated Time To First Rescue (TTFR).

a. SUBLOOK. A procedural validation of the state of a submarine when expected communications are overdue or safety of a submarine is in doubt.

SUBLOOK is to be declared as soon as such doubt arises and, in any event when a submarine's SUBCHECK Report, Surfacing Signal or Check Arrival Report is overdue, based on SURFACING ZERO TIME + 1 hour.

An initial search is made of the submarine's Exercise Area or Moving Haven, by ships in company with the submarine and/or submarines, Maritime Patrol Aircraft (MPA) and helicopters that might be in close proximity. No other ships, submarines or aircraft are to divert to join the search until ordered to do so by the authority conducting SUBLOOK.

During the SUBLOOK Phase the SUBOPAUTH will:

1. Initiate a Communication Search for delayed signals and take actions in accordance with the SSRA/SMC Check Off List (paragraph 3.A.1) as appropriate
2. Send a signal to the submarine advising it that SUBLOOK has been initiated for it
3. Alert all units operating in the vicinity to submarine's expected position. Nothing should inhibit authorities from immediately initiating SUBMISS or SUBSUNK, without the preliminary SUBLOOK, if circumstances dictate so. Although 5 hours (or 2 hours for single-compartment submarines) is the normal maximum for the SUBLOOK phase, this may be extended by the responsible authority (e.g. in the case of submarines on passage to distant waters). If possible, the expected time of escalation to SUBMISS should be included in the SUBLOOK Signals

4. Provide minimum estimated survival time based on last contact, personnel onboard and available stores and determine estimated TTFR.

5. Consider the possibility/need of activating an alert on the ISMERLO web site (www.ismerlo.org) especially if survival is potentially limited or TTFR is near or exceeds survivability. During the SUBLOOK phase, an ISMERLO alert will provide rescue responders to make initial assessment of TTFR and availability of potential airlift and VOOs. Rescue Elements will not be mobilized during SUBLOOK.

b. SUBMISS. Is intended for use when:

1. The initial search (SUBLOOK) has failed to establish the safety of the submarine, or

2. A SUBCHECK Report, Surfacing Signal or Check Arrival Report is 6 hours overdue or 3 hours for one-compartment submarines based on SURFACING ZERO TIME.

3. Circumstances indicate the need for an immediate full-scale search for a submarine. It may be appropriate to declare SUBMISS or even SUBSUNK without first declaring SUBLOOK for a preliminary search.

The release of the SUBMISS Signal should be coincident with the initiation of a full-scale coordinated search that will continue until the submarine or survivors are located. At the same time an Alert should be activated on the ISMERLO web-page and preparations are to be made for a rescue operation. Operational Commanders should consider beginning rescue mobilization during SUBMISS procedures when the submarine in question is predicted to have limited survivability or the predicted TTFR is extensive. In this case actions should include early pre-positioning of rescue assets deployment aircraft for loading and mobilizing them to designated rescue ports. These actions minimize TTFR while permitting decision makers additional time to validate distressed submarine indications in the case where clear SUBSUNK criteria (e.g., direct contact with a distressed submarine, SEPIRB message reception) are not met.

4. The SSRA/SMC should be designated and Check Off list at paragraph 3.A.1.2 should be initiated.

c. SUBSUNK. Is intended for use when there are significant positive indications or is known that a submarine has sunk (e.g., direct contact with a distressed submarine, SEPIRB message reception). The signal will initiate full-scale search and rescue operation if this has not already been initiated by declaration of SUBMISS.

3.8. GENERAL INSTRUCTIONS TO THE OSC AND UNITS OF THE SEARCH FORCE

3.8.1. COMMAND OF THE SEARCH FORCE

The OSC is in command of all forces at the scene of the accident and the choice of the right unit for this task is important. The following points are also relevant:

a. The SSRA/SMC should nominate (or confirm) the OSC as soon as possible. The OSC has to inform all concerned as soon as he assumes the responsibilities of OSC. The ship of the OSC is to be marked by a large red flag at the mast head by day and by an all-round flashing red light at the mast head by night.

b. The criteria for datum establishment are described at paragraph 3.11.4. OSC should implement a search plan based on information and indications provided by the Subopauth or SSRA/SMC. Once the datum and/or the search plan has been established, the OSC should send a SITREP to the SSRA/SMC and the rest of the Search Force.

c. Whenever possible specialists sent to the scene of the accident should be embarked in the OSC's ship or in other units at the scene of action.

d. The OSC should take appropriate actions in accordance with the OSC check-off list (paragraph 3.A.2).

e. Ensure participating Units have copies of ATP/MTP-57, specifically Chapters 3 and 5.

3.8.2. SUBLOOK - ACTION BY SHIPS AND SUBMARINES

On receipt of SUBLOOK, ships and submarines should take the following action:

a. Ships in company with the submarine concerned should attempt to contact the submarine by all available means. They should also initiate a visual search in the area with available naval and air assets as ordered by OSC.

b. Submarines in company should surface, make a Surfacing Signal and act as ordered by the OSC.

c. Other ships and submarines take no action until ordered to do so by the SSRA/SMC. Units more than 4 hours steaming from the Search Area/Datum are unlikely to be ordered to join the search unless the incident escalates to SUBMISS.

3.8.3. SUBMISS/SUBSUNK - ACTION BY UNITS AVAILABLE AT DATUM WITHIN 24 HOURS

Ships and submarines at sea or in harbour and able to reach the Datum within 24 hours (if not otherwise ordered by national authorities) are to take the following action:

a. Suspend all exercises immediately.

b. Proceed at full speed to the Datum.

c. Ships exercising with non-stricken dived submarines in the vicinity of the datum or Search Area are to initiate surfacing procedures for these submarines immediately. Ships are to remain in the vicinity until all submarines involved in the exercise are safely on the surface. Additionally, ships are to inform the submarines of the emergency before proceeding.

d. Submarines are to transmit a Surfacing Signal (if appropriate).

3.8.4. SUBMISS/SUBSUNK – ACTION BY UNITS AVAILABLE AT DATUM WITHIN 72 HOURS

Ships and submarines at sea or in harbour, and able to reach the Datum within 72 hours but unable to reach it within 24 hours, are to take the following action (if not otherwise ordered by national authorities):

a. Come to immediate notice for full power, and continue with their programme.

b. If appropriate, report to the SSRA/SMC the estimated time of being ready to proceed.

c. Signal requirements for any additional personnel required for a Submarine SAR operation. They are to take no other action unless ordered by the SSRA/SMC.

3.8.5. DETAILS OF SHIPS IN SEARCH FORCE

The SSRA/SMC requires information from Units and Commands to assist in the organization of the search. All ships proceeding to the search area are to report by PRIORITY signal addressed to the SSRA/SMC the following information:

a. Position, course and speed, and ETA Datum.

b. Estimated fuel (percent) remaining on arrival Datum.

c. Helicopter details as follows:

1. Helo(s) embarked.

2. Helo and deck operating clearance.

3. Helo controllers embarked.

d. Medical Officer embarked.

e. Medical facilities on board, such as availability of Hyperbaric Chambers, hospitalization capabilities etc.

f. Submarine Officers and Diving Officers embarked.

g. Any additional equipment fitted or any defects or shortages particularly to sonar and communications that affect the ship's capabilities in a submarine SAR operation, including Portable UWT and earliest launch time of UWT fitted helicopters or aircraft.

h. Time at which control of the air search could be taken over.

The SSRA/SMC will pass to the OSC details of those units who will be joining the Search Force. It is important to keep the communication circuit as clear as possible particularly at the start of a SUBMISS/SUBSUNK operation and, therefore, the signal is to be kept brief. Paragraphs that are NIL may be omitted.

3.8.6. CHECK OFF LISTS

Check of lists are at ANNEX 3.A.

3.9. PROVISION OF SMER EXPERT ADVICE

During the early stages of the operation, the SSRA/SMC will be coordinating the transfer of DLT to the scene of action.

A comprehensive two-way brief should be given as soon as the specialist advisers arrive on board. As well as operational aspects, the brief should address possible problems, especially those after the recovery of escapees, any advice or requirements that the visiting specialists may have, and also the geography and domestic arrangements onboard the ship.

Once the team is onboard, it is essential that the ship provides a dedicated Liaison Officer, familiar with the ship's capabilities and layout, especially her communications outfit.

3.10. ABILITY OF THE DISSUB TO SIGNAL HER POSITION

a. The crew of a DISSUB may be able to indicate her position by one or more of the following methods:

1. Releasing one or two indicator buoys.

2. Firing Submarine Launched One Way Transmission (SLOT) buoys which transmit on VHF JEZEBEL Channels 25, 27, 29 or 31.

3. Firing an expendable communications buoy (ECB) or SEPIRB, which will transmit a SARBE DF beacon.

4. Firing yellow or white smoke candles or red or green grenades. The smoke candles may have fluorescent dye containers attached, which produce patches of green dye in the water, and may also carry a message.

5. Transmitting her name in voice plain language and/or in SST mode on the UWT.
6. Transmitting on sonar, echo sounder, or by using emergency location beacons.
7. Hull tapping.
8. Releasing fuel or lubricating oil.
9. Switching on navigation or other underwater lights.

b. If power supplies are available, the DISSUB will try to transmit continuously. If power supplies are not available, the DISSUB crew will concentrate on using the Emergency UWT during established sonar silence periods(paragraph 3.12.2.f), or at any interval, whenever the Senior Survivor believes it may attract the attention of the Search Force. Additional information on DISSUB means of communication and other submarine specific data are contained on the ISMERLO website www.ismerlo.org (rescue coordination pages).

c. Unless the DISSUB is observed to sink or in case she is not COSPAS/SARSAT Buoy capable, the crew has to expect the Search Force to arrive in the vicinity well after one of her Safety signals is overdue. Under this condition, it is possible that the DISSUB will fire smoke candles, if able to do so, in order to:

1. Attract the attention of aircraft.
2. Attract the attention of any surface vessels that may be heard in the vicinity.

d. The submarine's crew will probably reserve a portion of smoke candles for discharge in the following circumstances:

1. In answer to the signal charges dropped by searching ships.
2. Shortly before escape has to be started (pending on physiological conditions inside the submarine) in the hope that any aircraft or surface ship will see them.

3.11. PLAN AND CONDUCT OF THE SEARCH

This article aims to provide details of the likely situation at sea in a SUBSAR operation, some of the problems likely to be encountered and guidance on the conduct of the search.

3.11.1. DEGREE OF URGENCY

The earliest possible location of the DISSUB and/or escapees is of paramount importance to the saving of the maximum number of lives.

3.11.2. GUIDANCE FOR THE OSC

The OSC is to conduct a search of the area detailed by the SSRA/SMC, using the allocated Forces. The OSC is to transmit SITREPS both to the authorities ashore, and to his own force. These should be sent on arrival at the datum and every 3 hours thereafter.

3.11.3. APPEARANCE OF ESCAPEES/SURVIVORS ON THE SURFACE

It is possible that the crew may have escaped from the DISSUB before the arrival of the search force, or survivors were left on surface before the submarine sank. They will probably be wearing brightly coloured submarine escape and survival suits and may be showing lights. Escapees may also blow whistles to attract attention and may be carrying PLBs to assist location.

3.11.4. THE DATUM POSITION

If the position of the submarine is unknown, it is essential that a datum position for the search should be established. If surface ships are operating with the submarine when the accident occurs, the Senior Officer of this force becomes the OSC and is responsible for establishing a datum

position. If no surface ships are present when the accident occurs, the responsibility for defining the datum position lies with the SSRA/SMC.

3.11.5. DATUM POSITION MARKING

It is essential that the datum position is positively marked and accurately fixed at the earliest possible moment. The presence of a local reference point is of considerable help to aircraft and to those vessels with limited navigational aids. When the depth of water permits, one of the searching ships (preferably a less capable search platform) should be anchored in the datum position. If this is not possible, a Dan Buoy with a radar reflector should be laid. If fitted, the ship marking the datum position is to utilise a vertical search-light and IFF Mode 3 to advertise her role.

3.11.6. PROMULGATION OF DATUM POSITION

In all cases the position of the datum, or centre of area of uncertainty, and how it is being marked, should be promulgated as soon as possible together with an indication of the accuracy of the fix.

3.11.7. PRIORITY OF TYPES OF SEARCH

The priorities for types of search should be visual (and ESM), passive sonar, active sonar. The following should be noted when conducting visual or active sonar searches:

a. Visual. The main requirement is to cover the whole area as soon as possible in order to sight an Indicator Buoy, smoke candles, debris, other visual indications of the submarine's position, or indeed survivors in the water. For this reason aircraft provide an invaluable method of searching the area.

b. Passive Sonar. It is potentially the most likely means to detect UWT transmissions or sonar beacon emissions from the DISSUB and identify its position should bathymetric condition be favourable. Passive search should concentrate during sonar silence periods (paragraph 3.12.2).

c. Active Sonar. Not all units will be capable of this type of search. Depending on the equipment available and the prevailing climatic and bathymetric conditions, the success of this type of search against a bottomed, zero-Doppler target is by no means assured. Ensure sonar silence periods are observed.

3.11.8. MANAGEMENT OF SEARCH FORCES

If the exact position of the submarine is not known, and the area to be searched is large, the OSC should divide his forces into groups and decentralize the tactical command of each group. If the area of probability is small (for example, if the submarine has been seen to sink) it will probably be better to keep the force concentrated. If there are a large number of surface assets, it may be advantageous to establish a holding area in which ships wait until they are allocated tasks. This will prevent overcrowding of the Datum at the start of the operation. Aircraft should conduct a rapid visual search of deeper water areas for signs of debris or oil.

During the planning of the Search, the OSC has to take into consideration the rescueable water concept. The major search effort should concentrate on that portion of the Search area shallower than the calculated DISSUB crush depth (provided to the OSC by the SSRA/SMC) and/or shallower than the maximum rescue depth of the Rescue Elements called on the scene, whichever of them is shallower. The following Figure 3-1 shows, as an example, an area where the depth contours clearly defines the rescueable waters.

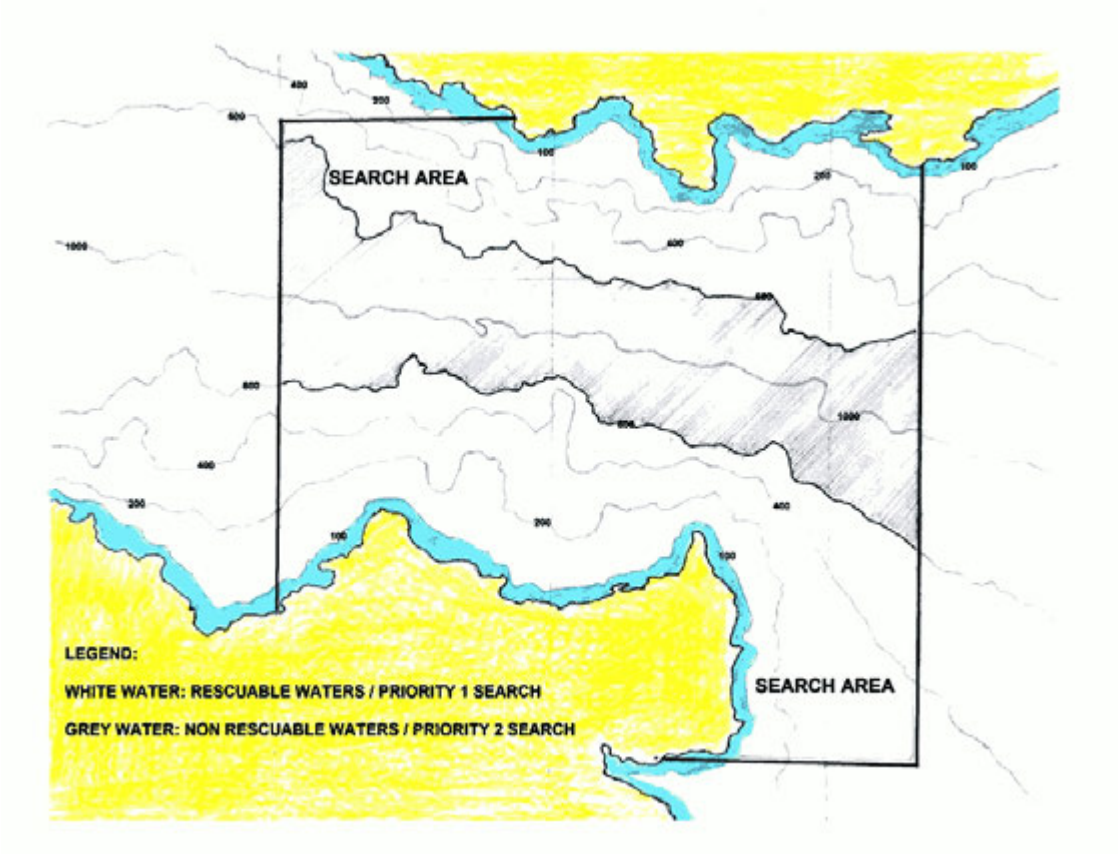

Figure 3-1 Rescuable waters

3.11.9. USE OF SURFACE ASSETS

The employment of surface assets on particular types of search will depend on the following factors:

a. The size of the area to be searched.

b. The thoroughness of the air/visual search.

c. Number of units available

d. The capabilities and limitations of individual assets.

e. Navigational facilities in the area.

f. The depth contour in the Search Area

g. The presence of choke points and the preferential merchant line of traffic

3.11.10. SEARCH PROFILES

There are numerous methods available to conduct a search depending on the search assets available and the conditions under which a submarine was discovered missing or presumed disabled. IAMSAR Manual Volume II chapter 5 discusses the searches in detail. However, there are two visual searches, Track Line search and the Parallel Sweep Search, that typically provide the best results when searching for missing submarines. Sonar searches are quickly adapted into these two visual searches. Due regard to probability of detection for visual and or sonar considerations can complicate the planning of these searches with multiple vessels. Area searches can be used when small areas need to be searched such as following the report of a collision or SEPIRB/PLB alert. The choice of profile will depend on many variables, but some

points for consideration by the OSC are given in following paragraphs. Review IAMSAR Manual (Vol. II Chapter 5) detailed techniques for search development based on existing conditions.

3.11.10.1. THE TRACK LINE SEARCH

A rapid method to search the submarine's planned track or moving haven. Depending on the size of the moving haven this search can be done very quickly by a single aircraft for visual searches or a single capable passive sonar capable vessel. This focuses on an area of highest probability.

3.11.10.2. THE PARALLEL SWEEP SEARCH

It is used when the area of uncertainty is much larger requiring uniform coverage. It is most often used when multiple units must search a large area and may have different capabilities requiring different track spacing. The position of the ASW capable Units within and the optimum track spacing for sonar conditions should be carefully considered. This search is especially effective when multiple units are involved. In addition commercial vessels passing through the search area can be requested to pass down parallel tracks to increase the speed at which a visual search of an area can be completed. The OSC need to carefully document the area searched to minimize duplication.

3.11.10.3. SEARCH CONSIDERATIONS:

a. Maintain Command, Control and Communication within the Force and groups to coordination UWT calls, Grenade signals/SUS signals and sonar silence periods.

b. Unless sonar-fitted helicopters are available for lengthy periods, they will not add much to the sonar swept path and will likely be better used with MCMVs to act as "pouncers" specifically to investigate potential.

c. Parallel Sweep search with all units operating in a line abreast. The speed of the search will not necessarily be the optimum speed for all ships and however this kind of search will probably leave fewer gaps in a visual search.

3.11.10.4. SPECIAL AREA SEARCHES

It is conducted when a specific point or very small area needs to be searched. It is typically conducted following the report of a collision or SEPIRB/PLB alert or in cases where the DISSUB or the submarine's assigned water is small enough to be searched by single or a small number of units. This will normally involve the allocation of boxes or sectors to units of the Search Force where expanding square or sector searches would be effective.

Search considerations:

a. This is simple for the OSC to order

b. Newly arriving units can be deployed to their allocated areas and start searching without delay

c. The size of the ship's allocated area can be adjusted to suit her capabilities

d. Units can investigate their own contacts without disrupting the overall search

e. A sonar-fitted helicopter can be profitably allocated to a ship, even for a short time

f. Ships can search at their optimum speed

g. Care must be taken to avoid leaving gaps

3.11.11. GUIDANCE ON SPEED, THE USE OF MEDIUM RANGE SONAR

As the speed of ships in the search increases:

a. The size of the area covered in a given time increases

b. The probability of missing a sonar contact increases

c. The distance travelled between sonar silence periods increases, so the probability of a submarine being heard decreases

d. Self-noise increases

Experience has shown that the maximum Visual Search speed should be 20 knots, and that the maximum Sonar Search speed should be 15 knots.

3.11.12. GUIDANCE ON DISTANCE APART

As the distance between ships in a line abreast search increases:

a. The swept path increases but:

b. The likelihood of missing a sonar contact increases and

c. The probability of a submarine being heard decreases.

Experience has shown that the maximum distance apart for a Visual or Passive Search should be 3 miles, and for an Active Sonar Search normal rules for stationing ASW units should be used.

3.11.13. EMPLOYMENT OF AIRCRAFT

Aircraft are ideal platforms for carrying out a rapid visual search of the Area and localization of distress beacons using ESM. In addition, helicopters can be very useful when employed as “pouncers” to extend the swept path of individual ships, or to investigate sighting reports. The tasking of MPA under the control of the appropriate RCC should include:

a. Visual, radar and radio watch.

b. Dropping of grenades/explosive charges in a 7 charge pattern as follows:

- 3 charges at 5 seconds interval
- 30 seconds pause
- 1 charge
- 30 seconds pause
- 3 charges at 5 seconds interval

c. Use of acoustic marking device ESUS Mk 84 as an alternative to the use of grenadesexplosive charges.

This pattern is to be dropped in the last known position of the submarine. Upon hearing this signal the submarine will surface if able, and communicate with the aircraft on 277.8 Mhz (Submarine SAR reporting net). If the submarine is unable to surface it will fire a smoke candle (or grenade) to indicate its position. If the aircraft does not establish contact with the submarine within minutes, then another identical pattern of charges is to be dropped in the submarine’s predicted position, and repeated every 30 minutes whilst a search is carried out until contact is made, or until the OSC assumes coordination responsibilities, after which the Search Force will fire a single grenade as described at paragraph 3.12.2.e.

MPA are also often capable of providing a valuable communications relay platform.

Note: Smoke Floats. The smoke candles fired by submarines are easily confused with smoke floats dropped by aircraft. Therefore air crews should avoid dropping smoke floats unless absolutely essential. If smoke floats are dropped, a report is to be signalled by the aircraft giving

the position of release and the expected burn time. This report should be relayed to all ships and Authorities involved in Search Operation.

3.11.14. EMPLOYMENT OF MINE COUNTERMEASURES VESSELS, SIDE SCAN SONAR AND AUTONOMOUS UNDERSEA VEHICLES

Mine countermeasure vessels and side scan sonar use high frequency sonar to provide very detailed look at the sea floor. MCM vessels using hull mounted sonar are typically more effective in shallow waters (less than 150M). Some side scan sonar can be effectively employed in waters exceeding crush depth of submarines but the process is slow and tedious. Both methods are better employed to provide a pouncer like role (paragraph 3.11.10.3) when the datum is known with less than 1-2 NM error otherwise the search phase could be exceeding long. Due to the high frequency of MCM and side scan sonars a detailed picture of the DISSUB and its orientation of can likely be determined. Given the wide availability of side scan sonar equipment and its relatively small footprint it is likely that one can be readily located and transported via small commercial or C-130 aircraft and operated from very small vessels of opportunity.

The technology and availability of Autonomous Undersea Vehicles is rapidly increasing. They have high-resolution sensors and are able to do detailed survey to depth well below submarine crush depth. The endurance of such AUVs is typically 60 hours or above 400 km, although most are not specifically designed to locate submarines they may be used effectively. Some AUVs can quickly be deployed by helicopter to commence a search in advance of arrival of search forces. Some MCM vessels are fitted to carry AUVs which can execute preset search patterns.

Additional description and capabilities of Mine Hunters:

MCM vessels can be used for visual search, integrated into a Line Abreast formation or “GPS” Lane search. They can be used for sonar search taking into consideration that they are equipped with very high frequency short-range sonar, which provides a detailed visual display of the bottom. The sonar can, in most cases, be used at variable depths to optimize its performance. Due to its detection range, the sonar search with such an asset can be performed only in shallow waters or after an initial position has been identified. Where the bottom is uncluttered they can typically proceed at up to 6 knots searching at 400/600 yard swept path, though a slower speed is normal. A mine hunter’s sonar normally operates only to a depth of 70 meters, but with some restriction of capability it can be used to 150 meters. Some MCM Vessels operate a Remote Control Mine Disposal System (RCMDS). This is a bottom following vehicle incorporating an underwater TV camera and searchlight with a proven operating depth of 70 meters. The RCMDS’ manoeuvrability is limited, but it has been successful in identifying bottomed contacts of submarine size.

MCM’s normally carry divers capable of diving to 55 meters and quite often carry a multiple seat recompression chamber which can be therefore used by the CRF during the Rescue Phase for the treatment of possible Escapees.

Mine hunters and their ROV’s can also be used to conduct surveys and intervention when equipped. They also have homing beacons that can be laid adjacent to the DISSUB and to mark the position on the seabed with extreme accuracy (within one metre). Some markers also include a small surface buoy, however these are depth limited and are often difficult to detect in high sea states.

Some MCM vessels also use AUVs to carry out preset search patterns. They have high-resolution sensors and are able to do detailed survey to depth well below submarine crush depth. The endurance of such AUVs is typically 60 hours or above 400 km.

3.11.15. EMPLOYMENT OF SUBMARINES

The search characteristics, capabilities and recommended employment of submarines in SUBSAR Operations (Search and Localization phase) are as follows:

a. Submarines are likely to provide the best passive sonar search

b. Submarines employed are to operate, when surfaced, a yellow flag or a yellow flashing light.

c. Additional duties can be:

1. Visual search.
2. Underwater Communications Guard Ship.
3. Datum ship if no surface ship is available.
4. As direct UWT link when the DISSUB has been found.

3.12. COMMUNICATION AND SIGNALS TO BE USED DURING THE SEARCH

Due to the overlap the Search and Localization Phase normally will have with the Rescue Phase during SUBSAR operations, the provisions of this article may cover all phases of the operation, although instructions contained are more focused on the Search and Localization Phase.

3.12.1. ABOVE WATER COMMUNICATIONS.

a. SUBSAR signals. Standard NATO communication procedures should be used for SUBSAR Operations. Formats for SUBSAR signals are given in ANNEX 3.B, including addressees. The word SUBLOOK, SUBMISS or SUBSUNK is to be included in the text of all signals relating to SUBSAR operations.

FLASH is mandatory as the signal precedence for the signals initiating SUBLOOK, SUBMISS or SUBSUNK, and for signals ordering any of the operations to be carried out. Other signals concerning the operation should not normally be given precedence higher than IMMEDIATE.

b. ISMERLO Alert. Activating an alert on the ISMERLO website will automatically provide immediate notification to registered SMER experts and rescue system capable nations world wide

c. Traffic management suggested rule. ISMERLO web site provides a rapid information dissemination method for ships equipped with Internet access. User accounts can be easily established. Experience has shown that SUBSAR operations can generate a large amount of signal traffic. It may be highly desirable for the appropriate Maritime Commander to implement MINIMIZE. In addition, as some units may not have on-line communications facilities, traffic addressed to such ships must be kept to a minimum. Traffic levels can also be reduced by sensible use of a policy of reporting by exception. The SSRA/SMC should consider this whenever issuing a blanket request for information.

d. Visual communications. Table 3-3 below contains a list of distinguishing signals used by Units and Commands, during a SUBSAR Operation

SIGNAL	SHOWN BY	SIGNIFICANCE
Large red flag at mast head by day	OSC	Indicates OSC during operation SUBLOOK/SUBMISS/SUBSUNK
All-round flashing red light at mast head at night	OSC	Indicates OSC during operation SUBLOOK/SUBMISS/SUBSUNK
Yellow flag by day	All submarines	Submarine taking part in search

SIGNAL	SHOWN BY	SIGNIFICANCE
Two black pennants by day and green Very light	Anti-submarine vessels	Possible message can be heard. Units in vicinity to maintain sonar silence
Green Very light by day or night		Possible underwater message. Units in vicinity to maintain sonar silence
Two white flares (rockets) by night	Searching ships	Fired by first ship to sight survivors/escapees in water
Vertical searchlight	Datum ship	Datum position

Table 3-3 List of distinguishing signals used during SUBSAR Operations

3.12.2. UNDERWATER TELEPHONE (UWT), SIGNALLING AND SONAR SILENCE

a. UWT communications may be difficult depending on conditions. Any ship in UWT communication with the DISSUB should ensure that her most experienced operators are available in order that no information from the DISSUB is needlessly lost. When communications are being attempted other units in the area should be warned to stop all unnecessary noise.

To assist in overcoming problems caused by background noise, high sea states etc, a three letter UWT code has been devised to be used only when communicating with a DISSUB (see ANNEX 5.A).

b. Underwater Communications Guard. This duty should be assumed automatically by the first ship or submarine arriving in the area and capable of communicating with, or intercepting messages from a sunken submarine. Subsequently the OSC is to detail the most suitable ship available and, as the search develops, a Guard Ship should be detailed for each searching Group. A helicopter fitted with UWT may temporarily assume the duty of Underwater Communications Guard until the arrival of the first UWT-fitted ship or submarine.

c. Initial calling of the DISSUB. Having marked the datum position, the first ship capable should carry out a periodic listening watch on sonar and attempt to establish communication by UWT. A visual or active sonar search should not prejudice this initial action.

d. Use of UWT. No ship, submarine or helicopter of the Search Force is to transmit any underwater signal unless:

1. Suspected UWT Communications have been received from what appears to be the DISSUB.

2. The initial call is being made (See paragraph 3.12.2.(c) above).

The time of all calls on UWT made by searching ships is to be logged so that subsequent reports of interception of UWT messages can be evaluated.

Throughout the entire SUBSAR operation, ship and submarine names should be used on UWT.

e. Firing of Single Charges During Search. In order to keep the stricken submarine informed of the presence and movements of surface ships, and indicate to her that distress signals will be seen, the Search Force is to fire a single grenade every 10 minutes. If the Search Force is split into several groups, the OSC must decide whether more than one ship should fire the charges; if

it is decided that the spread of forces merits more than one unit firing single charges, the OSC must co-ordinate the firings to avoid confusion and interference.

f. Sonar Silence Periods. To give the DISSUB the best chance of being heard, all units of the Search Force in the probability area are to stop all sonar transmissions from minute 00 to minute 05, and minute 30 to minute 35 of every hour. If possible, ships and submarines are to stop engines during these periods. However, if the prevailing conditions make this impracticable, the OSC should order units to slow to below cavitation inception speed during these periods.

The OSC may allow Sonar Silence Periods to be broken if:

1. Navigational constraints make slow speed impracticable.

2. The effectiveness of the sonar search over a particular area is jeopardised at a critical stage.

Units in contact with an object on the seabed are also to maintain the silence periods, unless conditions are so bad and the contact so faint that it is unlikely to be lost if transmissions are ceased. Other units in the vicinity are to be informed.

3.13. CONDUCT WHEN CONTACTING WITH THE DISSUB

3.13.1. ACTIONS ON HEARING TRANSMISSIONS FROM THE DISSUB

The ship, submarine or helicopter hearing UWT, sonar, echo sounder transmissions or hull tapping is to:

a. Initiate the signal for sonar silence by any available method. The visual signal during submarine SAR operations is:

1. By day - Ships fly two black pennants and fire a green Very light. Submarines fire a green grenade. Helicopters fire a green Very light.

2. By night - As by day, less the pennants.

b. Answer the call herself if capable.

1. Assume the duties of Underwater Communications Guard, if capable, keeping the OSC informed.

2. Ships in the vicinity are to reduce to slow speed and maintain sonar silence while the signal for silence is in force.

c. Special terminology. The following terminology should be noted:

1. “In Communication With”. The expression 'in communication with' is not to be employed unless the DISSUB has answered a call or has replied to a specific underwater morse or voice signal, originally transmitted by one of the Search Force.

2. ”Heard”. The term 'heard' is to be used to describe the receipt of any unusual transmissions which do not in themselves comprise a call, answer to a call or indefinite signal.

3.13.2. ACTIONS ON SIGHTING A SUBMARINE INDICATOR BUOY

The sighting of a Submarine Indicator Buoy may well be the first indication of a submarine accident. Consequently, on sighting such a buoy, the following actions are to be taken:

a. Report sighting by the fastest means available.

b. If possible, report the number of the buoy to enable its source to be identified by the SUBOPAUTH.

Establishing the status of a buoy may be problematic; however, its physical state, whether or not it is still transmitting, and any relative movement will help in evaluating whether or not there has been a submarine accident. It is vital that the wire should not be broken. Under no circumstances should a boat be attached to the buoy, nor turns taken on the wire once it has been established that the buoy is not adrift. Divers should on no account to use the Indicator Buoy wire to pull them down to the DISSUB.

Full details of the Submarine Indicator buoys carried by each class of submarine are given in the section II of this publication.

3.14. ACTION WHEN THE DISSUB HAS BEEN LOCATED

3.14.1. ENDING SEARCH AND LOCALISATION PHASE

With the location of the DISSUB, the Search phase of the operation is complete and Recovery and/or Rescue should follow without delay in accordance with ATP/MTP-57 procedures.

It is possible that the DISSUB will be located prior to the arrival of the Recovery or Rescue Forces, it is also possible to find escapees on the surface. In this eventuality the OSC should follow the procedures for Submarine Rescue stated in ATP/MTP-57 as far as possible.

The designated Coordinator Rescue Forces (CRF) will take the lead on the Rescue Phase/Operation on arrival at the scene, The OSC for the Search and Localisation Force is to support the CRF

3.14.2. COMMUNICATIONS WITH THE DISSUB

As soon as possible after the DISSUB has been found communications should be established using:

a. Marine Sound Signals (MSS). MSS or equivalent under water signals charges are to be fired to indicate the presence of surface vessels. This is not essential if good two-way UWT communications have been established with the DISSUB.

b. UWT. Communications should be established with the DISSUB on UWT if possible, and the OSC is to nominate a unit as UWT Link as soon as this had been done. Other units in the vicinity should keep a listening watch. Full use should be made of any recording facilities that are available.

3.15. SITUATION REPORTS

To ensure that SUBSAR Forces at sea receive appropriate support from shore authorities, the OSC should send frequent (at least every 3 hours), but brief, SITREPS to the SSRA/SMC. From these, the SSRA/SMC should compile a composite signal to keep other authorities informed.

3.16. MARKING THE SUBMARINE'S POSITION

It is important that the DISSUB's position is not lost, particularly in a tideway, in rough conditions or at night. The position should therefore be marked by a Dan Buoy, or by anchoring a ship within sonar contact range (but at least 50 yds from the DISSUB) as soon as possible. However, this should not be allowed to interfere with the early recovery of escapers.

Care should be taken not to foul the submarine with the anchor or cable, either at the time of letting go, or subsequently if the ship swings.

One Red, or a succession of Reds	By Submarine: Attempting emergency surfacing, keep clear
One Green	By Submarine: Have fired exercise torpedo
Two Whites, 3 minutes apart	By Submarine: I am surfacing, keep clear
One Yellow	By Submarine: Ascending to periscope depth
Red Smoke	By Submarine: Attempting emergency surfacing. Keep clear
Two White or two Yellow, (3 seconds apart)	By Submarine: I am surfacing. Keep clear

Table 3-4 Pyrotechnic Light Signals

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ANNEX 3.A. CHECK OFF LISTS

3.A.1. SSRA/SMC CHECK-OFF LIST

3.A.1.1. SUBLOOK PHASE

Determine the safety of submarine when in doubt.

1. _____ Continue communications search for delayed signals from submarine.
2. _____ Initiate SUBLOOK Implementing Signal (paragraph 3.B.3) to notify all concerned Authorities, including the involved submarine, that SUBLOOK procedures have been implemented.
3. _____ Alert Maritime Forces operating with or in the vicinity of the Area of probable presence of the submarine and request/direct they attempt to establish communication with submarine on assigned radio frequencies and UWT.
4. _____ Alert the authority guarding submarine communications nets and request they attempt to establish communication.
5. _____ Commence a chronological log of events.
6. _____ Commence emergency procedures to establish communications with submarine if suitable.
7. Obtain as much of the following information as possible:

   a. _____ submarine/submersible involved

   b. _____ type report due

   c. _____ date/time report due

   d. _____ last known position

   e. _____ date time group and type of last known transmission received

   f. _____ ships in company with submarine

8. Inform appropriate Commands, Authorities and Organizations of the situation, including the initiation of SUBLOOK, in accordance with the National dormant plan.

For example:

   a. _____ Chain of command

   b. _____ SAR coordinator

   c. through z.: additional commands, authorities, organizations, or persons to be notified as required

9. _____ Consider alerting the competent Rescue Coordination Center (RCC) for coordination of potential support of the maritime incident that may be occurring in its area.

10. _____ Establish availability of air and surface and submarine assets for search from appropriate authorities. Consider the involvement of Supporting Nations if insufficient national search asset is/are available in the vicinity of the datum.
11. _____ Establish an initial search plan based on the Area assigned, MHN or probable location to the submarine.
12. _____ Consider ordering an initial search to the Units in company of the submarine, or to MPAs/Helicopter in close vicinity of the area, if any are available.
13. _____ Establish location of expert personnel (see paragraphs 4.2 and 4.3) with appropriate Authorities and develop a plan for their transport to the Scene of Action
14. _____ Consider activating an alert on the ISMERLO web site (www.ismerlo.org). Tel: (+44) 1923-956735. Upload copy to ISMERLO website (alert page).

One Hour After Initiation of SUBLOOK:

15. _____ Initiate a SITREP to NA (MOD, CNO, etc . . .) of DISSUB nation, the SUBOPAUTH and any other appropriate authorities. Include actions taken and when it is intended to escalate to SUBMISS.
16. _____ Develop estimated survival time based on last contact, personnel onboard and estimated available stores. Estimate time to first rescue (TTFR).
17. _____ Post estimated TTFR to ISMERLO website (Alert page) if alert has been activated.

3.A.1.2. SUBMISS PHASE

Initiate full scale search.

If proceeding directly to SUBMISS review SUBLOOK section for appropriate items to initiate/complete.

18. _____ Complete and release SUBMISS implementing signal (paragraph 3.B.4) and activate an Alert on the ISMERLO web site (www.ismerlo.org) Tel.: (+44)1923-956735 if not previously done. Upload copy to ISMERLO website (alert page).

19. _____ Send National specific messages and notifications as required

    a. through z.: as required.

20. _____ Designate OSC based on criteria at paragraph 3.8.1 and 3.2.3.e.

21. _____ Obtain the Datum Position from the Senior Officer of the force operating with the DISSUB. If no units were operating with the DISSUB, define the datum position. Develop and provide the OSC with the established Search Area/datum details and the calculated DISSUB crush depth. Order all suitable assets to close the datum as soon as feasible and report to the OSC.

22. _____ Bring all suitable (within 24 hrs from datum) vessels in harbour to immediate notice for sea if they are available, and sail them as required.

23. _____ Pass to the OSC details of those Units which will be joining the Search Force.

24. _____ Request Air Search through the appropriate authorities.

25. _____ Determine estimated depth of DISSUB and escape feasibility and post data, indications and guidance to ISMERLO web site (alert page).

26. _____ Ensure participating Units Ship, Aircraft, RCC, and others as appropriate, have copies of ATP/MTP-57.

27. _____ Alert the competent RCC of the maritime incident in its area for coordination of potential support.

28. _____ Have expert personnel transported to the search areas, re-distribute local manpower and equipment (e.g. helicopters) to make up any shortfalls in the search force, and assemble additional personnel to augment units ashore and afloat involved in the search.

29. _____ Verify with the SUBOPAUTH that all other submarines in the area have surfaced and appropriate safety signals have been received. Consider surface transit to close the datum. Once all accounted for, other than DISSUB, they can be re-tasked to support the search if deemed appropriate.

30. _____ Consider implementing MINIMIZE.

31. _____ Update the ISMERLO web site with the estimated survival time based on expected on board stores and personnel embarked.

32. _____ Have the National RCC initiate a Notice to Airmen (NOTAM) and a Naval Warning (Notice to Mariners).

33. _____ Review or add existing rescue elements to the ISMERLO alert page to determine estimated TTFR of available Rescue Systems.

34. _____ Consider estimated survivability to determine if immediate mobilization of rescue efforts should be initiated.

35. _____ Post an initial estimated datum providing area of uncertainty in the Operational Summary of the ISMERLO website to enable identification of potential airport/seaport combinations and vessels of opportunity (VOO) suitable for air portable rescue systems. Update the Operational Summary frequently as the situation develops.

<u>The following are actions to be taken, typically, during the Mobilization phase:</u>

36. _____ Nominate Escape Gear Ship(s) and detail equipment/advisers to be carried.

37. _____ Request NA and nations to activate recall of specialist advisers.

38. _____ Discuss with NA and other nations the requirements for deployment of specialists.

39. _____ Alert appropriate authorities to the need to provide air transport as required. (TRANSCOM, DTSC, . . .)

40. _____ Check for available hyperbaric chambers including those located ashore in the vicinity of the datum.

41. _____ Consult and Initiate discussion with the NA and other appropriate authorities regarding provision, employment and deployment of Submarine Rescue Elements.

42. _____ Review status of Nations posting availability and tracking information of rescue capabilities and required logistics to the alert page on the ISMERLO website. (This should be done frequently during development of rescue options and during rescue system deployment phases).

43. _____ Review potential weather in the vicinity of the datum. Rescue becomes extremely difficult when Sea states exceed sea state 3.

44. _____ Determine availability of additional SMER Emergency Life Support Stores (ELSS) (CO_2 scrubbing material, O_2 candles) to deploy to the rescue port for potential posting to the DISSUB by pressure tight pod or with the rescue vehicle on the first rescue cycle.

3.A.1.3. SUBSUNK PHASE

Activate full scale rescue operation.

If proceeding directly to SUBSUNK review SUBLOOK/SUBMISS sections for appropriate items to initiate/complete.

45. _____ Complete and release SUBSUNK implementing signal (paragraph 3.B.4) and activate an Alert on the ISMERLO web site (www.ismerlo.org) if not previously done.

Upload copy to ISMERLO website (alert page).

46. _____ Maximize use of unclassified communications distribution though the ISMERLO website chat and document upload functions.

47. _____ Designate the CRF.

48. _____ Send National specific messages and notifications as required

    a. through z: as required.

49. _____ Draft and send a formal "Request for SMER Assistance" addressed to Nations owning the Rescue Elements. (paragraph 3.B.6).

50. _____ Prioritize Rescue Element selection. Key factors: Estimated TTFR, depth of water, predicted sea state, Transfer under Pressure (TUP) requirement.

51. _____ Mobilize portable hyperbaric chambers and operators.

52. _____ Sail Escape Gear Ships (EGSs) as soon as hyperbaric chambers and other stores (1RS) needed for the treatment of escapees are embarked with hyperbaric chamber operators. Augment with additional divers/chamber operators as appropriate.

53. _____ Call up Helo support.

54. _____ Request NA and nations to mobilize DLT and other specialist advisers.

55. _____ Mobilize SMER Emergency Life Support Stores (ELSS) to the rescue port.

56. _____ Mobilize medical augmentation element.

57. _____ Update the ISMERLO alert page and chat with any identified logistics or equipment shortfalls.

58. Track DISSUB status acquiring the following information and update ISMERLO web-site:

    a. _____ DTG of accident

    b. _____ Estimated / actual depth

    c. _____ Compartments available

    d. In each of these compartments: A / F

        (1) Number of personnel _____/_____

        (2) Absolute pressure and rate of rise _____/_____

        (3) O2 reading _____/_____

        (4) O2 Candles remaining/Amount of oxygen left (in liters) _____/_____

(5) CO_2 reading _____/_____

(6) Total amount of CO_2 scrubbing materiel (in kg) _____/_____

(7) CO reading _____/_____

(8) Damage report _____/_____

(9) Injuries _____/_____

(10) Senior Survivor's intentions/requirements. _____/_____

(11) Communication capabilities _____/_____

(12) In case of the DISSUB being nuclear powered all details of radiological activity and measurements taken to date. _____/_____

(13) Electrical Supplies available within DISSUB _____/_____

e. _____ Heading

f. _____ Aspect - heel and trim

g. _____ Indicator buoy(s) or SEPIRB have been released, if equipped

3.A.2. OSC CHECK OFF LIST

3.A.2.1. SUBMISS PHASE

Prior to arrival at the Datum/Search Area

1. _____ Inform all concerned of assumption of role of OSC. Establish communications with CRF/REC once nominated.
2. _____ Establish a Search plan based on indications received by the SSRA/SMC, including the determination of the rescueable waters. Set up priorities and patterns for type of search, considering the employment of all available assets.
3. _____ Fly red flag at masthead, (all-round flashing red light by night).
4. _____ Implement a SAR COMPLAN and an Underwater Communication Plan, taking into account the Sonar Silence periods (paragraph 3.12.2.f – Minutes 00-05 and 30-35 each hour).
5. _____ Coordinate the Air Search, ensuring appropriate liaison with aircrews.
6. _____ Prepare to receive specialist advisers, possibly by parachute or boat transfer.

On Arrival at the Datum/Search Area:

7. _____ Implement the Search Plan.
8. _____ Transmit SITREP to SSRA/SMC and Search Force Units, keeping CRF and Rescue Elements (when identified) informed. Provide updates every three hours.
9. _____ Mark the Datum position and promulgate it to all concerned, specifying its accuracy.
10. _____ Co-ordinate 10 minute firings of single charges.
11. _____ Take appropriate individual ship actions (paragraph 3.A.3).

On Location of the DISSUB:

3.A.2.2. SUBSUNK PHASE

12. _____ Any Unit or Authority with direct/positive indications (paragraph 3.7.2 refers) that a submarine has sunk, releases SUBSUNK message (see paragraph 3.B.4) or refers to the Alerting Authority/Subopauth for action
13. _____ Mark the DISSUB's position, when known.
14. _____ Establish UWT communications with the DISSUB via the Unit in contact or via the Intervention Assets (including the SPAG) if depth allows. Acquire all necessary information to brief the CRF.

15. _____ Prepare to use the Search Force to establish a security zone, and be ready to assist the CRF as requested.

16 _____ Provide SSRA/SMC and CRF with updates on following topics as changes occur

a.. Situation in the DISSUB (as per SSRA/SMC Check-off list paragraph 3.A.1.3.58 page 3.A-5)

b. Search Force units in area:

(1) Ships

(2). Fixed wing aircraft with time on task remaining

(3). Helicopter airborne with time on task remaining

(4) Any recompression chambers available in the area of interest.

(5) Helicopters available on ships of the search force, as well as in the area of interest, specifying both their passenger and Casualty Evacuation (CASEVAC) carrying capacities.

c. SMER and Medical specialists available in the Search Force.

d. Local conditions that may affect the conduct of the Recovery/Rescue

(1) Predicted sea state and weather for next 7 days

(2) Surface and bottom currents

(3) Underwater visibility

3.A.3. INDIVIDUAL UNITS OF THE SEARCH FORCE CHECK OFF LIST

3.A.3.1. SUBLOOK PHASE

1. _____ Ships in company attempt to contact the submarine by all available means.

3.A.3.2. SUBMISS/SUBSUNK PHASES

Units Proceeding to the Datum:

2. _____ Provide the SSRA/SMC with a signal in accordance with paragraph 3.8.5.
3. _____ If capable of accessing the Internet, request an ISMERLO account (www.ismerlo.org).
4. _____ Suspend all exercises.
5. _____ Surface any submarines in company,
6. _____ Submarines surface and send a Surfacing Signal.
7. _____ Submarines fly a yellow flag.
8. _____ Be prepared to take on OSC duties.
9. _____ Change frequency in accordance with SAR COMPLAN as ordered by OSC and observe sonar silence periods (paragraph 3.12.2.f – Minutes 00-05 and 30-35 of each hour).
10. _____ Prepare helicopters for flying.
11. _____ Prepare explosive charges and boats.
12. _____ Prepare diving equipment.
13. _____ Post extra lookouts.
14. _____ Brief Officer of the Watch (OOW), lookouts, aircrew on visual indications of a DISSUB's position.
15. _____ Brief OOW and aircrew not to use of smoke markers.

16. _____ Brief OOW and Sonar Operators on underwater communications, sonar silence periods and reactions on detection of the DISSUB.
17. _____ Ensure most experienced UWT operators are available for communicating with DISSUB on UWT.
18. _____ Make physical and personnel preparations for reception of escapees.

INTENTIONALLY BLANK

ANNEX 3.B. FORMATS FOR SUBSAR SIGNALS

The following formats have to be used as applicable

3.B.1. DIVING SIGNAL

PRIORITY

FM: NAME OF SUBMARINE

TO: SUBOPAUTH (Always)

APPOINTED MARITIME COMMANDER (IF COMMAND DELEGATED).

INFO: PREVIOUS AND/OR NEXT SUBOPAUTH

SSRA/SMC

SENIOR OFFICER COMMANDING SHIPS IN COMPANY/EXERCISING

WITH SUBMARINE

Appointed Maritime Commander (if command not delegated).

NATO UNCLASSIFIED or as appropriate

SIC LGQ

1. DIVING AT (Date-Time-Group) UNTIL (Date-Time Group) IN ACCORDANCE WITH (WPP)(???) ..... AMENDED TO CHANGE

..... OR IN AREA (LATILONG) ..... FOR (exercise) .....

2. SUBCHECK REPORT INTERVAL (optional).

All figures quoted in the text are to be spelt out in full; lettered abbreviations should also be spelled out using the phonetic alphabets.

INTENTIONALLY BLANK

3.B.2. COMCHECK

The AA is to originate a signal in the following form:

FLASH:

FM: AA

TO: NAME OF SUBMARINE (Normally by separate signal)

INFO NA

AIG 5652

ALLIEDSUBCOM DET NORFOLK VA

ADDITIONAL ADJACENT COMMANDERS WHO HAVE/MIGHT HAVE SEARCH ASSETS.

SUBOPAUTH DESIGNATED IN SUBNOTE AS HOLDING NEXT OF KIN

NATO UNCLASSIFIED

SIC LGS/SIJ

SUBMARINE SAFETY COMCHECK. NAME OF SUBMARINE,

INTERNATIONAL CALLSIGN (phonetic spelled out).

INTENTIONALLY BLANK

3.B.3. SUBLOOK

3.B.3.1. THE AA IS TO ORIGINATE A SIGNAL IN THE FOLLOWING FORM:

FLASH

FM AA

TO AIG 5652

ALLIEDSUBCOM DET NORFOLK VA

NAME OF SUBMARINE

ADDITIONAL ADJACENT COMMANDERS WHO HAVE/MIGHT HAVE SEARCH ASSETS (IF APPROPRIATE)

NATIONAL AUTHORITY DESIGNATED IN SUBNOTE AS HOLDING NEXT OF KIN

OTHER NATIONAL OR INTERNATIONAL ADDRESSES AS DESIRED/NEEDED (IF APPROPRIATE).

NATO UNCLASSIFIED

SIC LHA

1. SUBLOOK

2. NAME OF SUBMARINE, INTERNATIONAL CALLSIGN, INDICATOR BUOY NUMBERS ....FWD....AFT, CREW STRENGTH

3. REASON AND AREA

EG (A) SUBCHECK REPORT OVERDUE AT ....ON PASSAGE...TO..., LAST KNOWN POSITION OR (B) CONTACT LOST SINCE....DURING EXERCISE....IN AREA...., LAST KNOWN POSITION

4. SSRA/SMC IS....

5. IS/IS NOT FITTED WITH A RESCUE SEAT

6. INTEND TO ESCALATE TO SUBMISS AT ....

INTENTIONALLY BLANK

3.B.3.2. ON RECEIPT OF A SUBLOOK SIGNAL FROM AA THE DESIGNATED SSRA/SMC IS TO INITIATE SEARCH OPERATIONS AND ORIGINATE A SIGNAL IN THE FOLLOWING FORM:

FLASH

FM SSRA/SMC

TO AIG 5652

ALLIEDSUBCOM DET NORFOLK VA

OTHER AIGS (IF APPROPRIATE)

ADDITIONAL ADJACENT COMMANDERS WHO HAVE/MIGHT HAVE SEARCH ASSETS (IF APPROPRIATE)

ADDITIONAL NATIONAL AUTHORITIES (IF APPROPRIATE)

SHIPS AS APPROPRIATE

AIR BASES AS APPROPRIATE

NATO UNCLASSIFIED

SIC LHA

CARRY OUT OPERATION SUBLOOK

NAME OF SUBMARINE/INTERNATIONAL CALLSIGN INDICATOR BUOY NUMBER ...FWD ...AFT

REF: ATP/MTP-57 CHAPT 3

1. THE FOLLOWING FORCES .... ARE TO PROCEED WITH ALL DESPATCH AND SEARCH ...

2. R/V FOR PARTICIPATING FORCES

3. DUTIES AND LOCATIONS OF AUTHORITIES INVOLVED

4. AIR SEARCH DETAILS

INTENTIONALLY BLANK

3.B.4. SUBMISS/SUBSUNK

3.B.4.1. ALERTING AUTHORITY

The AA is to originate a signal in the following form:

FLASH

FM AA

TO AIG 5652

ALLIEDSUBCOM DET NORFOLK VA

NAME OF SUBMARINE

NATIONAL AUTHORITY DESIGNATED IN SUBNOTE AS HOLDING NOK

ADDITIONAL ADJACENT COMMANDERS WHO HAVE/MIGHT HAVE

SEARCH ASSETS (IF APPROPRIATE)

ADDITIONAL NATIONAL AUTHORITIES

NATO UNCLASSIFIED

SIC LHA/LHN

1. SUBMISS/SUBSUNK

2. NAME OF SUBMARINE AND INTERNATIONAL CALLSIGN

3. LAST KNOWN POSITION ...AT .../ESTIMATED POSITION.....AT.....(OBSERVED TO SINK IN POSITION...)

4. SSRA/SMC IS ....

5. SUBMARINE INDICATOR BUOY NUMBERS FWD AFT ...)(IF FITTED)

6. IS/IS NOT FITTED WITH A RESCUE SEAT

INTENTIONALLY BLANK

3.B.4.2. SSRA

On receipt of a SUBMISS or SUBSUNK signal from the AA or any unit/authority reporting the sinking of a submarine, the designated SSRA/SMC is to initiate or continue search operations by originating a signal in the following form (including as much information as possible to minimise the need for follow on traffic):

FLASH

FM SSRA/SMC

TO AIG 5652

ALLIEDSUBCOM DET NORFOLK VA

OTHER AIGS AS APPROPRIATE

SHIPS AS APPROPRIATE

OTHER NATIONAL AUTHORITIES

ADJACENT MARITIME COMMANDERS

NATO UNCLASSIFIED

SIC LHA/LHN

CARRY OUT OPERATION SUBMISS/SUBSUNK

NAME OF SUBMARINE/INTERNATIONAL CALLSIGN (INDICATOR BUOYS FWD....AFT....)

REF: ATP/MTP-57 CHAPT 3

1. SHIPS: PROCEED/PROCEEDING WITH ALL DESPATCH TO START SEARCH

2. DATUM POSITION FOR SEARCH ... DEPTH (IN METRES), POSITION TO BE MARKED BY ...

3. INITIAL AREA TO BE SEARCHED BY

   (A) SHIPS:…

   (B) AIRCRAFT:…

4. OSC IS ...

5. RENDEZVOUS AIR FORCES (IF NOT THE SAME AS THE DATUM)

6. DUTIES/LOCATION OF AUTHORITIES INVOLVED/

7. (NAMES OF SHIPS) EMBARK:

   (A) SUBMISS STORES.

   (B) RECOMPRESSION CHAMBERS.

(C) MEDICAL OFFICERS.

(D) NATIONAL LIAISON OFFICERS.

(E) MEDIA

3.B.5. DISSUB LOCATED

Any unit or Authority aware that a submarine has sunk or the OSC, when the DISSUB has been located, is to originate a signal in the following form.

FLASH

FM ...

TO AIG 5652

ALLIEDSUBCOM DET NORFOLK VA

APPROPRIATE AREA COMMANDER(S)

APPROPRIATE SUBOPAUTH(S)

NATO UNCLASSIFIED

SIC LHA

SUBSUNK

1. NAME OF SUBMARINE (IF KNOWN)

2. OBSERVED TO SINK IN POSITION .....AT.....(or LOCATED SUBMARINE SUNK IN POSITION.....AT.....)

INTENTIONALLY BLANK

3.B.6. REQUEST FOR SMER ASSISTANCE

A nation requesting SMER assistance should use the following format:

IMMEDIATE

FM NATION

TO NATION(S) AND AIG 5652

ALLIEDSUBCOM DET NORFOLK VA

INFO SSRA/SMC

OSC

SIC LHA/LHN

REQUEST FOR SMER ASSISTANCE

REF: ATP/MTP-57 CHAPTER 3

1. SUBMARINE (NAME) MISSING/SUNK IN (APPROXIMATE) POSITION ...

2. NA IS ...

3. SSRA/SMC IS ...

4. OSC IS ...

5. NATIONS ARE REQUESTED TO REPORT TO SSRA/SMC INFO NA AND POST TO THE ISMERLO WEBSITE THE READINESS STATUS OF THE FOLLOWING:

A. RECOMPRESSION CHAMBERS

(1) FITTED IN SHIPS

(2) PORTABLE

(3) SHORE BASED

B. LIFE/MEDICAL SUPPORT STORES

C. SUBMARINE RESCUE SYSTEMS

D. PERSONNEL

(1) SUBMARINE PARACHUTE ASSISTANCE GROUP

(2) OTHER ASSISTING PERSONNEL

(3) DIVING/MEDICAL PERSONNEL

E. OTHER

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3.B.7. NATIONAL SMER ASSISTANCE AVAILABLE

A nation replying a SMER assistance request or notifying own SMER Elements readiness status, should use the following format:

FM NATION

TO NATION REQUESTING SMER ASSISTANCE

INFO SSRA/SMC

ALLIEDSUBCOM DET NORFOLK VA

SIC LHA/LHN

READINESS STATUS OF SMER ASSETS

REF: ATP/MTP-57 CHAPTER 3

1. SUBMARINE RESCUE SYSTEMS

A. LOCATION

B. AVAILABILITY

C. ETA

D. MEANS OF TRANSPORT

2. SHOREBASED RECOMPRESSION CHAMBERS

3. SHIPBORNE RECOMPRESSION CHAMBERS (A. TO D. AS PARA 1. ABOVE)

4. PORTABLE RECOMPRESSION CHAMBERS ASHORE (A. TO D. AS PARA 1. ABOVE)

5. MEDICAL LIFE SUPPORT STORES (A. TO D. AS PARA 1. ABOVE)

6. SUBMARINE ESCAPE/RESCUE EXPERTS (A TO D. AS PARA 1. ABOVE)

7. SUBMARINE/DIVING MEDICAL EXPERTS (A. TO D. AS PARA 1. ABOVE)

8. OTHER INFORMATION

Notes:

Delete unused paragraphs.

Nations possessing submarine rescue Elements should automatically signal their availability/readiness status on receipt of a SMER alert message, as well as confirm their data specified in ATP/MTP-57.2 – National Data and on the ISMERLO web site (www.ismerlo.org Rescue Coordination Pages).

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CHAPTER 4 - MOBILIZATION OF SMER ELEMENTS

4.1. INTRODUCTION

Mobilization and assembly of SMER Elements are most likely to comprise SMER capabilities from different nations, and can be considered as a Multinational SUBSAR Response.

The SSRA/SMC, appointed by the National Authority (NA), will make the decisions on how the operation is to be conducted and provide appropriate recommendations to the NA, for issuing a request for SMER assistance, to meet the requirements of the operation.

Chapter 3 outlines NA and SSRA/SMC responsibilities, as well as the signal message formats for SMER assistance and SMER facilities availability.

The logistic requirements of deploying one or more rescue elements will likely be the most challenging aspect of the entire rescue operation. This deployment will require heavy airlift, cranes, road transport, infrastructure needs, welders, and other labour elements.

A typical decision making flowchart is provided, as guidance, in Table 4-1.

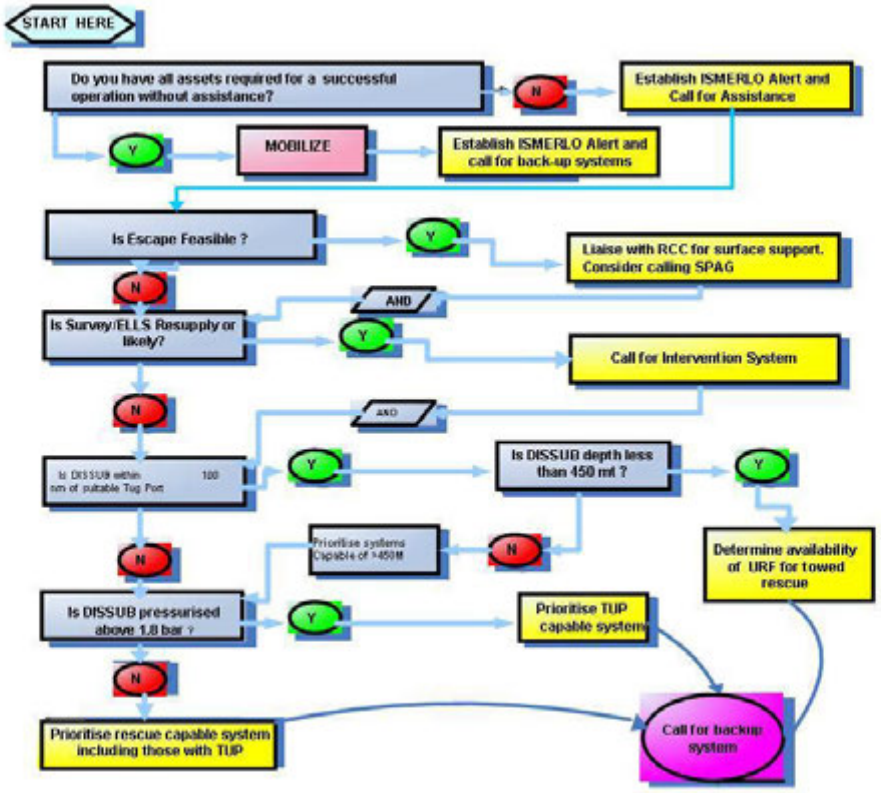

Table 4-1 SSRA/SMC decision making flowchart

The ISMERLO website has been developed to quickly post information on available Rescue Elements as well as the methods to mobilize equipment rapidly to the scene. Nations should make every effort to keep posted information up to date so that National and Multinational Command and Control Authorities can have a clear picture of the proper development of the rescue operation and the status of available means. Although being the principal coordinating focal point, ISMERLO

itself is not a Command and Control Authority. The movement of equipment and orders to rescue forces will use standard command and control circuits.

Validity at the Rescue Element Status on the ISMERLO Web Site is the key to the selection of the preferred Rescue elements and the Mobilization Airport-Seaport Combination (MASC).

Each nation is encouraged to have their own dormant rescue plans, with recognized and approved airport-seaport combinations and associated infrastructure capable of handling such Rescue elements. These can be posted and integrated into the ISMERLO website to help minimize time to first rescue. It is emphasized that this work should be coordinated with nations owning Rescue Elements, which may be considered as systems to be received in the event of a DISSUB incident.

Information about these combinations will be displayed on the ISMERLO web site (www.ismerlo.org).

It may also be necessary to deploy the Rescue Elements to nations that do not operate submarines and are not familiar with this type of operation. In these cases, the Nation owning the Rescue Element(s) liaises with the nation where its system is to be deployed.

4.2. SMER ELEMENTS COMPOSITION AND TASKS

SMER Elements can be divided into two main groups, both of them coordinated by the CRF:

4.2.1. GROUP 1: RECOVERY FORCES.

a. Composition.

These Forces may comprise one or more of the following main elements:

- Military Ships and Helicopters
- Civilian Ships and Helicopters
- Escape Gear Ship (EGS) with First Reaction Stores (1RS), including hyperbaric facilities for personnel recovered from the surface,
- Submarine Parachute Assistance Group (SPAG),
- DISSUB Liaison Team (DLT),
- Submarine Escape and Rescue Advisory Team (SMERAT).

b. Tasks.

Recovery Forces main task will be to recover escapees from the surface, stabilize and triage, as necessary, with subsequent timely transfer to the most suitable facility for definitive care. If available, a SPAG could also be deployed to render initial medical assistance, as required.

Recovery Forces are likely to arrive at the datum in advance of the Rescue Elements.

Where there are multiple escapees requiring hyperbaric treatment, which exceeds the capacity of chambers at the datum, the OSC will require transportation support to transfer them to shore facilities.

4.2.2. GROUP 2: RESCUE FORCES.

a. Composition

These forces may comprise one or more of the following elements:

- MOSHIPS transporting Submarine Rescue Elements for both Intervention and/or Rescue
- DISSUB Liaison Team (DLT).

- Submarine Escape and Rescue Advisory Team (SMERAT).

b. Tasks

Rescue Elements are most likely to be divided into two types of operation:

1. Operations with Intervention Elements.

   Ships with Intervention Elements will normally be the first units arriving at the scene of the incident; Intervention Elements main tasks may include:

   - survey,
   - debris removal and DISSUB preparation for SRV/SRC mating,
   - transponder field preparation,
   - ventilation and depressurisation operation,
   - conducting ELSS POD-posting,
   - providing safety redundancy for the SRV/SRC under mating operations with the DISSUB.

2. Operations with SRVs and/or SRCs.

   SRVs and SRCs will normally be carried on board civilian or military MOSHIPS from the MOPORT to the DISSUB's Datum area. Rescue Forces main task will be to rescue the DISSUB´s personnel.

4.2.3. SUBMARINE ESCAPE AND RESCUE ADVISORY TEAM (SMERAT)

This team is comprised of SMER experts, augmented by medical specialists. Its medical expertise will conduct the treatment to rescuees. The SMERAT should be embarked on the most suitable vessel, civilian or military deployed to the DATUM area and may transfer during the operation as the situation demands

For more information regarding the SMERAT (organization), see Chapter 6 -.

4.3. OTHER SMER EXPERTS AND ELEMENTS AVAILABLE

4.3.1. GENERAL

Every SMER Element mobilized will have its own System Operators and SMER experts.

ATP/MTP-57.2 contains national SMER data. Changes to this information should be reported to ISMERLO as the situation demands. The latest and most reliable information reported is posted on the rescue coordination pages of the ISMERLO web site (www.ismerlo.org).

4.3.2. DISSUB BRIEFING PACKS

These packs should include detailed and relevant information for the OSC, CRF, pilots and operators, which are required for the Rescue, for instance:

- General drawings and dimensions of the DISSUB;
- Details of escape and rescue fittings, as well as obstacles;
- Emergency Life support Stores (ELSS) re-supply details;
- Photographs of submarine hull, fittings and rescue seats;

- Data which, because of classification or sensitivity have not been included into ATP/MTP-57.2 – National Data.

4.4. PRIORITY FOR ASSEMBLY OF FORCES

At the same time the SSRA/SMC is initiating the search phase; the SSRA/SMC must assemble and start the mobilization of Recovery and Rescue Forces.

Priority for assembling the Forces will depend on the nature of the incident. Check off List at ANNEX 3.A and ANNEX 4.A act as a guide.

The SSRA/SMC should nominate Ships to carry the First Reaction Store (1RS) (particularly the hyperbaric facilities) and call for specialist advisors. If the quickest way of delivering assistance to the DISSUB or to the survivors already at the surface is by air, the SSRA/SMC should advise the NA to request the call out of a Submarine Parachute Assistance Group (SPAG).

Rescue Element mobilization demands a high degree of urgency; the logistics requirements means that there is likely to be a long lead-time from alert to first rescue. ANNEX 3.A contains check off lists for the SSRA/SMC during SUBLOOK and SUBMISS operations. A shift from SUBLOOK directly to SUBSUNK can occur. The checks off lists describe the sequence on which the SSRA/SMC should focus when proceeding with the assembly and mobilization of the SMER Elements, pending the NA formal request for assistance.

For deployment of more than one Rescue Element, there will be a requirement to de-conflict logistic support and mobilization activities. Identification of shortfalls and de-confliction of support requirements can be coordinated through the ISMERLO website.

Mobilization timelines for each rescue scenario are developed as a baseline and are posted on the ISMERLO web site.

4.5. AIRPORT/SEA PORT COMBINATION SURVEY PROCEDURE AND LOGISTICS DATA COLLECTION

The AP/SP database principal purpose is to identify and document infrastructure and logistics resources that will be used in an actual submarine rescue operation. The Airport/Seaport Combinations were historically developed and maintained in the US Deployment and User Manual (DUM) for the DSRV (Deep Submergence Rescue Vehicle). Specifically the size and weight of the DSRV vehicle limited accessible roads and therefore available Airport-Seaport Combinations. With the introduction of surface MOSHIP (VOOs) and containerization of the rescue to standard sizes and shipping weights the number of available combinations in a nation has increased. The idea of the Airport/Seaport Survey Checklist is to give nations a tool to collect key information in order to identify the logistic requirements to build a plan for deployment of rescue systems within their own country. An Airport/Seaport Survey Checklist (see ATP/MTP-57.2–Chapter 3) feeds the ISMERLO Airport/Seaport Database and enables online update and maintenance. This ensures that information is reasonably current and use of the database during exercises will enable better familiarity. Ultimately the database enables development and review dormant rescue plans that will provide a significant base of information to support a real rescue if needed.

ANNEX 4.A. ESCAPE GEAR SHIPS

Mobilization of Submarine Escape and Rescue Elements

Note: The following is a generic guide which will be adapted depending on the type of ship being used and national considerations and practices.

1. Embark portable hyperbaric chambers and operators.
2. Ensure a copy of ATP/MTP-57 is held onboard
3. Place hyperbaric chambers in hangar if available.
4. Keep flight deck clear (if appropriate).
5. Nominate junior Officer as Escape and Rescue Specialists assistant.
6. Conduct two way brief between Ship and visiting Escape and Rescue and Medical specialists.
7. If internet capable obtain login for ISMERLO website.

Before arrival at the datum

8. Log in and monitor ISMERLO website.
9. Ascertain numbers onboard the DISSUB if not included in the SUBMISS/SUBSUNK signal.
10. Non specialist Medical Officers read ATP/MTP-57 Chapter 6.
11. Select and prepare receiving treatment and observation areas.
12. Set up Escape and Rescue Specialists position in the Operations room.
13. Prepare evacuation sites.
14. Brief:
    - Detail non-medical guides, messengers, observers and log-keepers.
    - Detail experienced UWT operators.
    - Close up chamber operators, check out all systems.
    - Recovery Boats Crews.
    - All involved in reception of escapees.
    - Ships Company.

On Arrival at the Datum

15. Report to OSC and coordinate participation in the search effort
16. Attempt to communicate with the DISSUB on UWT at least every 15 minutes.

Once located:

17. Ascertain conditions in the DISSUB;
18. Log all information from the DISSUB;
19. Pass all relevant information (SITREP) to SSRA/SMC and appropriate Authorities.
20. When ready to receive escapees send SSS on UWT or make the 12 charge signal.

On Arrival of Escapees on the surface

21. Recover escapees from water (horizontally if possible).
22. Leave senior medical specialist to concentrate solely on triage.
23. Debrief escapees.
24. Keep all escapees under observation.

ANNEX 4.B. DISSUB LIAISON TEAM

- Designed Collapse Depth
- Construction drawings
- Profile drawings if deviated from those contained in ATP/MTP-57.2
- Basic Dive, Trim and Stability Calculations
- Precise situation of the Life Support Stores available aboard of DISSUB
- Detailed hatch drawings and procedure for opening from outside
- Detailed drawings of Rescue seat including certifications in accordance with ANEP/MNEP-85.
- Crew list and/or Next of Kin list (if deemed appropriate by the NA)
- Special tools, e.g. hatch cover/fairing removal and SRC attachment support,
- Interfaces which meets the requirements of ANEP/MNEP-85 (if submarine is capable of being ventilated, etc.)
- External HP air tools/Connectors
- Communication tools if available
- Atmosphere monitoring device
- National communication scripts if applicable
- SRV operators briefing diagram
- SRV operators briefing photographs
- Underwater photographs or photographs from a dry docking of the s/m external fittings.

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CHAPTER 5 - THE ESCAPE AND RESCUE PHASE

SECTION I – COMMAND, CONTROL AND COMMUNICATIONS

5.1. INTRODUCTION

During the Mobilization of SMER resources, the SSRA/SMC will coordinate the SMER Force and Elements deployment. Once a decision is made regarding Rescue Elements deployment, the most appropriate MASC will be determined. Integral to this process is the embarkation of specialist personnel, who will advise the CRF on the employment of the Rescue Elements.

There may be a case in which the Subopauth, due to the specific coincident indicators (i.e. a submarine has been seen sinking, the receipt of the distress signal from a SEPIRB) activates the SUBSUNK Operation without passing through the SUBLOOK and SUBMISS Phases. In this case, even if the Search phase will be limited to the localization of the very exact position of the DISSUB on the bottom, the SSRA/SMC will still have to go through the Mobilization of SMER Elements phase. In particular, attention is drawn on those Check off Lists actions (SUBLOOK/SUBMISS phases) which still need to be accomplished to guarantee the pertinent involvement of all concerned.

Escape and Rescue Phases may overlap but would possibly occur in the following sequence:

a. Recovery of personnel on the surface (described in Section II of this chapter).

b. Rescue of DISSUB personnel, including Intervention operations (described in Section II of this chapter).

c. Medical treatment of escapees and rescuees (described in ATP/MTP-57 - Chapter 6 -).

As these activities may take place at the same time, coordination between Forces described above is essential to speed up the process of saving as many DISSUB personnel as possible.

The CRF needs to be able to concentrate entirely on the saving of life by recovery and/or rescue without other operational distractions. Accordingly, once the OSC has handed over the above responsibilities to the CRF, he will continue to provide assistance with other tasks such as perimeter patrol, communications guard, helicopter operations co-ordination (including possible evacuation of escapees/rescuees), media operations and personnel transfer.

5.2. COMMAND AND CONTROL (C2)

The Authorities involved in a SUBSAR Operation and their responsibilities are described in Chapter 3. The CRF has the responsibility for coordinating and controlling the recovery of escapees on the surface and/or the rescue of DISSUB personnel.

Once the CRF has arrived at the datum, a formal handover will be conducted by the OSC in accordance with the OSC data exchange format (handover to CRF) (paragraph 3.A.2)

Each Rescue Element will be commanded by a Rescue Element Commander (REC), designated by the providing Nation. The REC will coordinate with the CRF for the operation of their own Rescue Element.

5.3. COMMAND RELATIONSHIPS

The C2 organization during the Escape and Rescue phase is represented in Figure 5-1. The OSC is the Authority normally possessing Tactical Control of allocated Forces at datum. The OSC's main function during this phase is to allow the CRF to concentrate on the rescue effort.

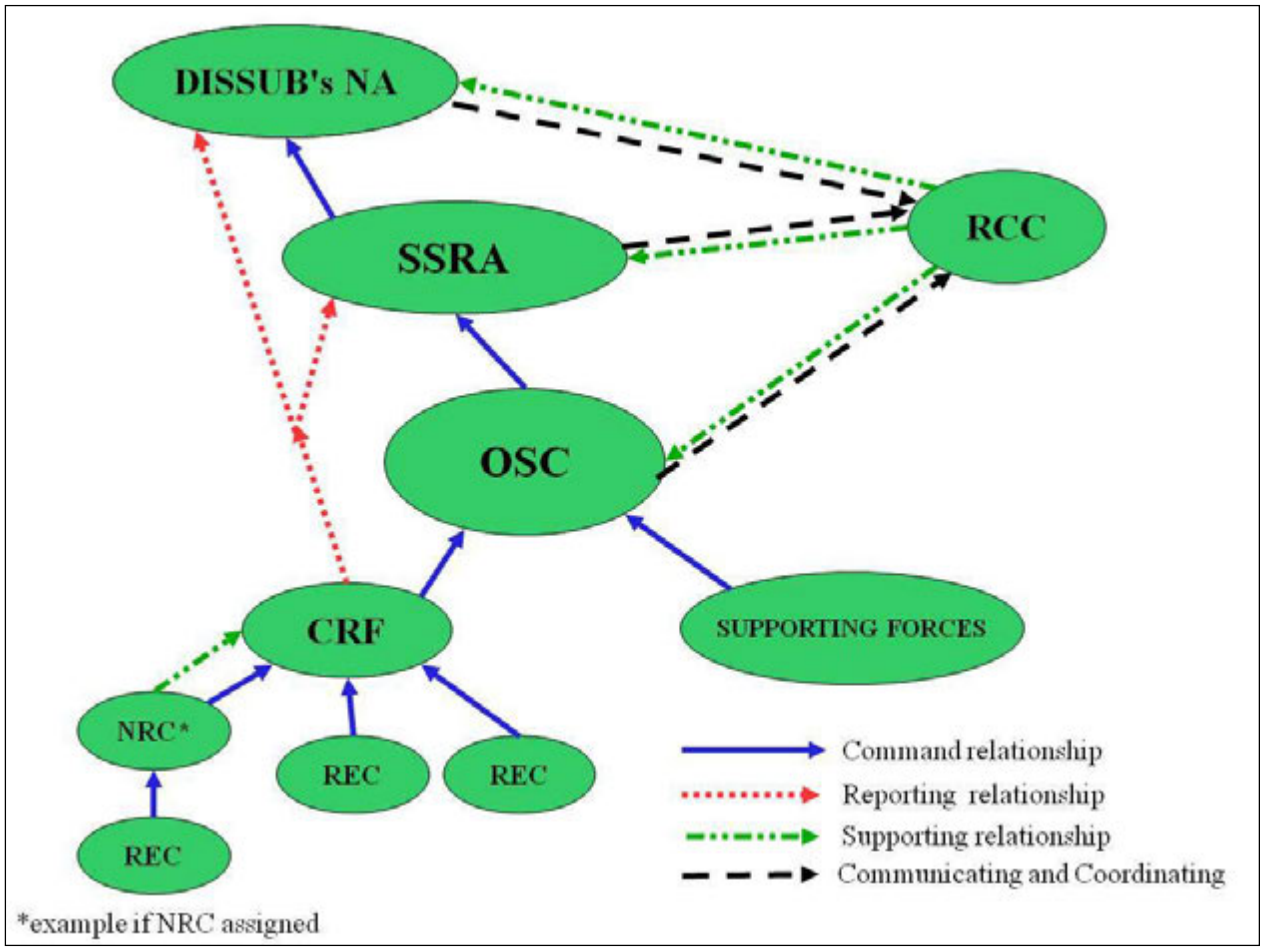

Figure 5-1 SMER Phase - Authorities relationship.

The OSC reports directly to the SSRA and maintains overall responsibility for the operation.

On arrival at the Datum area, the CRF will assume tactical control of those units assigned by the OSC. A shift of CRF responsibility is possible during the course of the operation. The REC(s) will be under the tactical control of the CRF and shall report accordingly.

ANNEX 3.A, paragraph 3.A.2, contains the OSC data exchange format (handover to the CRF).

In general terms and in accordance with military chain of command the OSC must control all non-SMER activities in order to allow the CRF the freedom of action to affect a speedy intervention and rescue.

During a SUBSAR operation it is possible that the OSC, SSRA/SMC and other Authorities could belong to different nations than that of the DISSUB. The CRF will have a direct relationship with the designated SSRA/SMC and/or DISSUB NA, focused on avoiding any public release of sensitive information. This relationship is recorded by the dotted lines represented in Figure 5-1. The CRF may or may not copy the reports to the OSC, depending on the sensitivity of the issues and in accordance with particular directions received from the NA.

5.4. COMMUNICATIONS DURING RESCUE OPERATIONS

5.4.1. GENERAL.

Communications with the submarine will normally be by UWT. However, Explosive Charge and Hull Tap communication signals can also be used.

A significant amount of underwater noise will be present in a submarine rescue scenario and a strict control of emission management is required to ensure efficient search and rescue operations.

Besides the communications that could be established with the submarine during the Search and Localization phase, the following equipment and procedures can be used to communicate with the DISSUB during the Escape and Rescue phase once the submarine has been located:

a. UWT

It is primarily used for communications between the DISSUB and the surface Forces when the Submarine has been located. In the case of a loss of power, the DISSUB personnel can use an Emergency UWT. This set works independently from the submarine electrical system, and it generally operates at 8 kHz.

b. TAP CODE

See related Scripts in ANNEX 5.A

c. EXPLOSIVE CHARGES

See related scripts in ANNEX 5.A

5.4.2. UNDERWATER FREQUENCY MANAGEMENT DURING RESCUE OPERATIONS

The goal of the communication management plan (COMPLAN) is to promote effective communication. The avoidance of mutual interference between systems by distinctly separating underwater frequencies is considered of great importance; it is the responsibility of the OSC to implement an initial plan until the arrival of the CRF. Each unit should provide the OSC with information on fitted communication systems. This information should be provided as far in advance as possible so that the OSC can determine interoperability of systems.

During the Search phase, only one ship should be designated to communicate with the DISSUB. During the Rescue Phase, only the MOSHIP conducting the rescue operation should communicate with the DISSUB.

Example of equipment which could cause interference:

- Sonars
- UWT
- Tracking Systems.
- Homing beacons.
- Ship generated noise
- Dynamic Positioning Systems.

5.4.3. COMMUNICATION CHALLENGES

Certain problems are almost inevitable:

a. Even at the best of times, communication by UWT is less effective than hard wired systems. In order to avoid noise, which is likely to peak at 10 kHz and below, higher frequencies (eg 27kHz) should be used, where available for communication with the DISSUB.

SRV/SRC may also be used as a relay for communication between CRF/REC and DISSUB.

b. Some classes of warship may have problems in communicating with the DISSUB due to transducer configuration. The answer is often to stand-off further, perhaps in excess of 3500 meters, from the DISSUB.

c. UWT interference is unlikely to degrade the performance of tracking systems. If long-life bottom transponders are deployed, frequencies must be chosen carefully in order to avoid previously discussed interference issues

d. Homing systems which interface with free running pingers or beacons are susceptible to mutual interference; however they are normally able to be distinguished separately. Transponders associated with Dynamic Positioning (DP), and other beacons, add further complications to the choice of frequencies.

e. High frequency sonars are unlikely to be influenced by any of the above systems. Two similar systems may interfere with each other but this is unlikely to degrade performance markedly. However warships' main-frame search sonars at lower frequencies could interfere with both UWT and tracking, and once the DISSUB has been located these should be strangled.

5.4.4. RESCUE AND INTERVENTION COMMUNICATION SCRIPTS

Scripts for mating/de-mating, POD posting, Ventilation and General Purpose are contained in ANNEX 5.A to this Chapter. The 3-letter code is used for UWT communications. When using UWT, receipt of transmissions is to be notified with "ROMEO ROMEO ROMEO".

SECTION II – RECOVERY AND RESCUE OF DISSUB PERSONNEL

5.5. RECOVERY OF PERSONNEL ON THE SURFACE

If the unit in charge of coordinating the recovery of personnel on the surface is different from the designated CRF, very close coordination between units is paramount for the success of the recovery operation. It is unlikely but possible, that an Escape and a Rescue scenario would take place simultaneously.

See Chapter 6 -for medical treatment of escapees.

5.6. INTERVENTION PRIOR TO RESCUE

Prior to execution of the rescue effort, it may be necessary to assist the DISSUB in maintaining conditions onboard by intervention. Intervention may be comprised of debris removal, preparing for Escape or SRV/SRC operations, POD-posting ELSS, and Depressurisation/Ventilation.

5.7. CONDUCT OF THE RESCUE

The composition of the Rescue Force will vary, depending on the availability of Rescue Elements and the location of the DISSUB. A very likely scenario will involve the use of a SRV/SRC operating from a MOSHIP as the major lifesaver. If time permits, it is preferable to survey a DISSUB prior to deployment of a SRV/SRC.

Coordination of the different SMER Elements is vital both for waterspace management and achievement of the aim. The CRF should ensure that all his RECs receive adequate and timely briefings. The arrival brief should include the DISSUB position and its internal conditions (if known), heading, depth, heel, trim and, if applicable, which indicator buoys have been released. Details of water conditions observed must be briefed as detailed in the OSC data exchange format (handover to CRF) (paragraph 3.A.2).

Every effort must be made to comply with the DISSUB's request for stores and to obtain specialist advice on what might be required. Providing provisions will greatly assist in sustaining morale in the DISSUB.

The NA/DLT advisor should carefully brief operators of SRVs/SRCs before their first mating attempt. Drawings and photographs of the DISSUB should also be available onboard the SRV/SRC, for immediate reference. Details of Submarine Specific Data are contained in ATP/MTP-57.2 – National Data.

See Chapter 6 -for medical treatment of rescuees.

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ANNEX 5.A. COMMUNICATION SCRIPTS

5.A.1. GENERAL

The following instructions have to be followed when using Scripts in this Annex:

a. Meanings in the code scripts at ANNEX 5.A differ from AXP1. These codes are only to be used in SUBSAR operations.

b. Ships (SRV/SRC) and Submarines names are to be used as callsigns.

c. If there are personnel in the DISSUB forward, aft or centre compartments the communications should contain the appropriate word or 3-letter group added to the code to indicate location (e.g. DELTA DELTA DELTA ALFA ALFA ALFA FIVE ZERO).

d. Some aircraft do not carry charges but drop buoys (SUS Mk 84) which transmit a 2 tone sound like a siren that can be picked up on UWT. On hearing this signal the DISSUB should fire a candle to indicate her position.

e. A DISSUB may use taps in Morse code in addition to UWT. In this case the dash is to be indicated by two or three rapid taps with a reduced interval and the dot by a single tap. The interval between individual dots and dashes should be 1 - 2 seconds and the interval between characters 5 seconds.

UWT Code	Charge/ Tap code	MEANING	
		From MOSHIP	From DISSUB
ALFA ALFA ALFA		Aft escape compartment.	Aft escape compartment.
BRAVO BRAVO BRAVO	1 Charge every 10 minutes	We are searching for you. Fire a smoke candle to indicate your Position.	
CENTRE CENTRE CENTRE		Centre LET position.	Centre LET position.
CHARLIE CHARLIE CHARLIE			First survivor making escape now.
DELTA DELTA DELTA		Total amount CO2 scrubbing material left in national absorption units?	Total amount of CO2 scrubbing left is (national absorption units): DELTA DELTA DELTA X X

UWT Code	Charge/ Tap code	MEANING	
		From MOSHIP	From DISSUB
ECHO ECHO ECHO	6 Charges	You have been found. Attempt to communicate by UWT and/or fire a smoke candle with message carrier giving full details of the conditions in submarine and your intentions. Ref SSRA/SMC check-off list at paragraph 3.A.1.3.58 page 3.A-5	Situation on board as follows (Ref SSRA/SMC check-off List at paragraph 3.A.1.3 page 3.A-5) (Example, to report situation in the forward compartment: ECHO ECHO ECHO FOXTROT FOXTROT FOXTROT ALFA 261430Z BRAVO 143 METRES … DELTA ONE TACK 38 … DELTA NINE TACK 15 … GOLF SEPIRB)
FOXTROT FOXTROT FOXTROT		Forward escape compartment.	Forward escape compartment.
GOLF GOLF GOLF		Report number of personnel in your compartment of DISSUB.	Number of personnel in this compartment is: GOLF GOLF GOLF X X
MAMA MAMA MAMA	2 Charges/ Taps followed after a short pause by 2 more.	Intend to Pod Post mini-pod. Attempt to communicate by UWT. If unable to do so, fire a smoke candle with message carrier stating ELSS needed. Once acknowledged, use the Pod Posting Script.	ELSS requirements are: (give details).
NEGATIVE NEGATIVE NEGATIVE		UNABLE TO COMPLY	UNABLE TO COMPLY
NOVEMBER NOVEMBER NOVEMBER		Report present atmospheric conditions in DISSUB.	Atmospheric readings are: (O2 in percentage, CO2 in percentage and absolute pressure in bar).
OSCAR OSCAR OSCAR		How much oxygen left.	Amount of oxygen left (in national generation Units): OSCAR OSCAR OSCAR X X X

UWT Code	Charge/ Tap code	MEANING	
		From MOSHIP	From DISSUB
PAPA PAPA PAPA	3 Charges/Taps followed after a short pause by 3 more.	Intend to Pod Post Emergency Life Support Stores (ELSS). Attempt to communicate by UWT. If unable to do so, fire a smoke candle with message carrier stating ELSS needed. Once acknowledged, use the Pod Posting Script.	ELSS requirements are: (give details).
QUEBEC QUEBEC QUEBEC	9 charges/ taps	Intend to conduct a rescue using SRV/SRC. Estimated TTFR (hrs): QUEBEC QUEBEC QUEBEC XX Once acknowledged, use the SRV/SRC Script (paragraph 5.A.2) n.b. During Exercise the meaning is: “I am ready to commence the exercise”	Intend waiting for rescue. n.b. During Exercises the meaning is: “Ready to start the exercise”
ROMEO ROMEO ROMEO		Message received	Message received
SIERRA SIERRA SIERRA	12 Charges	Standing by on the surface. Surface clear	Intend commencing escape in (hrs): SIERRA SIERRA SIERRA XX
TANGO TANGO TANGO		A rescue operation will not be attempted. Report estimate of latest time escape must start	Estimate escape must start in (hrs): TANGO TANGO TANGO XX
UNIFORM UNIFORM UNIFORM		How many injured personnel require urgent medical treatment?	Number of injured personnel requiring urgent medical treatment is (UNIFORM UNIFORM UNIFORM XX).
VICTOR VICTOR VICTOR	4 Charges/ Taps followed after a short pause by 4 more.	Intend to proceed with Ventilation. Once you acknowledge, use the Ventilation Script	Acknowledge
X-RAY (3) X-RAY X-RAY	Series of rapid taps	Carrying out emergency breakaway.	Clear my position urgently

UWT Code	Charge/ Tap code	MEANING	
		From MOSHIP	From DISSUB
YANKEE YANKEE YANKEE	5 Charges/ Taps followed after a short pause by 5 more.	I am going to abort current operation/exercise	Abort current operation/exercise
ZULU ZULU ZULU		DISSUB position clear	

In the national data add what the national units for CO2 scrubbing and oxygen generation are

Remarks: Transmission receipt to be notified with “ROMEO ROMEO ROMEO”

Notes:

1. If possible tap signals should be acknowledge by repeating them back loudly and clearly.
2. Ship/Submarine Telegraphy (SST). The basic procedure to be used when signalling by SST is the same as that used for signalling by radio telegraphy. Speed of transmission should not normally exceed 6 words a minute. It should be appreciated the DISSUB crew may not contain anyone familiar with morse code, although a copy of the code should be in escape compartments.
3. Signal XXX to be followed by Unit Name. Example: XRAY XRAY XRAY NEMO NEMO NEMO; XRAY XRAY XRAY DISSUB DISSUB DISSUB.

5.A.2. SRV/SRC SCRIPT - MATING/DEMATING PROCEDURE

5.A.2.1. SRV/SRC SCRIPT – MATING

STEP	FROM	TO	UWT CODE	TAP CODE	MEANING	REMARKS
01	MOSHIP	DISSUB	HOOKER HOOKER HOOKER	1 TAP 2 TIMES	DOWNHAUL CABLE IS CONNECTED	To be used only during operations with SRC
02	SRV/SRC	DISSUB	WHISKEY WHISKEY WHISKEY		HOLD YOU IN SIGHT. PROCEEDING TO FWD/AFT HATCH	RV identifies herself to DISSUB
03	DISSUB	SRV/SRC	NOVEMBER NOVEMBER NOVEMBER		MY INTERNAL ABSOLUTE PRESSURE IS (in bar)	
04	SRV/SRC	DISSUB	KILO KILO KILO	4 TAPS 2 TIMES	HAVE SEAL. DRAIN HATCH CAVITY	
05	DISSUB	SRV/SRC	KILO KILO KILO	4 TAPS 2 TIMES	DRAINING HATCH CAVITY	
06	DISSUB	SRV/SRC	NOVEMBER NOVEMBER NOVEMBER		MY INTERNAL ABSOLUTE PRESSURE IS (in bar)	
07	SRV/SRV	DISSUB	LIMA LIMA LIMA	3 TAPS 2 TIMES	HATCH CAVITY DRAINED. OPEN UPPER HATCH.	

5.A.2.2. SRV/SRC SCRIPT - DEMATING

STEP	FROM	TO	UWT CODE	TAP CODE	MEANING	REMARKS
01	SRV/SRC	DISSUB			SHUT HATCH AND DRAIN.	Shout through the hatch
02	DISSUB	SRV/SRC	MIKE MIKE MIKE	2 TAPS 2 TIMES	HATCH AND DRAIN SHUT	
03	SRV/SRC	DISSUB	MIKE MIKE MIKE	2 TAPS 2 TIMES	LIFTING OFF MOVING CLEAR.	
04	MOSHIP	DISSUB	ZULU ZULU ZULU		DISSUB CLEAR	To be used only during operations with SRC, meaning that the downhaul cable has been removed and the SRC has been recovered

5.A.2.3. SRV/SRC SCRIPT - EMERGENCY PROCEDURE

Signal UWT	Charge/Tap code	MEANING	
		From SRV/SRC	From DISSUB
X-RAY X-RAY X-RAY	SERIES OF RAPID TAPS	CARRYING OUT AN EMERGENCY BREAKAWAY	CLEAR MY POSITION URGENTLY

Remarks: Transmission receipt to be notified with “ROMEO ROMEO ROMEO”

5.A.3. POD (MINI-POD) POSTING SCRIPT PROCEDURE (1)

STEP	FROM	TO	UWT CODE	TAP CODE	MEANING	REMARKS
01	MOSHIP	DISSUB	HOTEL HOTEL HOTEL	3 TAPS	FLOOD TOWER (SSE), OPEN (UPPER) HATCH. I AM KEEPING CLEAR	
02	DISSUB	MOSHIP	HOTEL HOTEL HOTEL	3 TAPS	TOWER (SSE) FLOODED. HATCH OPEN. READY TO RECEIVE POD OR BAG (MINI-POD)	
03	MOSHIP	DISSUB	JULIETT JULIETT JULIETT	5 TAPS	POD/BAG (MINI-POD) IN PLACE. HATCH CLEAR TO SHUT.	(2)
04	MOSHIP	DISSUB	INDIA INDIA INDIA	4 TAPS	CHECK YOUR ALIGNMENT HATCH IS NOT OR WILL NOT OPEN	
05	DISSUB	MOSHIP	ZULU ZULU ZULU		INTEND TO RELEASE POD (MINI-POD)	
06	MOSHIP	DISSUB	ZULU ZULU ZULU		DISSUB CLEAR	CLEAR TO RELEASE POD (MINI-POD) IF NEEDED

5.A.3.1. POD (MINI POD) POSTING SCRIPT - EMERGENCY PROCEDURE

Signal UWT	Charge/Tap code	MEANING	
		From MOSHIP	From DISSUB
X-RAY (3) X-RAY X-RAY	SERIES OF RAPID TAPS	CLEARING YOUR POSITION	CLEAR MY POSITION URGENTLY

Remarks: Transmission receipt to be notified with “ROMEO ROMEO ROMEO”

Notes:

1. Terms in parenthesis are to be taken into consideration when conducting a MINI-POD Posting Operation.
2. For first run only to a submarine without its own pod bag, this signal means “pod receiving equipment in tower”.
3. Signal XXX to be followed by Unit Name. Example: XRAY XRAY XRAY NEMO NEMO NEMO; XRAY XRAY XRAY DISSUB DISSUB DISSUB

5.A.4. VENTILATION SCRIPT PROCEDURE

STEP	FROM	TO	UWT CODE	TAP CODE	MEANING	REMARKS
01	MOSHIP	DISSUB	GREEN GREEN GREEN	2 TAPS 3 TIMES	PREPARING TO ATTACH GUIDE WIRES AND VENTILATION HOSES	
02	DISSUB	MOSHIP	NOVEMBER NOVEMBER NOVEMBER		MY INTERNAL ABSOLUTE PRESSURE IS (IN BAR)	(1)
03	MOSHIP	DISSUB	TYPHOON TYPHOON TYPHOON	4 TAPS 2 TIMES	VENTILATION HOSES ATTACHED.	
04	MOSHIP	DISSUB	HURRICAN EHURRICA NEHURRIC ANE	4 TAPS 3 TIMES	OPEN AIR VALVES	
05	DISSUB	MOSHIP	HURRICAN EHURRICA NEHURRIC ANE	4 TAPS 3 TIMES	AIR VALVES OPENED	MOSHIP INCREASES INLET AIR FLOW (EVENTUALLY)
06	MOSHIP	DISSUB	INDIGO INDIGO INDIGO	5 TAPS 3 TIMES	SHUT AIR VALVES, ABOUT TO DISCONNECT	
07	DISSUB	MOSHIP	INDIGO INDIGO INDIGO	5 TAPS 3 TIMES	AIR VALVES SHUT	
08	MOSHIP	DISSUB	YELLOW YELLOW YELLOW	2 TAPS 3 TIMES	DISCONNECTING HOSES	
09	MOSHIP	DISSUB	ZULU ZULU ZULU		DISSUB CLEAR	

5.A.4.1. VENTILATION SCRIPT - EMERGENCY PROCEDURE

SIGNAL UWT	CHARGE/TAP CODE	MEANING	
		FROM MOSHIP	FROM DISSUB
PURPLE PURPLE PURPLE	3 TAPS 3 TIMES		WATER LEAKAGE. SHUT OFF VALVES
X-RAY (2) X-RAY X-RAY	SERIES OF RAPID TAPS		CLEAR MY POSITION URGENTLY

Notes:

1. To be used by DISSUB each time there is a change of internal pressure. MOSHIP will regulate inlet/outlet air flow accordingly.
2. Signal XXX to be followed by Unit Name. Example: XRAY XRAY XRAY ANTEO ANTEO ANTEO; XRAY XRAY XRAY DISSUB DISSUB DISSUB

Remarks: Transmission receipt to be notified with “ROMEO ROMEO ROMEO”.

CHAPTER 6 - MEDICAL ISSUES AND ORGANIZATION DURING SUBSAR OPERATIONS

SECTION I – INTRODUCTION TO SUBSAR MEDICAL DOCTRINE

6.1. NATO MEDICAL DOCTRINE

6.1.1. DOCUMENTATION

NATO medical doctrine is contained in AJP-4.10(B) Allied Joint Medical Support doctrine

More NATO medical doctrine can be reached in the following documents:

STANAG 1432	ADivP-2 - Allied Guide to Diving Medical Disorders
STANAG 2461	AMedP-6 Vol I- NATO handbook on the medical aspects of NBC defensive operations (nuclear)
STANAG 2462	AMedP-6 Vol II- NATO handbook on the medical aspects of NBC defensive operations (biological)
STANAG 2463	AMedP-6 Vol III- NATO handbook on the medical aspects of NBC defensive operations (chemical)
STANAG 1476	Technical and Medical Standards for Submarine Escape and Rescue
STANAG 2879	Principles of Medical Policy in the Management of a Mass Casualty Situation
STANAG 2068	Emergency War Surgery.

Additionally, National Publications both for Diving and Submarine operations may be used for reference on individual submarine classes and operating procedures as well as decompression tables.

6.1.2. MEDICAL INFORMATION HYERARCHY

Medical information contained in ATP/MTP-57 should be considered subordinated to NATO Medical Doctrine contained in AJP-4.10 (B). Nevertheless, specific information related to SUBSAR operations is better placed in ATP/MTP-57 rather than in AJP 4.10(B), due to close coordination that is needed among all SUBSAR operations participants. Every effort should be made to ensure that duplication of information between NATO Handbooks is minimised by placing information only in the most appropriate publication. AJP-4.10(B) does not contain SUBSAR specific information.

6.1.3. MEDICAL ORGANIZATION DURING SUBSAR OPERATIONS

This chapter contains specific information to SUBSAR participants, and facilitates the coordination between Commands and Units participating in SUBSAR operations, keeping in mind that the main objectives for SUBSAR operations should be to speed up response procedures (medical and non-medical) and to save as many survivors (escapees or rescuees) as possible.

6.2. GENERAL MEDICAL GUIDANCE FOR SUBSAR OPERATIONS

General guidance for organisation of the Submarine Escape and Rescue Assistance Team (SMERAT), including triage and management of submarine survivors is provided in this Chapter.

Medical guidance pertaining to problems likely to be encountered in survivors of a DISSUB scenario is also provided for specialist and non-specialist medical officers.

6.2.1. TERMS AND DEFINITIONS

This chapter complements preceding chapters in this publication. Definitions related to terms included in this chapter but not described in detail in it, can be found either in former chapters or in the Glossary, at the end of this publication.

6.2.2. MEDICAL CONSIDERATIONS

Medical considerations for survivors from submarine escape or rescue are of paramount importance. There are a large number of medical problems that may be encountered in this mass casualty setting, some of which are relatively unfamiliar to non-specialist medical officers. Because of the large number of medical, environmental and submarine variables, the strategies to organise and carry out medical management laid out in this Chapter will need to be tailored to each individual incident scenario.

SECTION II – SUBSAR MEDICAL ORGANIZATION

6.3. THE MEDICAL COMPONENT OF THE SUBMARINE ESCAPE AND RESCUE ASSISTANCE TEAM (SMERAT)

The SMERAT consists of experts in the field of Submarine Escape and Rescue Operations and medical specialists who are available to provide advice and assistance to the SSRA/SMC, OSC and CRF. The Officer in Charge of the SMERAT (OCSMERAT) is an expert in the field of submarine escape and rescue operations.

The Senior Medical Officer to SMERAT (SMO(S)) is in charge of the medical personnel allocated to the SMERAT, and reports to OCSMERAT for an escape and to the CRF for rescue operations.

The SMO(S) is alerted by either National SMER Authorities or via OCSMERAT who will also initiate the callout of all other designated SMERAT personnel in the event of a SUBSUNK.

The SMERAT should be capable of deploying at short notice to the scene of a DISSUB usually by embarking on an Escape Gear Ship (EGS) together with First Reaction Stores (FRS). As information about the condition of the DISSUB becomes available members of the team may need to embark on a MOSHIP (such as that appointed CRF), MOSUB or any other participating unit in the SUBSAR operation.

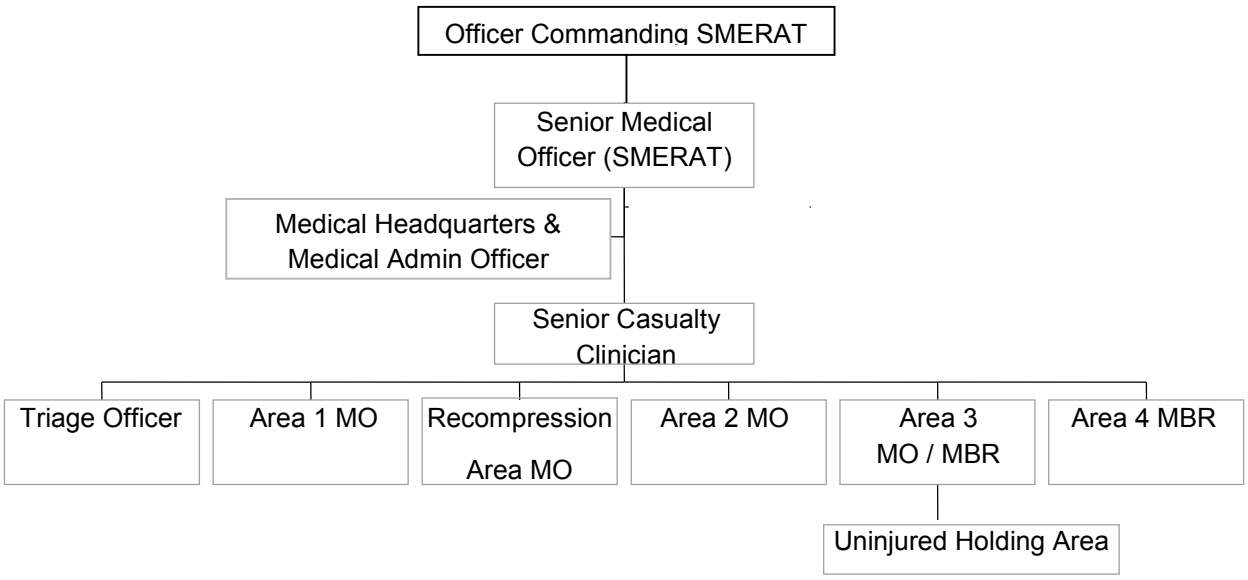

Figure 6-1 Organization of the medical component of the SMERAT for Escape

Figure 6-1 describes the general organization for the medical component to the SMERAT used during escape operations. The following articles in this section detail responsibilities for the key medical elements of the SMERAT. Later sections of this Chapter and ANNEX 6.C contain information regarding the rest of the medical manpower as well as treatment areas and equipment.

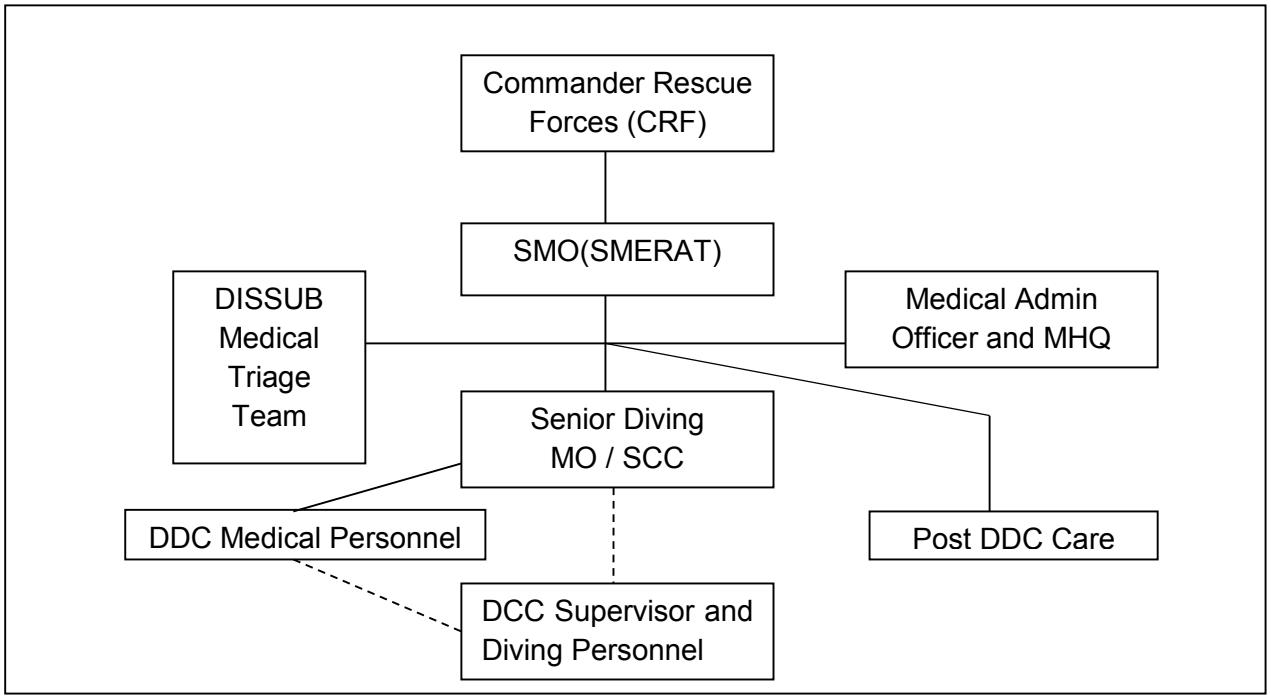

Figure 6-2 Generic C2 diagram for rescue operations

Figure 6-2 shows a generic organisation for Rescue operations. This is for guidance only as each rescue system has its own manning requirements as laid down in their deployment orders. Section VIII into this chapter contains further information on Rescue operations. ANNEX 6.D deals with DISSUB Medical Triage Team (DMTT) selection, deployment and equipment.

6.4. SENIOR MEDICAL OFFICER TO SMERAT (SMO(S))

The Senior Medical Officer to SMERAT (SMO(S)) is in charge of the medical personnel allocated to the SMERAT. He is responsible for:

a. The deployment of medical personnel to the scene.

b. Advising the OCSMERAT / CRF / OSC on the medical aspects of the DISSUB situation.

c. Advising the OSC / CRF of the numbers and types of casualties to be expected, and the assets required for management of survivors recovered from the DISSUB.

d. Liaison with the appropriate land-based authorities who may be required to participate in the treatment of survivors evacuated from an Escape Gear Ship.

e. Advising on deployment of a DMTT.

6.5. THE SENIOR CASUALTY CLINICIAN (SCC)

The SCC reports directly to the SMO(S) and is responsible for the co-ordination of the medical resources, both manpower and materiel, onboard the Escape Gear Ship (EGS) or Rescue Gear Ship (RGS). The SCC will usually be the Medical Officer most experienced in treatment of diving casualties. (The SCC may also be known as the Senior Diving Medical Officer (SDMO))

6.6. MEDICAL HEADQUARTERS (MHQ) AND THE MEDICAL ADMINISTRATION OFFICER (MAO)

The MHQ is the focal point for Casualty State administration and, as such, must remain manned at all times. Location and personnel composition may vary depending on operational limitations. Normally, the Medical Headquarters (MHQ) is composed by the following personnel and equipment:

a. Medical Administration Officer (MAO)

b. Sufficient writers and runners to cover all casualty management areas (minimum of 3 runners)

c. Communications equipment.

The MAO is responsible for the collation and management of casualty information in the MHQ.

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SECTION III – MEDICAL MOBILIZATION AND RESPONSE ACTION LISTS

6.7. GENERAL

This section deals with the action list of the following medical personnel:

- The Senior Medical Officer to SMERAT (SMO(S))
- The Senior Casualty clinician (SCC) / Senior Diving MO
- The Medical Administration Officer (MAO).

6.8. SENIOR MEDICAL OFFICER TO SMERAT (SMO(S)) ACTION LISTS

6.8.1. GENERAL

Prior to the deployment, the Senior Medical Officer SMERAT (SMO(S)) should assimilate as much information as possible to allow full manning of the medical team, make sensible judgements on the likely casualties and the requirements for their treatment. The Action lists below provide guidance on the areas to be considered.

6.8.2. PRE-DEPLOYMENT

a. Check local emergency orders

b. Contact the SSRA/SMC or National equivalent. It is important for the SMO(S) to familiarize himself with all the facts known about the DISSUB as soon as they become available. Discuss the medical situation and requirements with the Medical Advisor of the DISSUB Nation or point of contact if no Advisor exists.

c. Initiate a recall and muster of all appropriate Undersea, Submarine and Diving Medicine qualified staff ready to deploy with the SMERAT in accordance with local orders.

d. Arrange collection of SUBMISS / SUBSMASH publications, response plans, stationery, and equipment listed as contents for a SMERAT Emergency Case at ANNEX 6.L.

e. Contact the following, (either directly or through the appropriate chain of command depending on National Policy):

1. The Duty Senior Medical Officer of the Medical Centre or Hospital of the Naval Base nearest to the departure base of the EGS. They may be able to supply qualified staff to assist in manning the EGS or to provide assistance with CASEVAC of survivors.

2. The Duty Senior Medical Officer at the Military Establishment or Hospital (Civilian or Military) nearest to the sunken submarine. A casualty evacuation (CASEVAC) plan should be developed with the shore based medical support and communicated to the OSC / CRF as soon as possible to ensure that he is fully aware of SMO(S)'s intentions and is able to plan accordingly.

Note: The SMO(S) must not assume that shore-based authorities local to the incident will take charge of the situation or provide advice unless specifically asked to do so. The SMERAT is likely to be isolated and SMO(S) should seek sources of advice from national and international technical or medical authorities as appropriate, by phone or through the ISMERLO website. Early communication with these authorities whilst ashore or still in cell phone range is recommended to ensure that communications can be achieved once deployed.

6.8.3. INFORMATION GATHERING

Either in the pre-deployment phase or whilst en-route to the rescue site the SMO(S) should ascertain the availability of additional resources including:

- Hospital and decompression facilities ashore
- number, capacity and specialists facilities, e.g.: burns, ITU and neurosurgery medical and decompression facilities afloat
- capacity, medical personnel and specialist facilities
- Transport availability: helicopters, ships and small craft (and landing points)
- Medical support for casualty transportation
- available medical personnel and equipment
- Distances and transit times to potential medical receiving facilities.

This information will direct the production of a medical evacuation plan for casualties and survivors from the EGS / RGS / MOSHIP. SMO(S) should use either national medical authorities or the ISMERLO web site to gain such information.

Chambers and medical facilities that may be of use during the rescue should be alerted to the potential requirement for the transfer of casualties to them through national maritime or Foreign Ministry routes. When en-route to the scene, communication methods to these facilities will need to be worked out and links established.

6.8.4. ON BOARD AN EGS

a. Request that an officer is detailed to act as the ‘Ship’s Recovery Coordinator’ to facilitate the work of the medical SMERAT members. The ops officer or an officer of similar status and experience is recommended. In addition to liaison tasks this officer should be responsible through the command for the provision of recovery boat crews, stretcher bearers, communications numbers, escorts and any other manpower which is required (see Chapters 1, 3 and 5).

b. Establish working location in the Operations Room or on the Bridge with a close line of communications to the OCSMERAT and OSC.

c. Delegate the responsibility for the hands-on management of the medical manpower to the Senior Casualty Clinician. Direct him to establish Triage and Treatment areas. Depending on nations and vessels there may be pre-determined DISSUB casualty plans for the class of ship.

d. Establish contact and an agreed medical communications protocol with outside medical facilities.

e. Liaise with the Nuclear Emergency Monitoring Team if appropriate and co-ordinate their activities with those of medical treatment personnel.

f. The OCSMERAT and the SMO(S) brief the OSC on the relevant aspects of DISSUB survival, escape and rescue as soon as possible after embarkation. The proposed treatment regimens and casualty evacuation requirements must be fully explained to enable the OSC to request the appropriate assistance, e.g. helicopters etc. See ANNEX 6.A for points to be highlighted in the brief to an OCS.

g. Remain aware of the developing situation and the potential need to transfer medical staff and equipment from the EGS onto Rescue Vessels. This will occur as the scenario dictates a need to support rescue rather than escape. In this case SMO(S) will need to make early contact with the CRF to discuss appropriate arrangements and give early advice about the potential use of, and need to prepare, a (DMTT (see ANNEX 6.D).

6.8.5. ONBOARD A RGS

a. As a RGS (also known as MOSHIP) is likely to be a civilian vessel with limited crew, berthing for rescue personnel and rescuees, identify any requirements for additional personnel for casualty monitoring and transfers (e.g. stretcher bearers), administrative duties or logistic work. These requirements should be presented to the CRF for resolution.

b. On arrival on the MOSHIP, areas should be identified for the Administration point and for general patient regulating. Space may be extremely limited aboard the MOSHIP due to rescue equipment. Areas and routes should be provided for movement of rescuees through the medical areas including decontamination and a holding area post decompression. Transfer of rescuees either by boat or helicopter from the vessel may be impacted by weather conditions and must be planned for early.

c. Additional vessels carrying medical personnel and recompression facilities should be identified and contact made through the CRF to ascertain what facilities are available and best methods of transfer from the MOSHIP.

d. If more than one rescue system is deployed the SMO of each system should make contact with each other and discuss medical equipment availability, personnel, rescue capacity of their systems within the SRV, recompression facilities and medical facilities.

e. Brief the CRF on the relevant points from the OSC brief (see ANNEX 6.A).

f. Other actions should be as for deployment to an EGS as above.

6.9. SENIOR CASUALTY CLINICIAN ACTION LISTS

6.9.1. PRE-DEPLOYMENT

a. Ensure that the First Reaction Stores including the recompression chamber and oxygen stores have been correctly unpacked, stowed onboard and prepared for use.

b. Recompression chamber readiness: It is essential that the embarked recompression chamber is fully functioning and capable of completing a NATO Table VI (RN Table 62/USN Table 6) with extensions. Divers available to the hyperbaric treatment team should be trained in diving first aid and able to assist the treatment and monitoring of survivors who require recompression.

6.9.2. DURING TRANSIT TO DISSUB

a. Identify, with the aid of the ship's medical staff, suitable sites for the triage and treatment areas, holding area and mortuary. Ensure that there is free passage from the point at which survivors will be brought onboard to the triage area and then to the relevant treatment areas.

b. Where practical, all casualty routes should be under cover, on the same deck and casualty landing or triage areas should be weather protected by use of portable awnings or weather proof containers. The medical staff on board may already have a mass casualty handling plan which

may be adapted and consideration should be given to modifying the plan to accommodate the submarine escape scenario. (In planning the routes and sitting treatment areas in and around the hanger, consideration must be given to access when the EGS is at Flying Stations).

c. Where possible the primary and secondary treatment areas should be in the same geographical situation, usually the helicopter hangar, to best facilitate the logistics of emergency medical care.

d. The SCC although having a responsibility for all areas will in all probability spend most of his time close to the primary and secondary treatment areas. The SCC must remain flexible and be prepared to re-evaluate and modify the plan to meet changing circumstances.

e. Allocate personnel, including stretcher and first aid personnel, and medical supplies to the triage and treatment areas. Separate stretcher parties will be required to move casualties from the reception area onboard to Triage and from Triage to the treatment areas. The minimum personnel and equipment recommended for the triage and treatment areas are listed at ANNEX 6.C.

f. Fully brief all medical teams about DISSUB hazards, triage and treatment of survivors. Emphasise the manifestations and treatment of Decompression Illness (DCI). Ensure that a brief on the management of casualties with radioactive contamination is given, if required.

g. Brief ship's boat recovery crews and divers in accordance with ANNEX 6.B.

6.9.3. UPON RECEIVING ESCAPEES

a. Provide expert assistance to the medical teams in the treatment areas as required

b. Ensure optimal use of on board oxygen supplies. Prophylactic use of high flow oxygen for all escapees should be considered if adequate on board oxygen stores is available

c. Supervise the recompression of casualties onboard the EGS. Recompression facilities will most likely be quite limited and their use must be optimised. The SCC should apply the principles of chamber operation found in Section 0619 to managing the treatment of escapees

d. Ensure maintenance of clinical notes, casualty state boards and a flow of information, including CASEVAC and recompression requirements, to SMO(S) and MHQ

e. Ensure additional information regarding the DISSUB is obtained from survivors collated and briefed to SMO(S) accordingly.

6.9.4. ON A MOSHIP

Additional considerations for a rescue scenario include:

a. Plan the most appropriate use of the available chambers with the CRF, SMO(S) and SRV operating team.

b. Ensure the most effective use of the limited facilities for triage and treatment of rescuees in the DCC

c. Whilst not directly responsible for the safety of the SRV operators or chamber attendants, take due cognisance of these requirements in planning rescuee decompression schedules, work rosters and the use of these staff under pressure.

6.10. MEDICAL ADMINISTRATION OFFICER (MAO) ACTION LIST

a. Establish the MHQ in a suitable area in close proximity to the treatment areas.

(Note: however information from the triage point on the disposal of survivors to particular treatment areas onboard is crucial to allow the SCC to have oversight about how his resources are being used. The MAO must ensure that this communication link with the triage point works effectively. Exercise experiences have shown that if information is lost at this stage, the overall command and control of casualty management will often fail.)

b. Establish communications with the medical teams and the SMO(S) in the Operations room by the use of telephones, radio or messengers

c. Maintain an accurate Master Casualty State Board (see ANNEX 6.H).

d. Inform SMO(S) of the status of all survivors as required.

e. Provide the Recovery Co-ordinator (Escape) or CRF Communications Co-Ordinator (Rescue) with the information required for Casualty Reporting (CASREP) and Casualty Evacuation (CASEVAC) signals (Templates at ANNEX 6.J and ANNEX 6.K).

Notes:

1. Shore authorities require early information regarding casualties to prepare for casualty reception, for informing the next of kin and for public relations. Therefore, the first and subsequent casualty signals should be sent as soon as reasonably practicable. The precedence to be used for Casualty Reporting is IMMEDIATE.
2. Early casualty evacuation by helicopter may be required and due to the rapidly changing condition of some of the casualties, priorities for CASEVAC may change at very short notice. Last minute changes to the evacuation plan must not result in inaccurate or incomplete CASEVAC signals being sent. To ensure against this a runner should accompany the Senior Casualty Clinician when the final decision is made to load which casualties).

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6.11. INTERNAL COMMUNICATIONS

In any escape or rescue situation the SMERAT medical members will be widely distributed throughout units participating in the operation. Accurate and adequate communications within the SMERAT are essential to the smooth running of the response.

The SMO(S) (or deputy) is responsible for communications to the OSC, CRF and the CO / Master of the RGS or MOSHIP. SMO(S) is also responsible for passing information back to the other members of the SMERAT, particularly on casualties expected, operational matters or changes in the DISSUB scenario.

Administrative communications (casualty numbers, logistic requirements, and requests for additional manpower) should be passed through the MAO. Clinical communications should be passed via the Senior Casualty Clinician or Senior Diving Medical Officer.

Whenever possible, communications should be by fixed telephones. In the absence of fixed telephones, and for personnel such as the SMO(S) who are mobile around the vessel, then portable radios should be sought and used. Key points for radios to be available are with the SMO(S), Senior Casualty Clinician, MAO and at the triage point on an EGS or chamber control centre on an RGS.

All internal communications should be logged so that information can be checked and retransmitted if necessary. Messages that may be particularly prone to transmission errors should be sent in a written form by runner.

6.12. EXTERNAL COMMUNICATIONS

All external communications should be passed via the approved communications routes set up by the OSC or CRF. This includes the release of signals, use of e-mail and chat areas on the ISMERLO Website and the use of VHF for local contacts.

When more than 2 EGS or RGS / MOSHIPs are being used a formal communications programme should be set up between the medical team leaders on each vessel and the SMO(S). This should allow co-ordination of the use of resources and ensure that one vessel is not overloaded by casualties when the other vessels have spare facilities.

When mobile phone / satellite phone or Internet communications are available these may be used for ship to ship and ship to shore communications with the approval of the CO/Master (to avoid interference with ship's systems). All communications should be logged in the main communications log. Care should be taken with the classification of information passed by this method, especially when medically sensitive information is being transmitted.

When a Submarine Parachute Assistance Group (SPAG) has been deployed then the SMO(S) should make contact with the OC and MO SPAG as soon as the EGS enters communication range. The SPAG should be able to provide a list of escapees already recovered and a priority list for their evacuation to the EGS. If no escapees have been recovered then the SPAG team themselves will require recovery before they become subject to environmentally related problems such as hypothermia. Further information on the medical aspects of SPAG are available in the Medical Supplement.

The SMO(S) should remain in contact with a deployed DMTT using messages sent via the SRV or, if necessary, by use of an underwater telephone, if available.

6.13. LOGISTICS

The initial deployment to an EGS or RGS / MOSHIP should include enough stores to commence treatment of the expected number of escapees or rescuees. However, due to the bulk and weight of items, particularly Oxygen supplies, it may not be possible to deploy the full requirements for the operation during the initial phase. There will, therefore, be a need to re-supply the EGS / RGS / MOSHIP.

Logistic provision is the responsibility of the OSC or CRF. Logistic requirements should be collated by the MAO and passed to the SMO(S). The SMO(S) should then brief the OSC / CRF on the requirements and, where possible, provide guidance on where the materials required may be sourced. It will be necessary to use national authorities and the SSRA/SMC to provide not only the required materials but also transportation to the scene.

The supplies of Oxygen available may become a limiting factor on the ability to treat, decompress and recompress survivors of a DISSUB. Before deployment the SMO(S) and his Senior Diving Medical Officers should estimate the amount of O2 required for the number of survivors and the DISSUB pressure scenario. This information should be passed early to the authority organising the DISSUB response to ensure that an adequate supply of O2 is available to be transferred to the EGS / RGS / MOSHIP, preferable before the vessel sails to reduce the risks and problems of loading heavy O2 cylinders or ‘QUADS’ at sea.

Dependant upon the location of the DISSUB, re-supplying may be difficult due either to the distance from the nearest shore facilities or to the paucity of available stores. Therefore the SMO(S) should know how to access additional equipment and supplies from their own nation, or other major SMER nations and arrange for them to be transported to the scene. This should include any special arrangements necessary for the transport of analgesic drugs controlled under national or international legislation.

Limited supplies of clothing for DISSUB survivors should be included in the deployed stores. Due to the possibility of chemical or radiological contamination of the survivors the stores should also include over-suits to allow transfer of casualties without spreading the contamination.

Survivors of a DISSUB are likely to be significantly dehydrated and arrangements should be made on the EGS / RGS / MOSHIP for adequate supplies of drinking water or hot drinks. Feeding requirements will depend on how long the survivors will remain on board, the effects of DISSUB requirement (e.g. starvation diarrhoea) and clinical condition.

6.14. FACTORS AFFECTING CREW SURVIVAL TIME

6.14.1. GENERAL

Within a DISSUB both survival and the decision to escape (if possible) are influenced by many factors, including both physical and psychological factors. The major determinants are laid out below.

Multiple types of atmosphere contaminants are possible in a DISSUB. A catastrophe which results in a DISSUB is likely to produce supplementary casualties and damage such as fires, flooding, and system ruptures or leaks. It is imperative that additional casualties and damage are quickly contained to minimize toxic atmosphere levels and the subsequent need for the survivors to use EABs.

6.14.2. PRESSURE AND ATMOSPHERE

An increase in DISSUB pressure significantly raises crew morbidity and mortality risk from decompression illness (DCI). DCI becomes a problem from prolonged exposure (saturation) to atmospheric pressures of greater than 7 msw (1.7 ATA). Once saturated, safe escape by buoyant ascent may not be possible. Without Transfer Under Pressure (TUP) capability, rescued crew may be severely affected.

Atmosphere control considerations can be divided into two areas:

a. Control of toxic atmosphere contaminants to prevent donning Emergency Air Breathing (EAB) systems. If EABs are required, survival time in the DISSUB will be reduced due to limited air supplies and pressure will increase resulting in an increased risk of crew injury following escape or rescue due to decompression illness

b. Control of carbon dioxide and oxygen levels. Rest significantly reduces oxygen consumption and carbon dioxide production. Conversely, hypothermia and the onset of shivering can lead to increases in both. Efficient control of carbon dioxide and oxygen levels are critical to maximizing survival time in a DISSUB.

The ability to survive and remain onboard will depend on the accuracy and the reliability of the atmosphere monitoring equipment. To prolong the stay time in the submarine, the oxygen level can be allowed to drop to 17 kPa, (17% at 101.3 kPa / 1 bar) and maintained at that level and the CO2 allowed to rise to 2,5 kPa, (2.5% at 101.3 kPa / 1 bar)[5]. These are extreme limits, and a certain percentage of the survivors may not tolerate them easily, however, escape can be conducted from these levels. Other gases in the DISSUB atmosphere may affect the decision to escape e.g. Chlorine from batteries that have been contaminated with salt water, Carbon monoxide (CO) and nitrogen oxides (NOx) caused by combustion. High partial pressures of

[5] *Standard Atmospheric Pressure 1 atm = 101,325 x 10^3 Pa = 760 mmHg = 1,013 Bar, 14,6959 psi*

Oxygen may also constitute a potential health risk to survivors. (Further information on atmosphere control in the DISSUB can be found in the Medical Supplement).

6.14.3. HYPOTHERMIA AND HYPERTHERMIA

Hypothermia occurs when the core body temperature is lowered. Hypothermia impairs the judgment and performance of the victim. Water temperature in deep oceans or cold climates is frequently below 5 oC. Cold of this magnitude could be a significant factor in the survival of the DISSUB crew, depending on the heat transfer characteristics of the boat and the number of survivors. Hyperthermia occurs when the core body temperature is above normal. Heat stress conditions, posing the risk of heat casualties, may occur in well-insulated submarines, in engineering spaces or to escapees on the surface in hot climates. See the Medical Supplement for further information.

Whilst not always confirmed by trials, it is predicted that the temperature within the submarine will gradually fall and reach equilibrium with the surrounding water. In order to prevent hypothermia and shivering, personnel should attempt to remain dry and wear extra clothing. If escape and/or survival suits are available, they will provide excellent insulation. However, if they are damaged, they will fail to provide adequate protection after escape. Alternatively, a rising DISSUB temperature may lead to the requirement to provide extra water to survivors and methods of cooling such as hand and arm immersion is sea-water.

6.15. OTHER FACTORS AFFECTING SURVIVAL

6.15.1. PSYCHOLOGICAL ASPECTS

As with any disaster the psychological damage to both survivors and responders must be considered. Careful follow-up will be required. Cases of post-traumatic stress disorder (PTSD) are likely to be encountered. Additionally acute psychiatric reactions are possible in the survivor group and Nicotine withdrawal may also be a problem on the DISSUB.

6.15.2. RADIATION

If a nuclear-powered submarine is involved in a SUBSUNK situation, the crew may be exposed to gamma radiation that can penetrate bulkheads and irradiate survivors within the escape compartment. Other radioactive fission products may enter the escape compartment. This radiation will contaminate the survivors both externally and internally. A total dose of 1 to 2 Gray is considered acceptable in relation to the other hazards imposed by a SUBSUNK situation. A rapidly rising dose rate or a rate of around 200 milli-Grays per hour should initiate escape.

The handling of contaminated casualties by the response forces is dealt with in Section IX. The treatment of irradiated casualties is covered in the Medical Supplement.

6.15.3. HYDRATION AND NUTRITION

Under simulated DISSUB conditions, survivors performed escape and rescue procedures after seven days on a daily ration of one pint of water and 400 calories (kilogram calories). Subjects existing solely on survival rations tend to become dehydrated and energy deficient. Dehydration occurs sooner than starvation, making the need for water more important. Although dehydrated, they may not feel thirsty and might therefore need to be forced to drink water. The research indicated that each submarine survivor requires at least one (1) litre of water and around 1000 to 1200 Cal per day. Extra food supplies will be required if survivors suffer with hypothermia.

Hydration is even more critical in hyperthermic DISSUB conditions, which may mandate several litres of water per man per day.

While resting, the survivors should be able to maintain their blood glucose levels. However, minimal exercise may result in hypoglycaemia. In the cold, hypoglycaemia can lead to failure in thermoregulation, with survivors cooling much more quickly and becoming hypothermic. Pod posting can provide hot food and fluid replacement when rescue assets arrive. Eating foods high in fat content and low in carbohydrates results in less carbon dioxide production. If the survivors choose to escape, at least 1000 cal should be eaten just prior to escape.

6.15.4. HYGIENE

The appropriate disposal of urine and faecal material is essential to prevent gastroenteritis. Survivors should properly dispose of waste material. An outbreak of gastroenteritis will increase survivor susceptibility to other hazards.

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SECTION VI – ESCAPE

6.16. RISKS ASSOCIATED WITH THE ESCAPE PROCEDURE

a. There are 2 methods to escape from a DISSUB these are Tower Escape and Compartment Escape (sometimes called Rush Escape).

b. The Tower Escape procedure is essentially a very rapid bounce dive. As such, there are 2 main hazards, decompression illness (DCI) and barotrauma. The increase in pressure during this 'dive' will cause nitrogen to be absorbed into the body tissues - hence increasing the risk of developing DCI as the pressure is reduced. The very rapid pressure transients may induce barotrauma to sensitive body organs.

c. There are national variations in the size and shape of escape towers but all are designed to facilitate the rapid flooding up and pressurisation of the escapee within the escape tower followed by a rapid exit from the DISSUB and a controlled rise to the surface. The escaper dons the SESSPE and climbs into the escape tower. The lower hatch is shut and the tower is flooded up and pressurised to the outside seawater pressure. As the pressure inside and outside the tower equalise the upper hatch opens and the buoyancy within the SESSPE carries the escaper to the surface at a controlled rate. The SESSPE is fitted with a hood to enable the escaper to breathe normally, thus reducing the likelihood of pulmonary barotraumas.

d. Compartment Escape entails flooding the entire escape compartment up to the bottom of the escape tower. The whole escape compartment is then pressurized to sea pressure, the lids of the escape tower are opened and the survivors then proceed to escape in an orderly manner. This method entails the survivors spending considerably more time under pressure with a consequent increase in the risks of DCI. Additionally, given that the tower does not have to be drained down between escapes, escapees will arrive at the surface in quick succession.

e. Thus, there are 3 main parameters affecting the safety of the escape procedure:

1. The depth of the DISSUB - hence the depth down to which the escaper must be pressurised. A significant nitrogen load can be acquired over a very short time during exposures to deep escape depths and the pressure transients are severe

2. The time it takes to complete the procedure - the more time at increased pressure the greater the risk of DCI. Therefore, once the escape process has commenced it should be completed as smoothly and expeditiously as possible

3. The ambient pressure within the DISSUB. If this is greater than 1 ATA the escaper will already have an increase in tissue nitrogen loading and the chances of developing DCI are thus increased. This is particularly relevant if the survivor has spent a long period of time at pressure. All body tissues will become saturated with nitrogen after about 24 hours.

f. From an internal pressure of 1ATA escapes have been performed down to a depth of 180 metres (during controlled exercises) and some nations have routinely exercised escapes from 90 metres in open water condition. Thus the systems are well proven. A simulated escape pressure profile for a 180-metre escape is shown in the Figure 6-3 below:

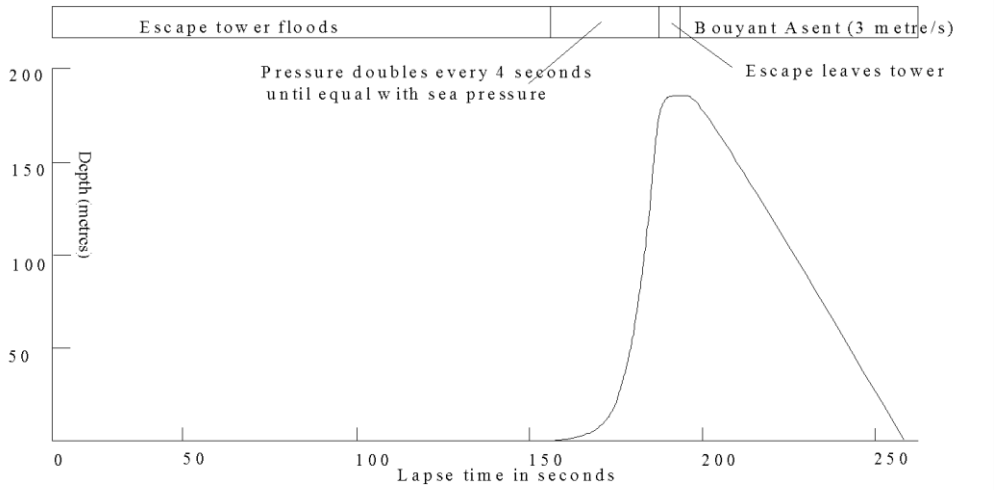

Figure 6-3 Simulated escape pressure profile for a 180 metre escape

g. Experimentation using a submarine escape simulator has been conducted to define the relationship between the risk of Decompression Sickness (DCS) and DISSUB depth and internal pressure – termed the '*Escape DCS curves'* - shown in Figure 6-4(a).

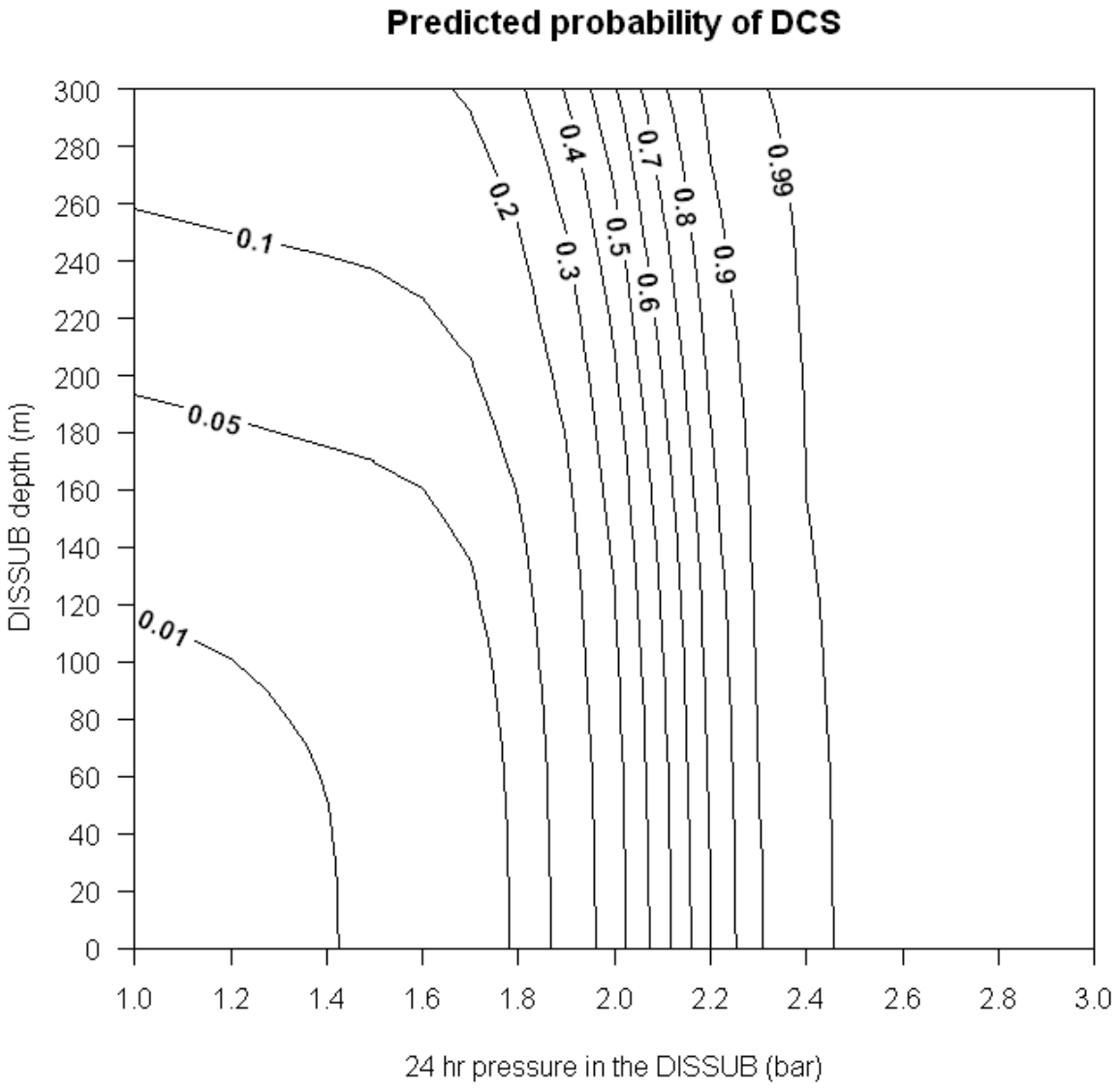

Figure 6-4(a) Escape DCS curves

Notes:

1. The Escape DCS curves are based on experimental work and actual sea trials, including over 1000 actual or simulated submarine escape exposures.
2. The curves apply where the compartment 'air' is composed of 21% Oxygen and 79% Nitrogen, where this is not the case, an equivalent DISSUB pressure should be used, based on the following formula: Deq = Dsub * (1 – FO_2)/0.79

   where:
   Deq = Equivalent DISSUB internal pressure (bar)
   Dsub = Actual DISSUB internal pressure (bar)
   FO_2 = Fractional concentration of oxygen in the DISSUB atmosphere

3. The maximum tower depth from which escape has been performed during sea trials is 184 m.
4. At a saturation pressure of 1.78 bar within the DISSUB, rapid depressurisation back to 1 bar is predicted to give a 5% incidence of DCS, that is P(DCS) = 0.05.
5. Below the P(DCS) = 0.05 (5% incidence) curve, escape would be considered 'relatively' safe.
6. The information will only apply to an escape system with the following characteristics:
   - provides a minimum pressure doubling time of 4 seconds during compression to 180 m
   - has a 'bottom time' not exceeding 4 seconds
   - has an ascent rate of 2.75 meters per second

h. If surface forces are not yet on scene, surface survival following submarine escape will depend on the type of DCS symptoms suffered by the crew. Survival estimates are presented in Figure 6-4(b) as the *'Escape survival curves.'*

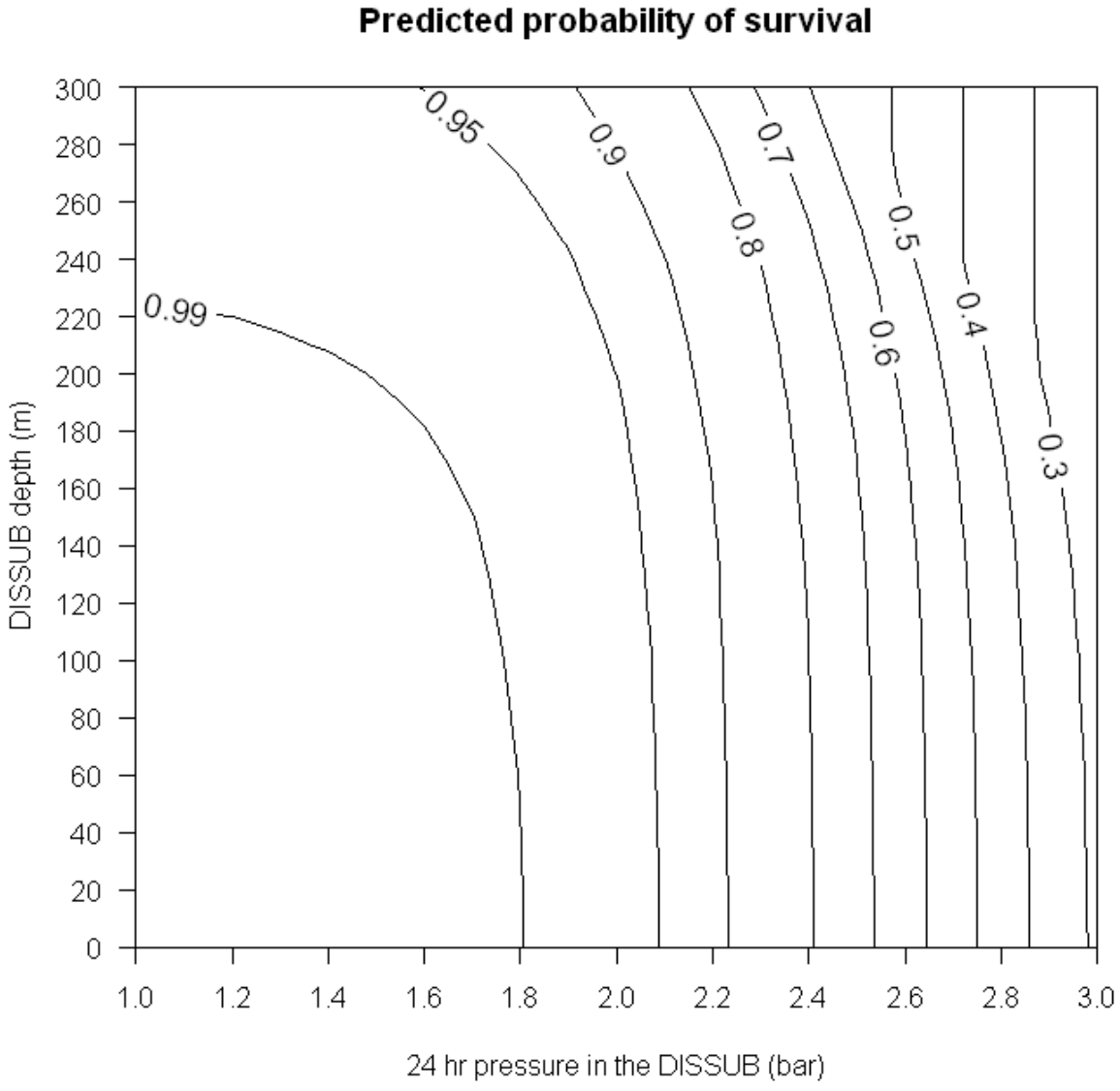

Figure 6-4(b) Escape survival curves

Notes:

1. Estimates of the effect of different DCS symptoms on surface survival were obtained from Subject Matter Experts (SME) from the RN Institute of Naval Medicine and Suitably Qualified and Experienced Personnel (SQEP) from QinetiQ Maritime Life Support.
2. The escape survival curves only account for the effect of DCS on the first 24 hours of surface survival assuming surface forces are not present and recompression is not available.
3. The escape survival curves assume that a single man life-raft is available to the escaper and account for the possibility that DCS will prevent some escapers from boarding their life raft.
4. The escape survival curves do not account for the effects of surface weather conditions.
5. Survival predictions suggest that basing escape decisions on DCS risk alone might result in conservative decision making, which may not be optimal for survival in an emergency scenario.
6. The effect of Pulmonary Barotrauma (PBT) on survival rates has been ignored, but could arguably result in up to 5% decrease in survival depending on the level of training in tower escape techniques that the crew have received.

6.17. DECOMPRESSION ILLNESS

Decompression Illness (DCI) is a complex series of signs and symptoms initiated by gas bubbles in the blood stream and/or tissues during or following decompression. DCI may present as a wide range of symptoms. Although symptoms may begin soon after surfacing, it is possible for the onset to be delayed for some hours.

The incidence, rapidity of onset and the severity of the illness among the survivors will tend to increase the greater the depth from which escape is made. With all methods of escape, the risk of DCI may increase with each successive escape. With most escape systems, each escape sequence increases the internal pressure of the submarine as water from the escape tower is drained into the internal volume of the submarine. Thus those who escape later will have spent a longer time at increased pressure and will have acquired a higher inert gas load.

Compartment escape requires longer periods under pressure and is thus more likely to cause DCI, particularly for later escapees. Survival is unlikely below 70m and compartment escape should be considered a method of last resort for most DISSUB situations.

6.18. BAROTRAUMA

a. General. Conditions of increasing or decreasing atmospheric pressure may create unequal pressures across closed air-containing body spaces. This may result in medical problems for DISSUB survivors

b. Pulmonary Barotraumas. Pulmonary barotraumas may occur in escapers as a result of pulmonary over pressurisation during rapid ascent to the surface. Air may then infiltrate to any or all of the following:

1. interstitial spaces to cause interstitial emphysema
2. the pleural space to cause a pneumothorax
3. the pulmonary vasculature to cause arterial gas embolism.

c. Interstitial Empyhsema. Air from mediastinal emphysema may migrate to cause subcutaneous emphysema of the neck or upper chest. This presents with swelling and crepitus on palpation.

The condition is not usually painful or dangerous in itself unless the upper airway is compromised by excessive tissue swelling, but it should alert the examiner to the possibility of coexistent simple or tension pneumothorax or arterial air embolism.

d. Pneumothorax. Symptoms will usually be shortness of breath and one-sided chest pain. Standard medical treatment and close observation is indicated, with needle thoracostomy only if tension pneumothorax develops. Recompression therapy for isolated non-tension pneumothorax is not required, but a careful neurological screening examination is necessary to rule out the possibility of coexistent arterial air embolism.

e. Arterial Gas Embolism. The rapidly progressive focal neurological signs and symptoms of neurological arterial gas embolism, including decreasing level of consciousness, would typically arise within minutes after completing a submarine escape. The symptoms and signs themselves are effectively indistinguishable from rapid onset neurological DCI and, as such, the term DCI includes illness caused by arterial gas embolism and treatment is described under the heading of Decompression Illness.

f. Otic Barotrauma. Otic barotrauma may occur with rapid pressurisation during the escape procedures. The following problems and symptoms may occur.

1. Tympanic membrane injury - Injury or rupture of the tympanic membrane may occur resulting in decreased hearing, pain, and bleeding. Only symptomatic treatment is required for this problem.

2. Round or oval window rupture - Forceful ear clearing during escape tower pressurisation may cause this. In addition to ear pain, vertigo, hearing loss, and/or nausea may be seen as presenting symptoms. These symptoms may make it difficult to distinguish this condition from neurological DCI. If in doubt, treat for DCI while placing the patient in a semi-recumbent position, minimising patient movement, and seeking consultation.

g. Tooth Barotrauma. A loose or cracked filling or crown may allow pressurised air to enter the nerve root area during escape procedures. Severe jaw or tooth pain will result as this gas expands during ascent. Despite the severity of symptoms, only symptomatic treatment is necessary after recovery aboard the DISSUB.

h. Sinus Barotrauma. Blockage of a sinus opening into the nasal cavity may cause barotrauma during either compression or decompression. If the orifice is blocked during compression, the sinus will be at lower pressure than the rest of the body including the vasculature, and bleeding will occur into the sinus cavity resulting in a nose bleed and residual sinus pain upon surfacing. If the sinus(es) become blocked during ascent to the surface, pressure will build up in the sinus during ascent, resulting in sinus pain and headache persistent on the surface. In either instance, neurological symptoms will not be present. Tapping or applying digital pressure over the affected sinus(es) will confirm the aetiology of these symptoms. Either condition requires only symptomatic management.

i. Oesophageal/Abdominal Barotrauma. Swallowed air may cause the lower portion of the oesophagus to rupture during rapid ascent due to expansion of trapped gas. Anterior chest pain,

usually left-sided, will occur and subcutaneous emphysema may develop. Survivors in whom oesophageal rupture is suspected should be medically stabilised, closely observed, and given a high priority for early CASEVAC. Bowel rest, administration of intravenous fluids, broad-spectrum antibiotics if available, and mask oxygen are indicated for this problem while awaiting CASEVAC.

Gastric or small bowel rupture can also occur with rapid ascent for the same reasons. In this event, symptoms would include abdominal pain and possible abdominal distension. A high degree of suspicion and thorough abdominal examination for sign of ruptured viscus is indicated. The treatment is similar to that of oesophageal rupture, with the additional recommendation for placement of a nasogastric tube for gastric decompression. Similar priority should be given for early CASEVAC.

6.19. TREATMENT OF ESCAPEES

6.19.1. DIFFERENTIAL DIAGNOSIS

Survivors may be suffering from more than one condition. Those who are diagnosed or suspected of serious or life-threatening DCI (either traditional decompression illness or arterial gas embolism) and therefore categorised C1 (see Section X) should be treated by recompression immediately if practicable, since any delay in such treatment will significantly reduce their chances of survival. Concurrent medical conditions will not normally be affected by recompression and can be treated within the chamber. Differential diagnosis may be difficult under these conditions, but the principle still applies: When in doubt regarding serious DCI, recompress, providing chamber space can be made available and operational limitations allow.

Evidence supporting the differential diagnosis of survivors should be available from other features of the incident. Unconsciousness may be a consequence of a head injury suffered during escape, an embolism occurring during ascent, hypoxia from near drowning, or from cold or heat exposure on the surface.

However all survivors from submarine escape who lose consciousness within a few minutes of surfacing must be treated by recompression, unless categorised as expectant (T4 (see Section X)). One must assume the likelihood of pulmonary barotraumas with arterial gas embolism with this presentation. (Cold or heat will normally affect persons after some interval on the surface. The interval will be related to ambient conditions and the use of the submarine escape and immersion equipment.)

6.19.2. DIVING RELATED CONDITIONS

Reference: NATO publication ADivP-2; Allied Guide to Diving Medical Disorders is the definitive document on diving related conditions.

6.19.3. DECOMPRESSION ILLNESS PRINCIPLES

The medical officer may have to cope with multiple cases of DCI and/or multiple survivors who have a decompression obligation but at the time of assessment have not developed symptoms of DCI. The casualties may present over several hours; triage and treatment will depend on the number and types of recompression chambers available. If escape occurs before recovery forces arrive, the medical officer may also have to cope with co-morbid medical conditions in addition to DCI although priority should be given to the treatment of serious cases of DCI (i.e. those with pulmonary or neurological symptoms or signs).

In managing multiple cases of DCI/decompression obligation with limited resources, in order to 'do the most for the most', a number of important principles need to be considered:

a. In a pressurised DISSUB where the survivors have not had time to become saturated or the pressure is rising, the more severe DCI cases can be expected in those last to leave the submarine

b. Recompression to provide hyperbaric oxygen therapy is the gold standard treatment for decompression illness. Available oxygen stores will limit the number of chamber treatments that can be supported. If re-supply will not be possible before the oxygen stores are exhausted, it may be necessary to conserve oxygen to treat more severe cases of DCI in order to do the most for the most. Even if hyperbaric oxygen is not available or practical for all patients, recompression on air for the remainder is generally the second best option and should be considered. Where this is not possible, treatment with high concentration oxygen at surface pressure and fluid replacement can be used for treatment of DCI and for prophylaxis against DCI in those with a decompression obligation until recompression facilities become available.

c. Only shallow oxygen tables (no tables in excess of a NATO Table VI with extensions) should be used whenever multiple DCI casualties may exist with a single on board recompression chamber. Consider procedures for shortening decompression times if the requirement for immediate standard treatments is likely to exceed the recompression facilities immediately available.

d. Recompression and treatment on tables deeper than 18 metres should only be done if absolutely necessary with due consideration of the logistical requirements. Eighteen meter tables can be swiftly interrupted, allowing more flexibility than deeper tables.

e. Although shipboard recompression chambers have a nominal rated capacity based upon ambulatory patients, in practice only 1-3 serious cases with an attendant and MO can be accommodated in most of these chambers.

f. It may be appropriate to accept and perform incomplete, but life saving, recompression therapy on some survivors to make chamber space available to save other lives. Repeat follow up treatments could then be performed when additional recompression facilities have become available.

g. Do not be misled by survivors with mild or absent symptoms. AGE is usually symptomatic upon surfacing or within minutes of surfacing, but there may be a lucent interval when the patient appears well before suddenly worsening. Decompression sickness can develop immediately or have no symptoms for many hours after ascent. Treat DCI or omitted decompression early before symptoms develop.

Based on these principles, the following paragraphs give notes of guidance:

6.19.4. PROPHYLACTIC TREATMENT FOR POTENTIAL DCI IN THOSE WITH A DECOMPRESSION OBLIGATION

Prophylactic treatment of DCI should be given to all DISSUB survivors whose pressure exposure may lead to DCI or if any survivors have symptoms of DCI. Recompression is the gold standard treatment for omitted decompression and this should be organised and performed whenever available and appropriate while recognising that symptomatic survivors and those with severe DCI

have higher priority. Recompression guidelines for omitted decompression may be found in AdivP-2; Allied Guide to Diving Medical Disorders (Chapter 6), or in National diving manuals.

6.19.5. TREATMENT OF DCI OR OMITTED DECOMPRESSION WHEN A RECOMPRESSION CHAMBER IS NOT AVAILABLE

Treatment with oxygen at the highest concentration possible should be given to all cases of suspected DCI or omitted decompression where chamber treatment is not immediately available, but adequate oxygen supplies do exist. Casualties should be re-hydrated – (for C1 casualties this should preferably be by the intravenous route). If transport to a treatment centre is necessary and feasible, it is preferable to use low flying (<1000 ft/300m) or aircraft pressurised to these levels. Unconscious patients should be put in the recovery position during transport, with continuous use of high flow oxygen and care of skin pressure areas. Intensive care may be required during transport. Transportation risks must be weighed against delays in reaching a definitive care facility.

6.19.6. TREATMENT OF DCI WHEN A RECOMPRESSION CHAMBER IS AVAILABLE

A single recompression chamber, such as one provided on an Escape Gear Ship as part of First Reaction Stores, may be the only recompression chamber initially available. Backup chambers and evacuation support must be requested at an early stage if circumstances indicate the possibility of multiple DCI/arterial gas embolism casualties. The single on deck recompression chamber should be used for treating the most severe cases immediately available until adequate transport or backup recompression chambers are available. If chambers are full, survivors with less severe DCI or omitted decompression should be placed under observation and given high concentrations of oxygen and fluid replacement until recompression when chambers become available or they can be rapidly evacuated to other facilities.

6.19.7. GUIDANCE ON RECOMPRESSION THERAPY

a. Consider delegation of this responsibility to the MO in charge of the recompression area if this MO has been trained in diving casualty management. No survivor should be recompressed unless authorised by the SCC or an MO to whom the SCC has delegated responsibility.

b. The sooner DCI or arterial gas embolism is treated, the better the prognosis. Time must not be wasted in detailed evaluation prior to treatment. A detailed neurological examination can be completed in the chamber under pressure following initial recompression in the case of survivors with serious neurological findings on the preliminary screening examination.

c. If in doubt regarding symptoms resembling DCI, it is recommended to treat with recompression, provided chamber space is available.

d. The recompression chamber should be fully utilized immediately for patients that may be at risk of DCI. After initial pressurisation, keep the recompression chamber inner lock pressurised to 18 metres (2.8 bar) and lock any additional cases in, if possible. Upward excursions during treatment should be brief and avoided when possible. Casualties whose DCI becomes less serious with treatment may be removed from the recompression chamber inner lock to the outer lock and then surfaced after partial treatment to make room for more serious cases. Re-treatments can be performed in due course.

6.19.8. UTILISATION OF DIVING MEDICAL OFFICERS

If only one diving medical officer is present he/she should not enter the chamber, as he/she must remain available to triage new casualties for treatment. An attendant should remain in the chamber to monitor and care for survivors. If more than one diving medical officer is present, one remains outside to continue triage and evaluate support requirements. The second diving medical officer may be called upon to provide therapeutic support either in or outside the chamber as necessary.

6.19.9. MEDICAL TREATMENT IN THE RECOMPRESSION CHAMBER

Treat for tension pneumothorax if necessary with needle or tube thoracostomy, and other supportive medical care as required. If thoracostomy is carried out, care must be taken during the decompression phase to monitor the one-way Heimlich valve to ensure that it continues to function properly. Other types of specific treatment that may be required or helpful adjuncts include:

Catheterisation and turning of the paralysed patient with attention to pressure points.

Hydration with a crystalloid solution such as Ringer's Lactate (Hartman’s) Solution or Normal Saline (recommended for serious DCI).

6.19.10. OTHER SPECIFIC CONDITIONS

Within the Medical Supplement there is further guidance on the recognition and treatment of the following specific injuries:

a. Hypothermia, heat stroke and heat exhaustion treatment

b. Cold and heat injuries,

c. Injuries due to Irradiation

SECTION VII – SURVIVAL HAZARDS ON THE SURFACE AFTER SURFACE ABANDONMENT OR ESCAPE

6.20. GENERAL CONSIDERATIONS

Fire, flooding, atmosphere contamination, and reactor emergencies are some of the major casualties that could result in the need for surface abandonment of the crew. Conditions leading to abandonment will likely develop rapidly and result in a hurried evacuation from the vessel. Once egress is accomplished from the stricken submarine, survivors face numerous adverse conditions. Although the surface survivor faces many hazards they can be broadly categorized into 2 major areas; the baseline physical condition of the survivor upon arrival to the surface and environmental conditions encountered on the surface. All surface hazards compound one another and are further exacerbated by the time spent on the surface prior to rendezvous with rescue forces.

6.21. UNDERLYING MEDICAL ISSUES

The survivor will likely arrive on the surface in a deteriorated state of physical or mental capacities as a result of the initial incident itself, the DISSUB experience and the escape experience. They may present to the surface already demonstrating signs of trauma, respiratory compromise, barotrauma, Decompression Syndromes, hypo/hyperthermia, and mental exhaustion. Surface abandonment in high sea states also places the crew at risk for orthopaedic injuries with poorly timed jumps from the sail of the submarine. Debris and petrochemicals may pose hazards upon immediately exiting the submarine.

6.22. ENVIRONMENTAL CONSIDERATIONS

Environmental conditions encompass a wide range of factors such as sea state, water temperature, air temperature, radiant heat, and marine hazards. An immersion suit, such as the SESSPE, is designed to prolong surface survival by providing protection from environmental hazards. There are national variations in Submarine Escape and Survival Personnel Equipment design. Some employ the free-floating method whereby the survivor lies in the water. Others employ a small one-man life raft to raise the survivor out of the water such as the MK 10 SESSPE. Properly outfitted, the MK 10 SESSPE has increased the projected surface survival time in cold waters to about 24 hours with concurrent cold injury as likely presentation. Assuming that the submariner survives the initial cold shock in response to entering cold water, survival time without an immersion suit is considerably less than 24 hours: approximate times are shown in Table 6-1 below:

Water Temperature	Time
21.0-15.5° C (70-60° F)	12 hours
15.5-10.0° C (60-50° F)	6 hours
10.0-4.5° C (50-40° F)	1 hour
4.5° C (40° F) and below	less than 1 hour

Table 6-1 Life expectancy times for immersion temperatures without SESSPE

Note: The use of a properly outfitted SESSPE with life raft will increase immersion times to roughly 24 hours in 3-4° C water temperatures.

The use of SESSPE does not guarantee complete environmental protection; various shortcomings may still put the survivor at risk of environmental hazards. Improper donning of undergarments, loss of the raft, or damage of the immersion equipment during egress compromises thermal protection of the SESSPE.

Free-floating SESSPE have several reported shortcomings including unfavourable flotation angle increasing aspiration risk, severe low back pain, excessive suit flexion, inability to urinate, and decreased circulation to limbs. The buoyancy and suit flexion of a large percentage of immersion suits negates the self-righting ability of approved lifejackets. Splash guards to protect the face have been fitted to some systems in efforts to reduce aspiration. Possible modifications to the MK 10 SESSPE include addition of a streamer or global positioning equipment to aid in search and recovery efforts.

6.23. MARINE ANIMAL HAZARDS

The main animal hazard faced by survivors will be pelagic sharks. These animals may abrade exposed areas or bite causing extensive injury.

6.24. PHYSIOLOGICAL/PSYCHOLOGICAL CONSEQUENCES

6.24.1. ASPIRATION

Drowning or near-drowning of survivors may be encountered. Salt water or vomitus aspiration may induce respiratory distress.

6.24.2. COLD WATER IMMERSION-UNPROTECTED IN HYPOTHERMIC CONDITIONS

Fatalities may occur in four stages:

- Stage 1: Cold shock (3 -5 minutes)
- Stage 2: Swimming failure (3-30 minutes)
- Stage 3: Hypothermia (after 30 minutes)
- Stage 4: Post rescue collapse (during or hours after rescue).

The rate of heat loss of individual floating in the water depends on the following: water temperature, air temperature, wind speed, insulation provided by immersion suit and clothing, rate of agitation of the water, metabolic heat production (produced by shivering and exercise), ratio of body mass to surface area, subcutaneous fat thickness, state of physical fitness, physical behaviour, and body posture in the water.

6.24.3. HYPOTHERMIA AND HYPERTHERMIA

See the Medical Supplement.

6.24.4. DEHYDRATION

Dehydration results from inadequate fluid intake, insensible fluid loss, seasickness, or osmotic diarrhoea 2° salt water ingestion. Fluid loss in excess of 5 percent body weight may be associated with headache, irritability, and pre-syncope symptoms. With losses of 8 - 10 percent, performance declines significantly. Further losses lead to hallucinations and delirium. Death usually occurs with acute losses in the range of 15 - 20 percent of body weight. Survival expectancy without water is on average 3 days (or less in hot weather) and no more than about 5-6 days. Death from starvation occurs in excess of a month.

6.24.5. SKIN/SOFT TISSUE INJURY

Prolonged immersion leads to skin breakdown and ulcer formation. Severe sun and wind burn may occur over unprotected skin. Cold induced injuries include freezing or non freezing injuries (frostbite or chilblains). SESSPE mitigates some of these conditions. Even with this equipment, in waters of 5° C (41° F) or colder, non-freezing cold injury of the extremities may still occur. Effects may be seen after 10-15 hours of exposure.

Eye exposure to petrochemicals, salt water, and ultraviolet light may impair vision by chemical or solar conjunctivitis.

6.25. MEDICAL CONSIDERATIONS

Rescued survivors may suffer from traumatic or exposure-related conditions- near drowning, significantly impaired peripheral neuromuscular (nerve and muscle) function, blood volume alterations, cardio-vascular function impairment, hypothermia, and electrolyte imbalances. The prolonged immersion may leave soft tissue friable and subject to secondary injury during extraction efforts. Those not at risk for aspiration should be extracted from the water with care, preferably horizontally, and handled as if they were critically ill. Unconscious individuals or those at risk for aspiration should be removed in haste. Rapid medical assessment of ABC's should occur and near-drowning victims should receive oxygen as soon as possible.

Cold survivors must be protected from further heat loss and placed in medical observation. Severely hypothermic persons require extensive medical intervention and may overwhelm medical capabilities if multiple casualties present. Core temperature re-warming should be done slowly and only with critical care capability because of the increased risk of cardiac arrhythmias and cardiovascular collapse. Re-warming hypothermic rescuees may be limited to blankets, warm showers, or heated PO fluids.

Thorough evaluation of soft tissue cold injury cannot be made before thawing and does not influence first aid treatment.

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SECTION VIII – RESCUE

6.26. INTRODUCTION

There are a variety of rescue systems; each of them is operated by a different nation or group of nations with their own Standing Operating Procedures. Therefore this chapter gives general guidance and should be read in conjunction with the SOPs for the relevant system.

(Note: Where the term SRV is used in this section it covers both rescue vehicles and rescue chambers)

6.27. POTENTIAL PROBLEMS DURING RESCUE

In addition to the problems of survival in a DISSUB there are some specific risks pertaining to the rescue process between the DISSUB and arrival at shore facilities. Routine transport between vessels and ashore are normal risks and are not considered.

6.27.1. ACCESS TO THE SRV

The SRV will mate with the DISSUB via an escape tower or trunk. To access the SRV there is a requirement to climb through the tower and then over a series of gaps through the tower hatch, over the casing and into the SRV. This will be taxing for able-bodied rescuees but may be impossible to debilitated survivors or those with injuries to one or more limb. Assistance to move survivors through the submarine to the tower should be planned by the senior survivor and DMTT (if deployed). Assistance with strops and winching should be provided by the SRV.

6.27.2. IMMOBILE PATIENTS

Rescuees who cannot climb through the tower, even with assistance, may be transferred to an SRV using a stretcher and winch arrangement. Due to the limits on access and turning in the vehicle it is normal for only a half-back stretcher to be available. For lower limb injuries this will mean that additional splinting will be required. Once in the SRV these casualties occupy space for at least 6 to 8 seated casualties and access to undertake interventions (airway manoeuvres, ventilation, IV access e.t.c) is very limited. With similar difficulties in extracting these rescuees into the MOSHIP / MOSUB and into a DCC careful planning will be required to retrieve these casualties.

6.27.3. CO2 OFF EFFECT

The change from a contaminated submarine atmosphere, especially if the CO2 level is high (>3%) to a clean atmosphere can lead to sudden collapse. This may occur in the SRV or deck reception area.

6.27.4. VEHICLE CONSTRAINTS

SRVs are small vehicle with limited space. On-board monitoring or treatment for rescuees may be very limited until arrival on the MOSHIP deck and unloading. Therefore rescuees with medical problems may worsen during transit in the SRV.

6.27.5. TRANSFER UNDER PRESSURE

Not all SRVs are capable of transferring rescuees directly to a decompression system. These rescuees will need to be decompressed to surface and then placed in chambers and taken back to depth. As the DISSUB pressure increases the time between surfacing and onset of DCI shortens and these rescuees may be at significant risk of DCI during this period with consequent requirement for prolonged decompression and therapeutic treatment.

6.28. RESCUE MISSION PLANNING

En-route to the DISSUB the SMO (S), Senior Diving MO and the CRF should undertake a mission planning exercise with the SRV operators to maximise chamber usage, decide on decompression tables and ensure that injured survivors are brought out of the DISSUB at an appropriate point in the rescue process. This plan will then form the basis for rescue cycles modified by further information received on arrival at the DISSUB location. Guidance on the choice of decompression tables is in ANNEX 6.G.

6.29. CO-ORDINATION OF RESCUE ASSETS

When more than 1 rescue asset is being used the medical teams supporting each SRV require to co-ordinate casualty management. Unless the OSC has the facilities to co-ordinate the casualty response, chamber availability and casualty information then 1 rescue system shall be nominated as the lead to co-ordinate the rescue response, for compiling casualty details and collating rescue force store and replenishment requirements.

Selection of the co-ordinating rescue system will depend upon the availability of administrative staff and communications facilities on the MOSHIP to undertake this task.

6.30. EQUIPMENT SUPPLY TO THE DISSUB

The DMTT may require additional medical equipment to support the DISSUB survivors. This should be supplied via the next available SRV trip. If multiple vehicles are being used this will require co-ordination between the two medical teams to ensure the right equipment is provided in an appropriate timescale.

6.31. RESUPPLY

Additional medical supplies and oxygen, both for the chambers and for direct patient use, may be needed during a rescue. The SMO(S) should feed these requirements to the CRF who will arrange for resupply via the OSC. If poor weather or sea conditions are expected at the DISSUB location then consideration should be given to loading additional stores before deployment from the MOPORT.

6.32. CASUALTY TRANSFERS:

Guidance on off-loading casualties to shore is in Section XII.

SECTION IX – THE MANAGEMENT OF RADIOLOGICAL AND OTHER CONTAMINATION

6.33. GENERAL CONSIDERATIONS

Survivors within the DISSUB are highly likely to have been exposed to a variety of potential contaminants during the survival phase before escape or rescue. Contaminants vary depending on the class of the submarine, and nature of the accident. These include: diesel fuel, lubricating oils and grease, hydraulic oil, pyrolysis products, human excreta and in the case of nuclear submarines they may have been exposed to radioactive contamination.

All forms of contamination represent a threat to the health of the survivors. Therefore all survivors should be assumed to be contaminated until proven otherwise. All survivors from a nuclear DISSUB should be assumed to be radiological contaminated until they have been adequately monitored and shown to be uncontaminated. Furthermore it is highly probable that most survivors will have been exposed to more than one sources of contamination.

If the contamination is not adequately managed and contained it could also represent a potential hazard to rescue forces; this is true both for rescue forces on the surface and the DMTT. Furthermore the flammability of flammable contaminates such as diesel fuel and lubricating oils will be increased in a hyperbaric environment, thus there may be a significant fire hazard in the event of TUP being necessary or, in the case of escapees, therapeutic recompression being required. These hazards can be reduced if contaminated individuals are decontaminated as soon as reasonably practical and rescue forces follow a few basic principles.

Contamination can be expected to be present both on survivors clothing and on their skin and hair. Up to 80% of contamination can be removed by the simple process of undressing the individual.

If the conditions and supplies permit, every effort should be made for early decontamination of escapees and rescuees. Escapees from a DISSUB are likely to arrive on the surface in some form of SESSPE suit, which will likely be worn over their clothes. Once they have been recovered to the EGS and have undergone initial medical triage ambulatory escapees should undress and shower as soon as practically possible. This process should be supervised by a medical trained individual since delayed decompression illness may occur.

In the case of rescue decontamination should if at all possible start aboard the DISSUB. Clothing should be removed and left in the DISSUB. The DMTT can assist where needed in decontamination and dressing of rescuees on board the DISSUB. This procedure should reduce the amount of contamination transferred to the rescue vessel. In addition it will also reduce the critical loss of time devoted to extensive decontamination procedures on the MOSHIP.

If TUP is not required, ambulatory rescuees should be decontaminated as soon as practical after initial triage. This process should be observed by a medically trained individual.

Non-ambulatory individuals should be assisted with decontamination by members of the medical team. Disposable garments worn during the transfer should be bagged and disposed of in accordance with national guidelines. If TUP is required individuals should wash as best able within the TUP complex. This will vary depending on the rescue system in use. Once again disposable garments should be removed from the TUP complex via an airlock and bagged for disposal in accordance with national guidelines.

Every effort should be made by casualty receiving & caregivers to wear personal protective equipment (PPE) to avoid cross-contamination. Contaminants likely to be encountered are most unlikely to present a significant health hazard to rescue force personnel. Simple precaution such as wearing a disposable plastic apron and surgical gloves should provide more than adequate protection. Respiratory protection outside the DISSUB will unlikely be required for chemical contamination.

ESSENTIAL MEDICAL CARE SHOULD NEVER BE DELAYED WHILST DECONTAMINATION IS PERFORMED.

6.34. CHEMICAL CONTAMINATION

In most DISSUB scenarios it is highly likely that the survivors will be exposed to a number of chemical contaminants. Damage to submarine systems may result in the release of diesel fuel, lubricating oil, hydraulic oil, MEA, sulphuric acid and a number of other chemical contaminants. A further source of chemical contamination is from pyrolysis products following a fire. Additionally it is inevitable that during the survival phase the survivors will have to have deployed some means of carbon dioxide scrubbing. This is most likely to have taken the form of either lithium hydroxide or soda lime; both have the potential to release extremely caustic dust into the DISSUB.

Whilst survivors can be expected to have attempted to remove gross contamination they are still likely to have residual contamination on their clothing, skin and hair. The presence of contamination on the skin can be expected to cause skin irritation especially if has been present for several days.

6.35. BIOLOGICAL CONTAMINATION

Conditions within the DISSUB are likely to have been very primitive. Freshwater is likely to have been in very short supply and thus it is most probable that survivors will be unwashed and potentially contaminated with human excreta. Additionally injured survivors may have blood stained clothing as may their colleagues who have rendered first aid. As with chemical contamination individuals should be afforded every opportunity to shower or wash as soon as possible on the EGS or MOSHIP. Assistance should be provided to injured survivors as required. Contaminated clothing again should be bagged for disposal in accordance with national guidelines.

6.36. RADIOLOGICAL CONTAMINATION

In the event of the DISSUB being nuclear powered there is a very real possibility that some or all of the survivors will have been exposed to radiological contamination. This could result from a primary coolant spill or, exposure to fission products if the incident has been of such severity that it leads to a loss of core integrity. In both situations the radioactive isotopes involved will be Beta/Gamma emitters, which have the potential to cause burns to the skin if not removed.

Individuals with skin contamination are at increased risk for internal contamination through ingestion or inhalation. If internal contamination is suspected then this can be assessed by taking nose blows from survivors collecting samples of urine and faeces. If there remains a persistent concern about internal contamination, then this can be assessed once the individuals concerned have been transferred ashore by whole body monitoring.

The DISSUB atmosphere may also be contaminated, and thus will represent a hazard to members of the DISSUB entry team (DET). Therefore if a radiological release is suspected members of the DMTT or DET should wear respiratory protection prior to and during DISSUB entry.

Radiological contaminated individuals represent a potential hazard to rescue forces, particularly those engaged in medical triage, decontamination and medical care. The risk can be ameliorated if personnel engaged in these operations wear simple PPE; this should include: surgical type mask and hood, waterproof apron, latex gloves and plastic overshoes.

It must also be remembered that any area were a contaminated individual is treated or is otherwise held is at risk of becoming contaminated. Access to these areas must be controlled to individuals wearing appropriate PPE and individuals leaving the area should undress and be monitored before being allowed to enter any clean area. On completion of the rescue operation it will be necessary to monitor and decontaminate any area where contaminated individuals had been held.

Rescuees from a nuclear DISSUB should be considered as radiological contaminated until proven otherwise. Prior to entry into the rescue vehicle they should disrobe and don disposable identifiable garments. On arrival at the MOSHIP they should undergo monitoring as soon as practical, the location where this is conducted will depend on the design of the individual system. Contaminated individuals should undergo decontamination as described above taking into account the limitations of the rescue system if TUP is required.

Escapees from a nuclear DISSUB must be considered to be radiological contaminated until they have been monitored and been shown to be uncontaminated. Given that they will have ascended from the DISSUB through the water it is most unlikely that the exterior of the SESSPE itself will be contaminated however, contamination of the escapees clothing worn under the SESSPE can't be excluded. Able bodied escapees should remove their SESSPE prior to monitoring. SESSPEs should be bagged as radiological waste in accordance with national guidelines. Following monitoring areas of contamination and its severity should be recorded.

Decontamination of able bodied escapees will best conducted in a designated decontamination area. If available, this ideally would include a washroom equipped with showers as close as possible to the area where the escapees are monitored. This avoids extending contamination into treatment areas. Non-able bodied escapees should have their SESSPE suits removed by medical staff prior to monitoring. If still contaminated after removal of clothing they should be washed by medical staff using soap and water and wash cloths. Irrigation run-off should be contained.

The route to the washroom should ideally be covered in absorbent paper to prevent the deck becoming contaminated; access through this area should be restricted to escapees and rescue workers wearing appropriate PPE. In the washroom the contaminated individual should undress themselves and place their own clothes in bags which again should be treated as radiological waste in accordance with national guidelines. They should then shower and wash using soap and water. The process should be repeated till contamination is removed or reduced to twice the background reading. Scrubbing using a scrubbing brush is not recommended, since it has the potential to abrade the skin and increase the risk of internal contamination. Contaminated wounds should be irrigated with sterile normal saline, with care being exercised to contain the irrigation fluid. Once they have showered they should be re-monitored ideally in an area that has been kept clear of contaminated individuals. If clean they should dress and leave the washroom.

If urgent recompression therapy is indicated this again should not be delayed by the need to radiologically decontaminate an individual however, the SESSPE and the patient's clothing should be removed, if at all possible, prior to the patient being placed in the chamber. However, it should now be remembered that the chamber itself is now potentially contaminated and it should be treated as a controlled contamination area.

SECTION X – TRIAGE

6.37. INTRODUCTION

The aims of triage are to deliver the right patient to the right place at the right time so that they receive the optimum treatment and also to 'do the most for the most[6]. The principles of triage should be used whenever the number and severity of casualties exceeds the resources available. It is a dynamic process since the appropriate triage category allocated to any individual will change with time and treatment.

The triage system given in this section assigns each casualty a composite triage category consisting of a medical 'T' component and a recompression 'C' component. This system is used to direct the management of casualties as they arrive onboard an EGS or MOSHIP and also to direct their evacuation to other facilities. A 'triage sieve' (based on mobility for example) should be used to rapidly allocate survivors to treatment areas onboard an EGS or MOSHIP and a more complex 'triage sort' should be used for the movement of casualties between areas onboard and for evacuation.

A proposed triage sieve is reproduced at Figure 6-4. This modifies the sieve proposed in the Reference 2 but includes the NATO definitions for T 1 – 3 laid out in STANAG 2879 MED (Edition 3) – 'Principles of Medical Policy in the Management of a Mass Casualty Situation'. The STANAG uses 'DELAYED' for T2 (instead of urgent) and MINIMAL for T3 (instead of delayed). To avoid communications difficulties the T category should be used supplemented by the NATO definition if required.

This sieve may be useful in some DISSUB casualty scenarios but alternative strategies may be preferable in others. For example this sieve is not designed to prioritise escapees for recompression therapy; this recompression needs assessment could occur as part of a triage sort as opposed to a sieve but in the case, for example, of an escapee who is witnessed surfacing then losing consciousness it would unnecessarily delay recompression. Also it may not be able to separate cold exhausted uninjured casualties from those that are cold, exhausted and have injuries. In situations like this the ability to communicate or other assessments of conscious level may represent more appropriate decision thresholds.

6.38. CONDUCT OF TRIAGE

Triage will ideally be conducted in an area shielded from the weather and readily accessible to oncoming survivors that provides adequate space for medical care, depending on the class of the EGS or MOSHIP. The area need not be large but there should be sufficient space to evaluate up to 5 casualties prior to them being moved to the treatment or holding areas.

The Triage Medical Officer (TMO) is responsible for the rapid assessment of survivors and their placement into the relevant triage categories which will, in turn, determine which treatment area they are initially taken to. If rescue has been carried out using a submarine rescue vehicle (SRV),

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[6] Major Incident Medical Management and Support The Practical Approach. 2nd Ed. Advanced Life Support Group. 2002 BMJ Publishing Group. London.

or if escape took place prior to the arrival on scene of the EGS, survivors may arrive in small or large groups. In the event of a Compartment Escape the TO will have to assess a greater number of survivors and will require assistance.

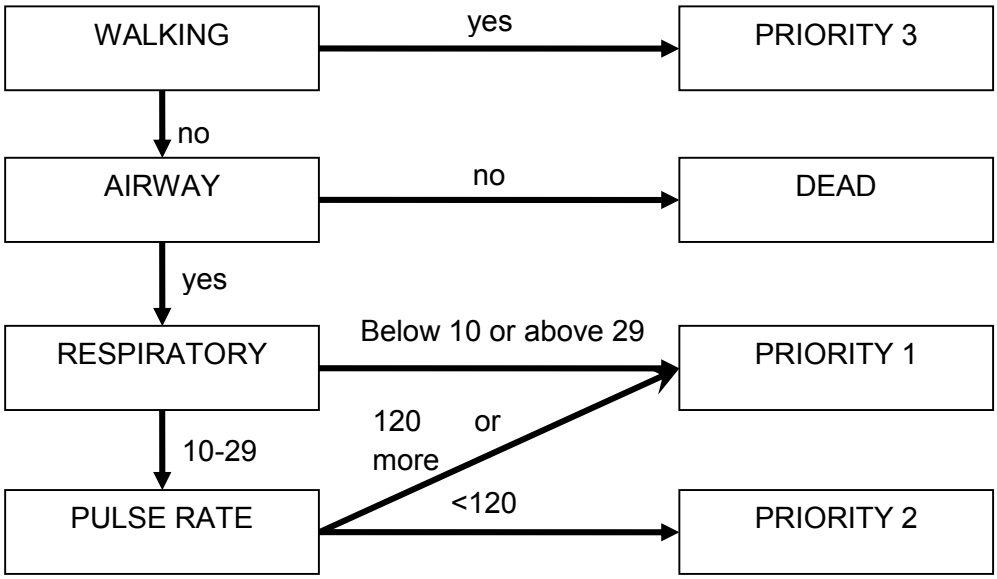

Figure 6-4 Medical Incident Medical Management and Support Triage Sieve

The TO requires a supply of triage cards, preferably either cruciform or folding triage cards.

The TO will allocate each survivor a unique casualty identification number. This is to be written in indelible ink on the forehead and on the Casualty Report Form. One or more fit survivor(s) should be retained in Triage to assist with the identification of unconscious casualties. Immediate use of high-flow oxygen should be considered for all unconscious patients as well as any patients in whom the suspicion of DCI exists. A physical description of unconscious survivors is to be written in their notes to facilitate and confirm identification. As soon as the TO has allocated a triage category and written brief clinical notes, survivors are to be taken to the appropriate treatment areas. The clinical notes must accompany each survivor at all times (see Casualty Handling Algorithm - ANNEX 6.F).

The Area Casualty Report Log (ANNEX 6.I) is to be kept up to date at all times and the information passed to the MAO as soon as possible. The MAO is to be informed of all casualty movements in or out of triage area by telephone or written message and the destination and time of transfer is to be recorded in the Triage Casualty Log and Master Casualty State Board (ANNEX 6.H).

The standard NATO medical triage categories (T1, T2, T3, T4) are to be used to indicate medical treatment priorities. In addition, it must be determined which survivors need immediate recompression (C1) or non-urgent recompression (C2) in order to allocate them to recompression chamber spaces on the EGS / RGS and in receiving shore facilities (see Table 6-3 Medical and recompression triage and treatment grid).

6.39. TRIAGE CATEGORIES

6.39.1. T1

This category should only be applied to casualties who require immediate life saving medical and/or surgical treatment which is not overly time-consuming, and who have a high probability of survival. Examples of medical conditions in this category include haemorrhagic shock, tension pneumothorax and other respiratory emergencies, and the finding of an acute surgical abdomen. Casualties in the T1/C1 category require both lifesaving immediate medical treatment and stabilisation prior to immediate recompression; whereas those in the T1/C2 category require non-urgent decompression. Depending upon severity of injury and availability of resources, certain survivors that initially appear to be in the T1/C1 category may be determined to be effectively unsalvageable with available resources (T4).

6.39.2. T2

This category should be applied to casualties requiring time-consuming major medical and/or surgical treatment, and whose general condition permits delay in said treatment without unduly endangering life. Examples of these medical conditions include: <20% second degree burns, open fractures, inhalation pulmonary injuries, major lacerations, and moderate hypothermia. Category T2/C1 indicates the additional requirement for urgent recompression, and T2/C2 the need for non-urgent recompression.

6.39.3. T3

This category will include both casualties with relatively minor injuries that may be managed by First Aid trained personnel and casualties with no obvious injuries. Examples of these medical conditions include: closed bony fractures without vascular compromise, minor lacerations, first degree burns, and mild hypothermia. Casualties categorized as T3/C2 require non-urgent decompression as well as medical/surgical treatment. Those individuals categorised as T3/C1 should be sent to the recompression chamber for immediate treatment.

6.39.4. T4

This group comprises patients who have injuries so severe (serious and/or multiple injuries) that even if they were treated under the best possible conditions, their probability of survival would be extremely low. This categorisation is based both upon injury severity and availability of medical and recompression resources. These casualties should not be abandoned, but receive simple palliative treatment and made comfortable including use of opiod analgesics. They must be monitored by assigned medical personnel, and their condition reviewed periodically. If sufficient medical and/or recompression resources become available, these patients may be re-categorised.

6.40. RECOMPRESSION TREATMENT CATEGORIES

Recompression treatment categories will be established to facilitate priorities for decompression treatment of DISSUB casualties. This is essential considering the limited on board resources for recompression therapy and the high risk of serious complications for delay in recompression treatment of serious DCI.

6.40.1. C1

Patients in this category have symptoms of serious or life-threatening DCI and require immediate treatment in the on board recompression chamber. To delay their treatment would entail a significant increased risk of death or subsequent permanent injury.

6.40.2. C2

Patients in this category have minor and non life-threatening DCI symptoms at the time they are assessed. If the scenario involves rescuees from a DISSUB saturated at a DISSUB pressure above 1.7 bar, all rescuees have a decompression obligation and are at some risk of DCI. These rescuees by definition fall into the C2 category and require close monitoring for the development of DCI symptoms. If sufficient oxygen is available, they should receive prophylactic surface high flow mask oxygen treatment until they can be recompressed and treated on a saturation decompression table.

Note: Escapers from any DISSUB or rescuees from a pressurised DISSUB (> 1.5 bar) with no obvious symptoms should be considered C2 and should be held in the tertiary area for medical observation due to the risk of late development of symptoms of DCI.

6.40.3. C0

Patients in this category have no current indication that recompression is required.

6.41. RADIATION CASUALTIES

Radiation exposure must be taken into consideration in the emergency treatment and disposition of casualties. Those survivors who are known or suspected to have received a high radiation dose (> 2 Gy) will require hospitalisation within 24 hours or after treatment of serious or life-threatening DCI. In this case, they should be considered at least T2, with priority for early CASEVAC (See: AMedP-6 Vol 1).

6.42. ALLOCATING SURVIVORS TO THE APPROPRIATE TREATMENT AREAS

Once allocated a triage category survivors are to be taken to the appropriate treatment area as follows:

TRIAGE CATEGORY	TREATMENT AREA
All T1, T1/C1	Area 1 (Primary Treatment)
T2/C1 (See Note), T3/C1	Recompression Chamber
All T2, T2/C2,T3/C2 (symptomatic)	Area 2 (Secondary Treatment)
All T3, T3/C2 (asymptomatic) and uninjured survivors	Area 3 (Tertiary Treatment and Observation)
T4	Area 4 (Palliative Care)

Table 6-2 Allocation of treatment area by triage category

Note: T2/C1 casualties may receive urgently required non-life saving medical treatment prior to recompression if that treatment can be accomplished in a short period of time (less than 20 minutes) prior to recompression.

Those casualties who do not require immediate recompression therapy, i.e. the T1, T2 and T3 groups, will be treated on board or be evacuated to other receiving hospitals or sick bays. Casualties who require immediate or urgent recompression therapy, i.e. the C1 group, will be treated aboard the EGS / RGS, in another nearby shipboard chamber, or immediately evacuated to a shore-based chamber (transferred under pressure if and whenever possible) (See ANNEX 6.E TRIAGE ALGORITHM FOR ESCAPE and ANNEX 6.F - Casualty handling algorithms).

Casualties in the T3 triage category asymptomatic for DCI (T3/C2) could receive surface oxygen in the tertiary treatment area in order not to overcrowd the secondary treatment area. Category T3/C2 casualties that develop symptoms suspicious of DCI should be moved to the secondary treatment area (nearer the decompression chamber) and be observed until they can either receive therapeutic recompression treatment or be CASEVACed to a shore facility for treatment.

Once it is ascertained that all survivors have been recovered and Triage is complete, the Triage Medical Officer is to report to the Medical Controller who will reallocate him to one of the treatment areas.

	C1	C2	C0
T1	Require lifesaving immediate medical treatment Require immediate recompression	Require lifesaving immediate medical treatment Require non-urgent recompression	Require lifesaving immediate medical treatment No indication that recompression is required
T2	Require immediate recompression Require non-lifesaving major medical treatment (*medical treatment prior to decompression must be accomplished in less than 20 minutes)	Require non-lifesaving major medical treatment. Require non-urgent recompression	Require non-lifesaving major medical treatment No indication that recompression in required
T3	Require immediate compression Require minor general medical care/observation	Require minor general medical care/observation Require non-urgent recompression	Require minor general medical care/observation No indication that recompression is required
T4	Unsalvageable with available treatment resources - palliative treatment only.		

Key:

T1-T4	categories are NATO standard for surgical/medical treatment
C1	Requires urgent or immediate recompression
C2	Requires non-urgent recompression
C0	Does not require recompression

Table 6-3 Medical and recompression triage and treatment grid

SECTION XI – CASUALTY RECORDING PROCESS

6.43. INTRODUCTION

Casualty recording is essential in both the escape and rescue scenarios. The guidance outlined is to be followed for either escape or when a Submarine Rescue Vehicle (SRV) is used to rescue personnel from a DISSUB.

The Medical Administration Officer (MAO) is responsible for co-ordination this information and will require a series of assistants who can be used in the various triage and holding areas to collect information from patients and medical staff. These personnel may need to be from the DISSUB nation to avoid language difficulties with the rescuees.

6.44. CASUALTY IDENTIFICATION

6.44.1. GENERAL

To avoid confusion over casualty numbers, locations and identities each casualty should be allocated a Unique Casualty Identifying Number (UCIN) at the earliest possible opportunity. The first chance to do this will vary depending on whether escape or rescue is being conducted. This UCIN should be used to follow the casualty through the whole process until returned to shore.

The UCIN should be marked prominently on the casualty (e.g. on the forehead), and on the casualties triage documents. The use of wrist bands or numbered tabards should also be considered.

The MAO will collect the following information on each casualty and update it as the casualty moves through triage, treatment, holding and transfer ashore:

- Unique Casualty Identification Number (UCIN)
- Surname
- Forenames
- Rank
- Service Number
- Date of Birth
- Triage category and main injuries
- Location
- (Radiological contamination / irradiation status if appropriate)

6.44.2. ESCAPEES

Once aboard an EGS each escapee should have their UCIN allocated by the Triage Officer. The additional information in paragraph 6.44.1 above should be collected in the treatment areas and forwarded to the MAO at the co-ordination point.

By prior agreement if SPAG is deployed to recover casualties the UCIN may be allocated by the SPAG medical personnel to ease communication between SPAG and the EGS.

6.44.3. RESCUEES

Where the UCIN is allocated to rescuees will depend on whether a DMTT is deployed. If a DMTT is deployed then they should allocate UCINs to each rescuee before they leave the DISSUB, and issue casualty cards listing any injuries or treatment given in the DISSUB. If not, then the following routines should be followed:

a. TUP Not Required. If the internal DISSUB pressure is such that there in no need to transfer casualties to the decompression chambers then the casualties will be depressurised to the deck. On emerging from the Submarine Rescue Vessel (SRV) or Deck Reception Chamber (DRC) each casualty should be triaged and allocated a UCIN. The casualty's details listed in paragraph 6.44.1 above should be taken in the treatment area and forwarded to the MAO at the co-ordination point.

b. TUP Required. If TUP is required then casualties will pass from the SRV via the DRC to the Deck Decompression Chambers (DDC). Once in the DDC they will remain there until their decompression to the surface is complete before being released onto the MOSHIP deck. The following routine should be used to record casualty details and control casualty location:

1. The UCIN should be given to each rescuee as they pass through the DRC.

2. Once in the DDC and commencing decompression then the surname and service number should be collected from each rescuee and transmitted, along with the UCIN , to the outside of the chamber.

3. Once removed from the DDC the casualty should be triaged and referred to the appropriate treatment area. On arrival the casualties details listed in paragraph 6.44.1 above should be taken and passes to the MAO at the co-ordination point.

6.45. INFORMATION HANDLING

The MAO is responsible to the SMO(S) for maintaining accurate information on all escapees or rescuees onboard the EGS / RGS / MOSHIP. The MAO is to maintain a running log of this information and update the log on changes in the patient status (e.g. change of triage category or location).

The MAO is responsible to the SMO(S) for producing casualty signals and reports from the information received on the escapees and rescuees. Signals shall be in the standard NATO format and released by the Communications team.

All information on casualties is to be prefixed with the casualties UCIN whatever other forms of identification are used. This will avoid confusion over surnames and incorrect service numbers.

Mobile casualties should be identified by the use of tabards, t-shirts or similar clothing so that they can be differentiated from the ship's company and rescue personnel.

Once transfer to another vessel or ashore is agreed the MAO will ensure that each casualty transferred is logged off the MOSHIP and that they take their medical record / triage card with them to their next point of care. Copies of medical records should be taken and retained on the MOSHIP if possible.

On transfer from the MOSHIP the MAO shall keep a record of the location of the next point of care and passed to the national authority of the DISSUB to allow them to make arrangements for continuing follow up and appropriate repatriation of casualties / survivors.

6.46. CASUALTY IDENTIFICATION WHEN USING MULTIPLE VESSELS

When multiple EGS are used UCINs should be allocated so as not to duplicate numbers. The SMO(S) should allocate numbers beginning at 100 to the first vessel, 200 to the next and so on.

When using multiple SRVs the numbering of casualties will depend upon whether a DMTT has been deployed. If a DMTT is deployed they should issue UCINs to each rescuee before they leave the DISSUB. If no DMTT is deployed then the lead SRV should use UCINs beginning from 100, the second SRV from 200, the third from 300 and so on.

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SECTION XII – TRANSFER OF CASUALTIES FROM ESCAPE AND RESCUE SHIPS TO FURTHER MEDICAL CARE

6.47. GENERAL CONSIDERATIONS

All current Safe to Escape Curves, Decompression and Therapeutic treatment schedules have a risk that the escapees or rescuees will subsequently develop DCI. The risks of DCI following an Accelerated Decompression schedule may be as high as 30%. These risks may be elevated in DISSUB survivors by their general debilitation, dehydration, hypothermia and because of their prolonged saturation to DISSUB pressure. Therefore DISSUB survivors being transferred ashore may require access to therapeutic recompression facilities or treatment during transfer.

Therefore all escapees or rescuees should be observed for a minimum of 1 hour on the EGS / RGS / MOSHIP before transfer to another vessel or ashore. Should helicopter transfer to another ship or shore-side medical facilities be undertaken then similar precautions to flying DCI cases should be applied to these casualties, with flight height limited to 300m whenever possible.

In case escapees / rescuees develop DCI whilst in transit they should be accompanied by medically qualified persons who can recognise the onset of DCI and prioritising the use of available oxygen, as well as informing receiving medical staff of the case(s) and their requirement for assessment and treatment. O2 equipment should supply surface high flow O2 via a reservoir mask. Oxygen supply equipment should be carried sufficient to support 1 or 2 DCI cases per 10 rescuees for the duration of the journey and into an appropriate medical facility. If the helicopter is using another ship for refuelling stopovers during its journey then there may be access to medical review and further medical treatment on this vessel.

If the receiving hospitals or vessels are not from the same country as the DISSUB the provision of interpreters or medical staff from the DISSUB country should be a priority requirement. Rescuees will need the reassurance of being able to deal with rescue personnel speaking their own language in the immediate post-rescue phase.

Should rescuees need to be returned to their country of origin by air then the risk of DCI for flying at reduced cabin pressure should be assessed by a senior diving medicine specialist. It may be necessary to hold personnel in area for several days or to arrange for aircraft to maintain a higher cabin pressure than normal.

6.48. SPECIFIC REQUIREMENTS

6.48.1. GENERAL

The SMO(S) should use information acquired during deployment and from the SSRA/SMC to locate appropriate facilities ashore to transfer both conventional and decompression casualties. These facilities should be alerted early and kept regularly informed of the likelihood of their use and the types of casualties that may be transferred.

6.48.2. CASUALTY TRANSFER

Whether the MOSHIP is offloading direct to shore facilities, to shore facilities via a transit vessel or airhead or to another ship then the general considerations listed in Section 1 above should be used for transfer planning. Distance, method of transfer, transfer duration and availability of receiving facilities will all affect the decision on evacuation from the MOSHIP.

Whilst the minimum holding time on the EGS / MOSHIP should be 1 hour if there are better facilities on the EGS / MOSHIP to treat decompression casualties than ashore them C1 casualties requiring immediate recompression should be treated on-board. If experience of treating decompression casualties is limited ashore then the transfer of an experienced Diving MO with the casualties should be considered.

6.48.3. TRIAGE CATEGORIES

Specific consideration of the casualty's triage categories will affect their disposal:

a. T1 Casualties (requiring immediate life-saving medical treatment) should be stabilised as much as possible on the EGS / RGS / MOSHIP and transferred rapidly to an appropriate receiving facility. If they also have an urgent decompression obligation (C1) then normally the medical intervention should take place before resolution of the decompression problem unless access to highly specialised hyperbaric ITU facilities exist

b. T2 casualties (require urgent medical treatment) should be stabilised on board and transferred to an appropriate receiving facility preferably within 6 hours. If they have an immediate or urgent decompression obligation (C1 or C2) then consideration should be given to resolving the decompression obligation before medical intervention

c. T3 casualties should be held on the EGS / RGS / MOSHIP until other facilities have the capacity to cope with them. Transfer of large numbers of T3 casualties to a limited receiving facility should be avoided to stop the facility becoming overloaded. T3 casualties with immediate or urgent decompression obligations should be fit for decompression after first aid treatment

d. Uninjured casualties without an immediate or urgent decompression obligation (C3) should be transferred to a holding facility where they can be observed in case of the development of DCI or medical problems.

6.48.4. MOSHIP UNABLE TO OFF-LOAD

Due to location, absence of other vessels and aircraft or weather conditions it may be impossible to off-load rescuees from the EGS / RGS / MOSHIP once decompressed. In this situation the rescuees will have to be accommodated and cared for on the EGS / RGS / MOSHIP. If this is seen as a likely scenario then urgent consideration should be given to augmenting the SMERAT with surgical and anaesthetic trained personnel prior to deployment.

SMO(S) and the Senior Diving MO should assess the likely requirement for chambers to provide therapeutic decompression for surfaced survivors and agree with the CRF and the diving officer controlling the chambers whether to retain a specific chamber for therapeutic decompression. This may affect the number of personnel that can be rescued on each SRV trip.

Patients showing early symptoms of DCI, particularly skin and joint pain effects only, should initially be treated by use of 100% oxygen at surface pressure and only transferred to the chambers if space becomes available between treating more serious cases.

Assuming no re-supply, Oxygen supplies (both medical and chamber) will be a limiting factor on the ability to decompress and to treat rescuees. This may limit the ability to use accelerated decompression schedules, therapeutic tables and either slow the rescue process or increase the risk of being unable to treat emergent DCI.

Escapees and rescuees who remain on-board should be monitored by medical personnel for 4 hours post their initial decompression and the by their own colleagues (buddy aid) for a further 12–24 hours. Those requiring therapeutic decompression should be monitored for 12 hours by medical staff post their treatment.

ANNEX 6.F contains algorithms for casualty handling and transfer through the process to shore.

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ANNEX 6.A. OSC BRIEFING POINTS

6.A.1. OSC BRIEFING POINTS

The different ways for getting the crew out of the distressed submarine are recorded in Chapter 2 into this publication. Rescue is normally the preferred method of extraction because it is inherently safer. However, escape is more likely in a number of circumstances (see article 0203 for more details).

Decompression illness (DCI), including pulmonary barotraumas, may be the major medical condition requiring treatment. Its occurrence will be dependent on the depth of the DISSUB, the pressure in the DISSUB, and time of exposure to the pressurized atmosphere.

When the DISSUB's crew is using Tower Escape (Hooded Ascent), it is expected that one to five escapees will surface as rapidly as every 4-5 minutes, depending on the size, type, and number of escape towers being operated.

When DISSUB's crew is using Compartment or rush Escape, the SMO(S) has to expect all of the survivors to arrive on the surface at a rate of up to 1 - 2 per minute. In this case, note that:

A large number of survivors will surface in a short period of time. These survivors have a much higher probability of serious injuries and DCI.

The medical organization may be overwhelmed and there will be an urgent requirement for additional asset such as medical personnel, equipment and CASEVAC facilities.

If delay to scene: crew may be scattered over a wide area.

If the survivors have already escaped prior to the arrival of the rescue forces, they may have already been in the water for several hours. Locating and recovery of escapees may be complicated by prevailing current and wind direction.

In the event of known or suspected radioactive contamination, arrangements must be made to treat, monitor and decontaminate survivors as well as minimizing the spread of contamination throughout the ship.

The SMO(S) will make recommendations to the OSC for provision of necessary assets to support triage and treatment of survivors. Oxygen supplies are vital for decompression casualties and trauma casualties as well as recompression chamber operation. Oxygen re-supply may be required and should be planned for early in the response.

The SMO(S) will brief the OSC on the requirements to transfer ashore escapees, including medical support for them onboard and during the transfer.

Remember the potential need to transfer medical staff and equipment onto a MOSHIP or other vessels to support rescue or further escape.

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ANNEX 6.B. MEDICAL CHECK OFF LIST

6.B.1. CHECK OFF LIST: MEDICAL BRIEF FOR RECOVERY BOAT'S CREWS

1. Submarine escapees may be suffering from one or more types of injury. Basic life support is the same for all casualties:

a. Remember ABC:

A -	AIRWAY	Check the airway clear and support open.
B -	BREATHING	Check for breathing begin resuscitation if necessary.
C -	CIRCULATION	Check for pulse if absent, begin chest compressions

b. Once ABCs are complete, consider:

D -	DISABILITY	Determine the level of consciousness.
E -	EXPOSURE	Expose injuries - examine for fractures/bleeding etc.

2. The following types of problem may be seen:

	CONDITION	TREATMENT
A.	HYPOTHERMIA	Remove from cold, warm if possible, keep covered.
B.	HEAT EXHAUSTION	Remove from heat, cool if possible, give fluids
C.	PHYSICAL TRAUMA	First Aid, stop bleeding, support fractures, protect spine.
D.	SEASICKNESS	Reduce stimulus, rest, consider decompression sickness.
E.	CEREBRAL ARTERIAL GAS EMBOLISM (CAGE)	Coma position, Oxygen recompress
F.	DECOMPRESSION ILLNESS (DCI)	Oxygen, recompress

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ANNEX 6.C. TREATMENT AREAS, EQUIPMENT AND PERSONNEL

6.C.1. MEDICAL MANAGEMENT AREAS FOR ESCAPE

1. General

Triage should be conducted close to the point that the escapees are brought onboard the EGS. For rescue triage may be conducted either in the DRC or after coming out of the DCC.

2. Triage Area

The requirements for this area are:

a. Personnel: Triage Medical Officer (TMO), (who should ideally be a Diving Medical Officer), Medical assistant, writer, and messenger.

b. Material: Basic resuscitation and airway management equipment and supplies, including oxygen.

c. **Space for several stretchers**

The TMO reports to the SCC and is responsible for the rapid assessment of survivors and their placement into the relevant triage categories (see Section X).

3. Triage Medical Officer (TMO) action list

a. Prepare triage area, considering the following:

- Make accessible to oncoming survivors
- Weather protection
- Sufficient space to evaluate up to 5 casualties prior to being moved to the treatment or monitoring areas
- Basic resuscitation equipment (airways, O2)
- Casualty handling algorithm (ANNEX 6.F)
- Triage algorithm (ANNEX 6.E)
- Area Casualty Report Log (format at ANNEX 6.I).
- Triage cards
- Brief staff

b. Reception of survivors. Allocate each survivor a unique casualty identification number. Record this:

- in indelible ink on his forehead
- in clinical notes/casualty card to accompany casualty
- on a Triage Area Casualty Report Log (format at ANNEX 6.I)

c. Allocate a triage category. Record this:

- In clinical notes/casualty card to accompany casualty
- On the a Triage Area Casualty Report Log (format at ANNEX 6.I)

d. Direct stretcher bearers to transfer casualty to appropriate treatment area

e. Consider immediate use of high-flow oxygen for:
- All unconscious patients
- Any patients at risk of DCI

f. Ensure MAO is given regular updates of information from the Triage Area Casualty Report Log (format at ANNEX 6.I)

4. **Area 1 (T1). Immediate treatment area**

The requirements for this area are:

a. Personnel: One Medical Officer, preferably with casualty or surgical training, Ships First Aid Personnel, two medical assistants or ratings, writer, and messenger.
b. Equipment: resuscitation equipment and advanced life support equipment, including drugs, oxygen, chest drains, intravenous infusion sets and fluids, and basic dressings and emergency medications.
c. Characteristics: Area 1 will have adequate space for stretchers (estimate minimum of six), and will be in the immediate vicinity of the recompression chamber.

Area 1 should be sufficiently large to hold all the casualties who are undergoing immediate treatment and ideally be adjacent to, or within easy access of the Casualty Receiving Area and to the Recompression Chamber Area (on warships with a helicopter hangar, this space is usually ideal). A clear evacuation route between the triage and treatment area should be designated which avoids, as far as possible, ladders and other obstacles that will hinder the movement of stretcher-borne casualties.

5. **Recompression Chamber Area (RCA)**

a. The requirements for this area are:

- One Diving Medical Officer on each ship for every two to three chambers (a minimum of one Medical Officer for every 20-30 recompressed casualties), medical assistant, writer, and messenger.
- Sufficient Diving Technicians/Supervisors to operate the chamber(s) - 1-2 per chamber per shift.
- Sufficient diving medical assistants or divers with basic medical training to act as inside chamber assistants for each chamber - one per chamber.
- Standard recompression chamber medical supplies and medications.

b. The Medical Officer (MO) allocated to the Recompression Chamber Area reports to the SCC and is responsible for reception and treatment of casualties sent there. The following actions are to be undertaken by the RCA MO:

- Brief staff allocated to the Area.
- Ensure equipment listed is available and operational.
- Receive and treat of casualties sent to the treatment area by the TMO.
- Supervise the care of casualties in the RCA if delegated the authority to do so by the SCC
- Ensure accurate record keeping (use writer). A Recompression Area Casualty Report Log (Format as in ANNEX 6.I) is to be kept up to date and updated information is to be passed by telephone or messenger to the MAO as frequently as possible for inclusion on the Master Casualty State Board (format at ANNEX 6.H).

6. **Area 2 (T2)**

a. The requirements for this area are:

- One (or more) Medical Officer(s) and medical assistant(s) - one for each five stretchers, Ship's first aid personnel, writer, and messenger.
- Resuscitation equipment, oxygen for at least fifteen casualties for six hours, chest drains, intravenous infusion sets and fluids, standard dressings, medications, and first aid supplies.
- Space for a minimum of 10% of submarine crew.

b. Area 2 is for the treatment of less serious cases and should be physically close to Area 1. It is important to designate an access route these areas that is clear of obstructions.

c. The Medical Officer allocated to Area 2 reports to the SCC and is responsible for reception and treatment of casualties sent to the treatment area by the TMO. The action list below should be completed by the T2 Area MO:

- Brief staff allocated to the Secondary Treatment area
- Ensure equipment listed is available and operational.
- Receive and treat casualties sent to the treatment area by the TMO.
- Monitor casualties for change in triage status. Be especially vigilant for deterioration in the condition of casualties with Decompression Illness (DCI). Report changes in triage status to SCC via the MAO
- Ensure accurate record keeping (use designated non-medical personnel). An Area 2 Casualty Report Log (format as in ANNEX 6.I) is to be kept up to date and updated information is to be passed by telephone or messenger to the MAO as frequently as possible for inclusion on the Master Casualty State Board (format at ANNEX 6.H).

7. **Area 3 (T3)**

a. The requirements for this area are:

- Personnel: Medical Assistant (preferably with experience in diving medicine), ship's first aid personnel, writer, and messenger.
- Equipment: Basic resuscitation equipment including oxygen, first aid supplies, and medications.
- Size: this area should have adequate space for seated or supine casualties (estimate minimum of 20% of submarine crew).

b. Area 3 is where casualties who have undergone or who do not need primary or secondary treatment can rest, receive first aid treatment, receive prophylactic oxygen therapy (if sufficient supplies are available and allocated) and be monitored. This area should be separate but reasonably close to the triage and other treatment areas.

c. The Medical Branch Rating in charge of this area is responsible for the treatment and monitoring of all survivors placed in his care. Some of these survivors may have traditional injuries. Some may not but will be at risk of DCI either because of a decompression obligation from a pressurized DISSUB or because of the risk of DCI following an escape. There may also be rescuees who are uninjured and not at risk of DCI but who may be wet, cold and/or exhausted. These survivors can be grouped together in an "uninjured holding area".

d. The action list of the Medical Branch Rating in charge of this area includes:

- Brief staff allocated to the Area
- Ensure that they are fully conversant with the signs and symptoms of DCI.
- Ensure equipment listed is available.
- Receive and treat casualties sent to the treatment area by the TMO.
- Monitor casualties for change in triage status. Make patients aware of the need to translate any unusual symptom to medical staff. Be especially vigilant for the development of DCI in casualties at risk. Immediately report changes in triage status to SCC via the MAO.
- Supervise the movement of survivors. Do not allow survivors to leave the area without escort.
- Ensure accurate record keeping (use designated non-medical personnel). An Area 3 Casualty Report Log (format as in ANNEX 6.I) is to be kept up to date and updated information is to be passed by telephone or messenger to the MAO as frequently as possible for inclusion on the Master Casualty State Board (format at ANNEX 6.H).

8. **Area 4 (T4)**

a. The requirements for this area are:

- Personnel: Medical Assistant, first aid personnel and messenger
- Material: Body bags, and basic medical supplies for palliative care
- Size: Adequate space for stretcher cases

b. A compartment or space near, but screened or isolated from the Area 3, should be identified for the accommodation of T4 casualties.

c. The Medical Branch Rating in charge of the Area 4 (T4 Area Controller) is responsible for the palliative care and monitoring of casualties placed in his care.

d. T4 Area Controller action list:

- Brief staff allocated to the T4 area
- Ensure that they fully understand the role (and rationale) for use of the 'expectant' category (assisted by a senior MO)
- Ensure equipment listed is available.
- Receive and care for casualties sent to the area by the TMO.
- Monitor casualties for change in status. Report deaths and/or any other significant changes in casualty's condition to SCC via the MAO.

6.C.2. MEDICAL MANAGEMENT AREAS FOR RESCUE

Each national / multinational rescue system has its own manning and operating procedures. The information below is for guidance only and should be modified to fit with those standard operating procedures and the capabilities of the vessel to which the equipment has been deployed

1. **Deck reception chamber personnel**

There should be sufficient diving medical assistants, hyperbaric trained nurses or divers with basic medical training to act as inside chamber assistants for transferring casualties between the SRV and DRC. The number may vary with the composition of each SRV load.

Normally, at least one Diving Medical Officer should be able to be locked into the chamber at short notice to assist with casualty triage or treatment.

2. **Recompression chamber(s)**

The following are the typical composition and material to operate recompression chambers:

a. One Diving Medical Officer for every one or two chambers (a minimum of one Medical Officer for every 20-30 recompressed casualties) plus an MO available to be locked into the chamber if required. Medical assistant, writer and messenger.

b. Standard recompression chamber medical supplies and medications.

c. Sufficient Diving Technicians/Supervisors to operate the chambers in accordance with SOPs.

d. Sufficient diving medical assistants or divers with basic medical training to act as inside chamber assistants for each chamber – at least one per chamber.

3. **Triage area personnel and equipment**

a. Triage Medical Officer (preferably a Diving Medical Officer), medical assistant, writer, and messenger.

b. Basic resuscitation and airway management equipment and supplies, including oxygen.

c. Triage cards and recording forms.

d. Space to triage the maximum number of rescuees which can be held in each decompression chamber.

4. **Rescuee holding area medical personnel**

a. One or two Medical Officers or Senior Medical Assistants capable of providing care to recuees and observing for signs of DCI whilst transfer off the MOSHIP is arranged.

b. Personnel to escort the rescuees as necessary around the ship and stretcher bearers.

c. Writer and messenger.

5. **Medical headquarters personnel and equipment**

a. Medical Administration Officer.

b. Sufficient writers and messengers to cover all casualty management areas.

c. Necessary communications equipment as authorised by OSC.

ANNEX 6.D. DISSUB MEDICAL TRIAGE TEAM SELECTION, DEPLOYMENT AND EQUIPMENT

6.D.1. GENERAL

The DMTT Team may be deployed to assist survivors who require medical care due to injury, illness, and effects of atmospheric constituents or where multiple rescue systems are to be used and casualties need to be triaged to the appropriate system. The team may form part of a larger group including engineering support for the DISSUB.

6.D.2. MANPOWER

a. **Composition.** The following personnel comprise the DMTT:
- One Submarine or Diving Medical Officer, preferably with experience in emergency care.
- One Senior Medical Assistant, with submarine experience.

b. **Augmentees.** This minimum team may be supplemented by:
- MBRs / First Aid Personnel with submarine experience
- Interpreter (if necessary) fluent in language of submarine crew.

c. **Selection.** The team should be drawn from personnel who are experienced in working either with the class of DISSUB submarine or the rescue system. The DISSUB nation may be requested to provide the DMTT personnel if language challenges make this appropriate. The selected DMTT personnel must be able to communicate with the SRV personnel, an important consideration when multiple SRVs/SRCs are used.

6.D.3. DEPLOYMENT

The deployment and composition of a DMTT will be decided upon by the CRF advised by the SMO(S). The potential gains from their specialist knowledge and expertise must clearly justify the additional risk of placing personnel into a hazardous environment. Factors to be considered by the CRF and SMO(S) include:

- Submarine engineering stability
- Submarine atmosphere and toxic contaminants (including radiological)
- Submarine pressure and decompression risks to DMTT
- Types of casualties reported
- Available DISSUB medical support and equipment
- Available medical resupply to the DISSUB

Depending on the scenario the DMTT may deploy and remain on the DISSUB throughout the rescue or undertake a series or trips to make assessments and necessary treatments for the survivors. It is most likely that the DMTT will be committed for the full duration of the rescue unless the DISSUB pressure is below the requirement for decompression on the MOSHIP.

6.D.4. ROLE

The functions of the DMTT could include:

- Initial assessment of the DISSUB situation including a survey of the medical and life support situation.
- To provide accurate situation reports for the CRF, OSC and casualty reports to SMO(S).
- To transport necessary additional life support and medical supplies to the DISSUB.
- To triage casualties and assist in prioritisation of survivors for evacuation.
- To arrange movement of casualties to the escape trunk for collection by the SRV.
- To provide emergency stabilisation and treatment of the DISSUB medical casualties in order to allow them to be evacuated to the SRV.
- To provide an interpreter for non English speaking submarine crews to ensure effective communications to facilitate the rescue process.
- To provide medical recommendations to the Senior Survivor.
- To assist with / direct on-board decontamination where indicated.

6.D.5. EQUIPMENT AND SUPPLIES FOR DMTT

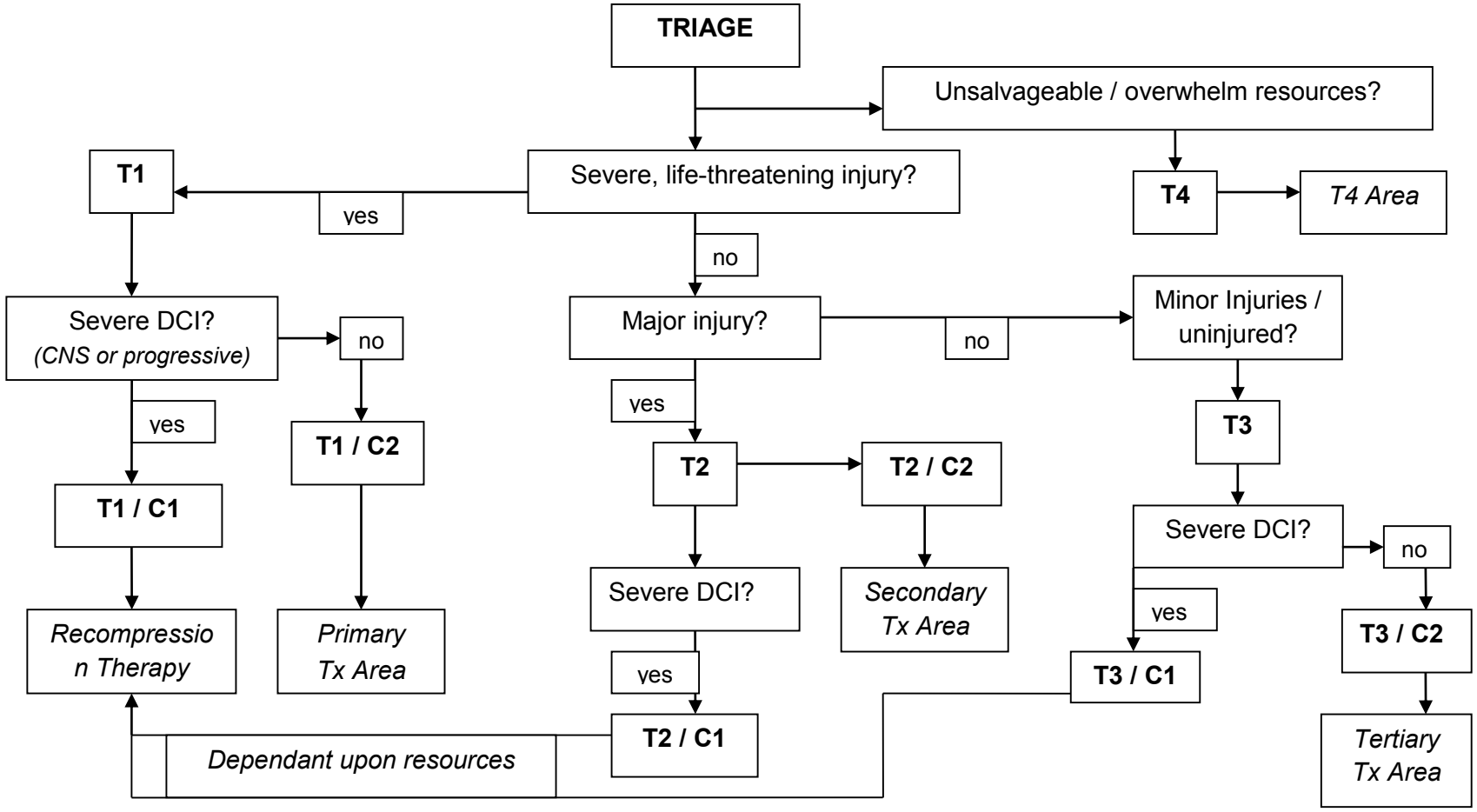
Medical emergency equipment and supplies, appropriate for the particular circumstances on the DISSUB, should be transferred on board in easily portable bags or vests. Recommended items include:

Stethoscope	Pen torch	Guedel airways	Drugs
BP cuff	Knife	Ambu bag	Opiates and naloxone
Battery powered pulse	Scissors	Portable oxygen	Salbutamol
Oximeter / monitor	Suture kit	Heimlich valve	Ketamine
Half-back stretcher and head protection for casualty	Surgical tape	Nasogastric tube	Glucose tablets/oral solution

Other equipment that may be required by the DMTT includes:

- Respiratory protection and atmospheric monitoring equipment, to include breathing sets if necessary.
- Lighting - headlamps for personal lighting, DC lamps and Cyalume light sticks for compartment illumination.
- Triage cards / Medical Cards / Record Forms for survivors.
- Radiation dosimetry and monitoring equipment as appropriate.
- Additional life support supplies for the DISSUB.
- Communications equipment permitting contact with SRV/SRC.

ANNEX 6.E. TRIAGE ALGORITHM FOR ESCAPE



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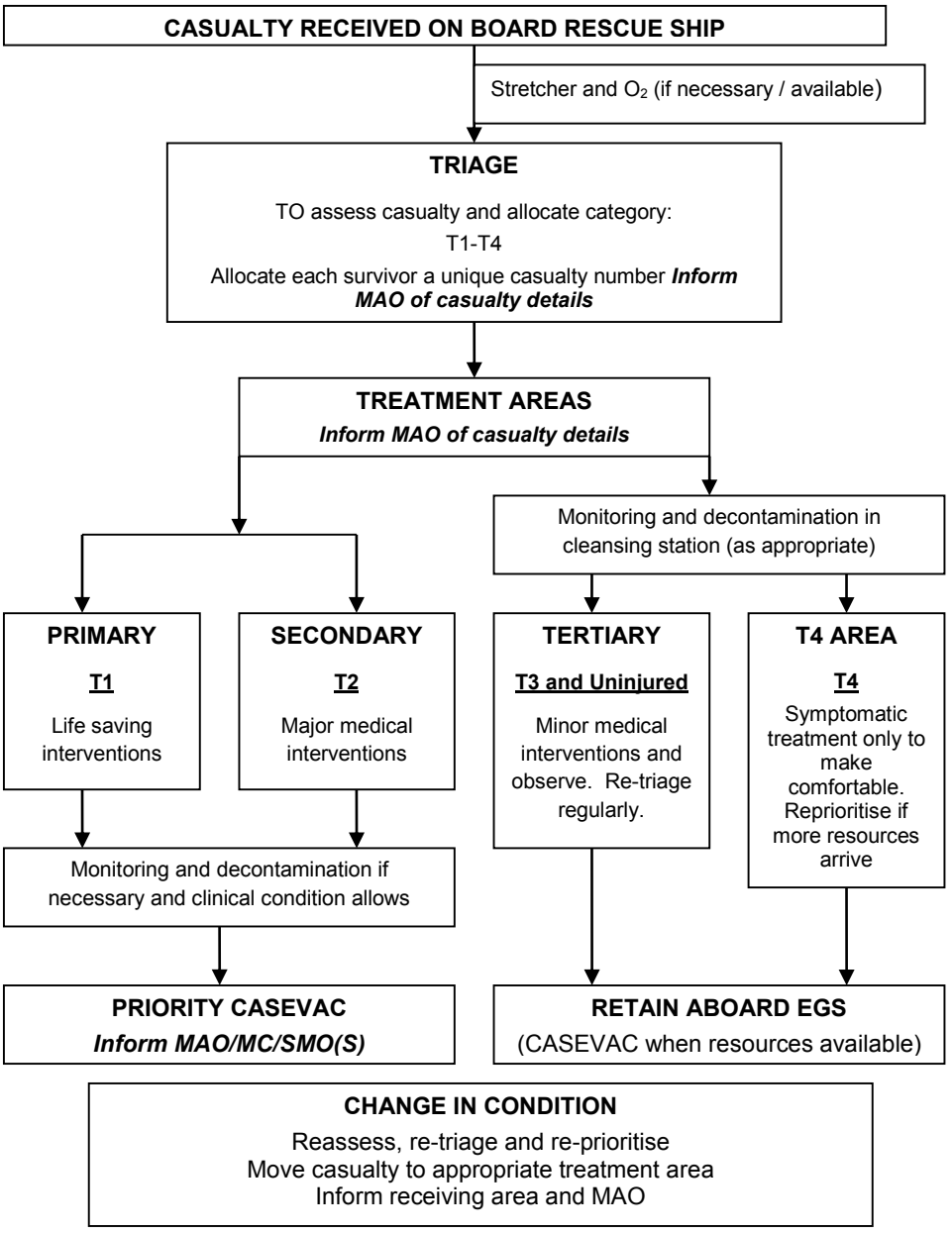
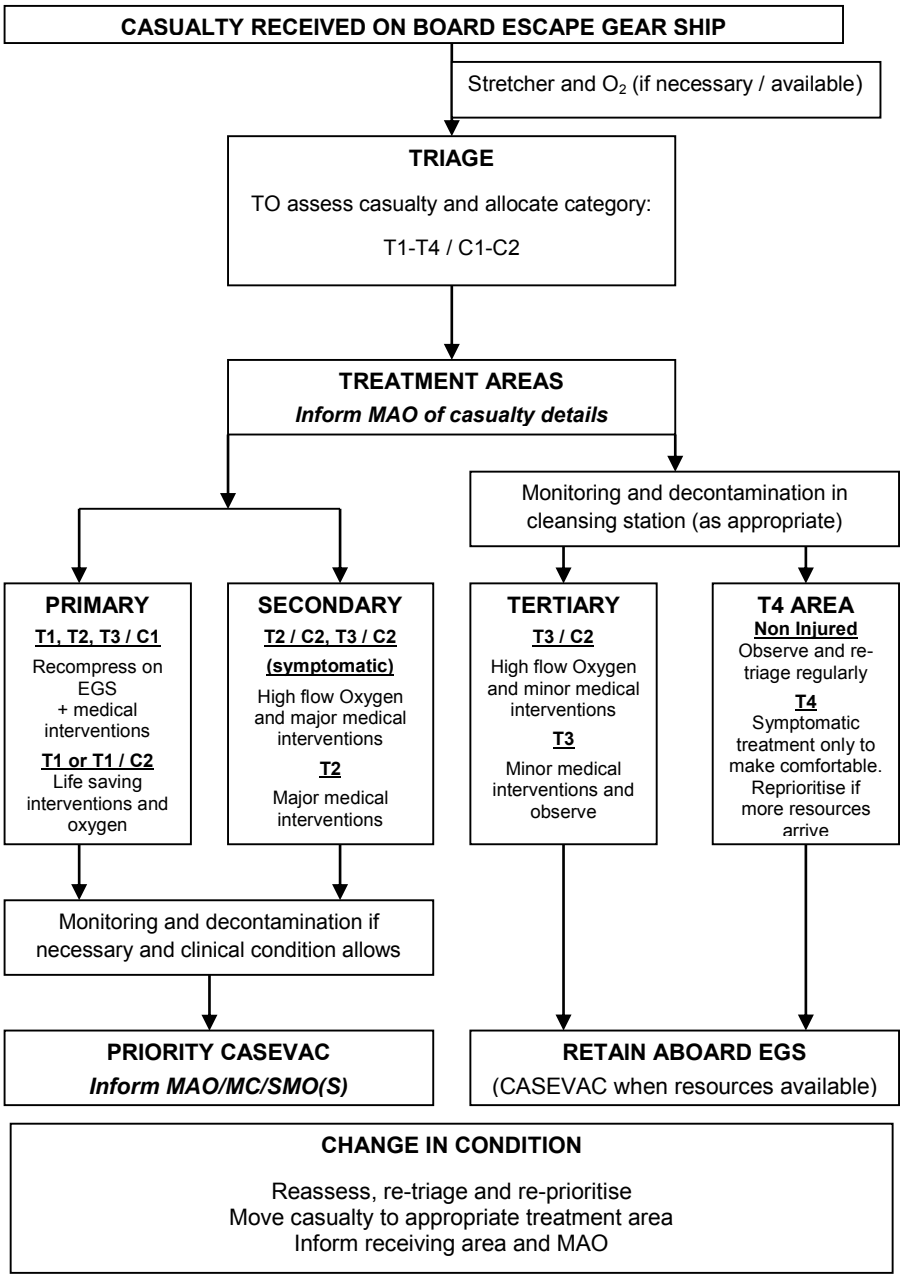
ANNEX 6.F. CASUALTY HANDLING ALGORITHMS

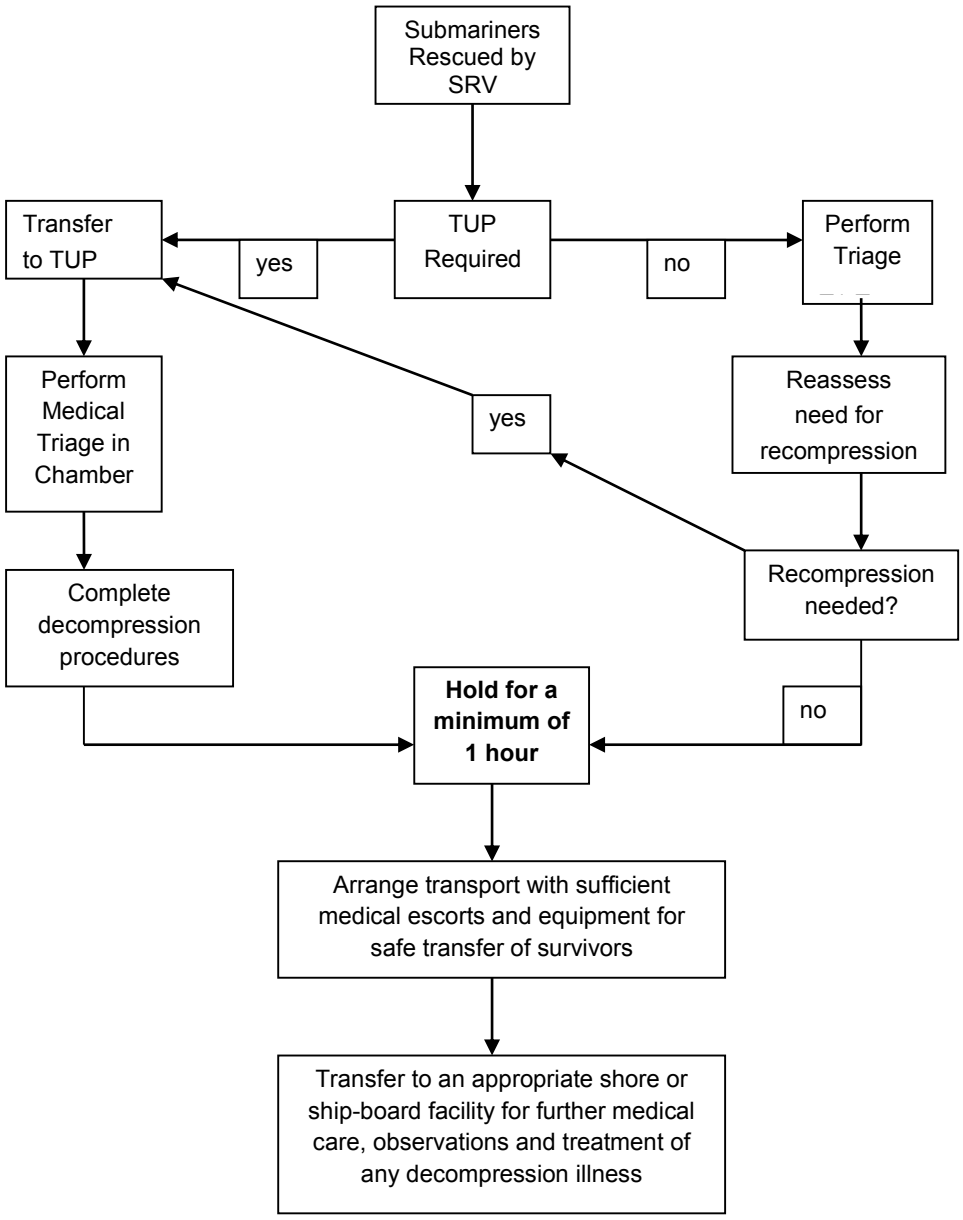
6.F.1. SURFACE ABANDONMENT



6.F.2. ESCAPE


CASUALTY RECEIVED ON BOARD ESCAPE GEAR SHIP
Stretcher and O_2 (if necessary / available)
TRIAGE
TO assess casualty and allocate category:
T1-T4 / C1-C2
TREATMENT AREAS
Inform MAO of casualty details
Monitoring and decontamination in cleansing station (as appropriate)
PRIMARY
T1, T2, T3 / C1
Recompress on EGS + medical interventions
T1 or T1 / C2
Life saving interventions and oxygen
SECONDARY
T2 / C2, T3 / C2
(symptomatic)
High flow Oxygen and major medical interventions
T2
Major medical interventions
TERTIARY
T3 / C2
High flow Oxygen and minor medical interventions
T3
Minor medical interventions and observe
T4 AREA
Non Injured
Observe and re-triage regularly
T4
Symptomatic treatment only to make comfortable. Reprioritise if more resources arrive
Monitoring and decontamination if necessary and clinical condition allows
PRIORITY CASEVAC
Inform MAO/MC/SMO(S)
RETAIN ABOARD EGS
(CASEVAC when resources available)
CHANGE IN CONDITION
Reassess, re-triage and re-prioritise
Move casualty to appropriate treatment area
Inform receiving area and MAO

6.F.3. CASUALTY HANDLING ALGORITHM FOR RESCUE



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ANNEX 6.G. SELECTION OF DECOMPRESSION TABLES

6.G.1. TABLES FOR ESCAPE

See §6.19.

6.G.2. TABLES FOR RESCUE

1. Each Rescue system is expected to have a selected a series of decompression tables available to use depending upon circumstances. Factors affecting the choice of tables include:

a. The number of casualties to be rescued

b. The number of available chamber places (including stretcher cases)

c. The cycle time for the rescue vehicle

d. Internal submarine pressure and equivalent air depth

e. Changes in submarine internal pressure (especially if rising)

f. Submarine stability and internal status (is there a chance of the SM becoming uninhabitable)

g. Submarine atmosphere constituents and potential effects on the lung

h. Volume of Oxygen available to the chambers

i. Availability of Oxygen rebreathers to deploy to the DISSUB

j. Availability of additional chambers to support the RGS and conduct therapeutic decompression post return to surface.

k. The safety of the rescue personnel manning the chambers / SRV and going through the decompression schedule with the rescuees.

2. There is a wide variety of tables available. None of these tables have been fully validated for use in bringing rescuees to the surface, and most have been derived from basic diving theory and therapeutic tables or are extensions of old air-saturation tables.

Research conducted into submarine escape indicates that decompression to the surface from saturation at up to 1.6 bar can be conducted safely with a minimum risk of DCI. Therefore transfer to DDC and subsequent decompression in the chambers is unnecessary for rescuees saturated at up to 1.6 bar. However, these personnel should be monitored closely for signs of developing DCI and chambers should be available to undertake therapeutic recompression should this occur. The RAN allows direct decompression to the surface from up to 1.75 bar with the understanding that there may be a significant risk of DCI. This limit may be of use in cases where a large number of submariners require to be evacuated rapidly from a DISSUB.

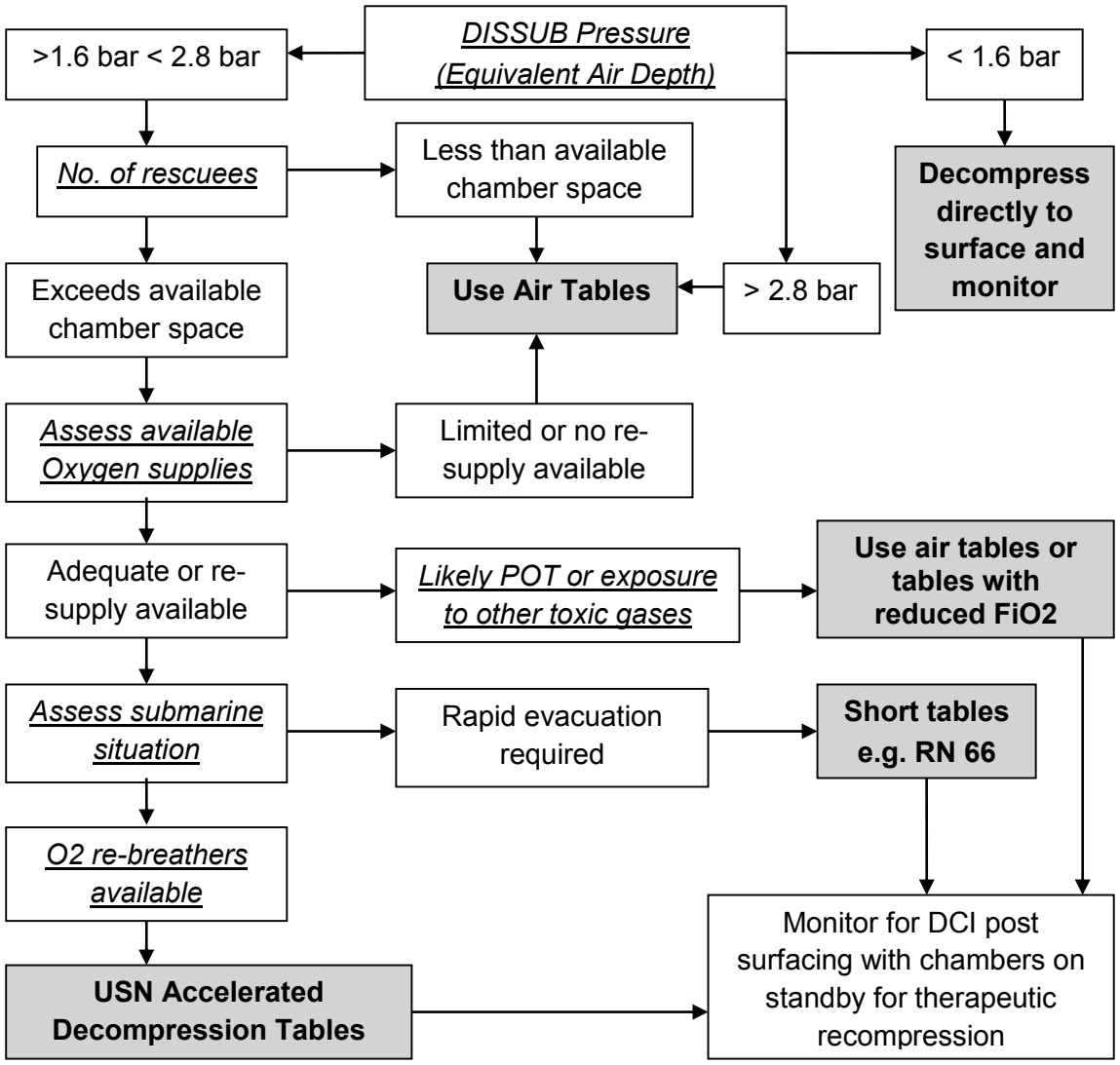
Where the DISSUB internal pressure is greater than 2.8 bar then rescuees can not be placed on 100% FiO2 due to the risks of cerebral pulmonary Oxygen toxicity. Therefore initial decompression must be commenced on Air, unless the chambers are fitted for mixed gas supply and a mixed gas table has been agreed for use with the rescue system.

The USN has developed a protocol for use of oxygen pre-breathing at saturation depth prior to rescue accelerate the decompression process. This protocol has been tested at equivalent air depths between 40 and 60 feet of seawater (approx. 13 to 18 msw). The protocol is laid out in the medical supplement to this document.

As part of the UK response to the sinking of the KURSK a modified RN table was produced to allow for decompression of personnel without access to TUP. This table, Table 66, is a 100 minute table based on holding rescuees at 14 msw (2.4ATA) for Oxygen breathing before a 10 min return to the surface. The table can be extended as the DISSUB pressure increases. The tables can be found in the medical supplement to this document.

In preparation for the introduction of the NATO Submarine Rescue System a review has been conducted of the available tables to allow decompression from saturation at 5 or 6 bar absolute. This has led to the development of a series of NSRS tables including long air tables based on the NOAA air saturation tables to allow decompression from high DISSUB pressures. The NSRS tables are laid out in the medical supplement.

3. Selection Algorithm:



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ANNEX 6.H. MASTER CASUALTY STATE BOARD

TIME : ……..

Survivor N.	Name and initials	Rank/ Rate	CAT T/C	DIAGNOSIS	CURRENT LOCATION						PLAN/DISPOSAL	REMARKS
					Area1	RCC	Area2	Area3	Area4	OTHER		

Table 6-4 Master Casualty state board

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ANNEX 6.I. AREA CASUALTY STATE BOARD

FROM (circle): Triage Area/ Area 1/ RCC/ Area2/ Area 3 and monitoring/ Area 4/ Other …..

Time: …….

Survivor N.	Name	Rank/ Rate	OFF N.	CAT T/C	DIAGNOSIS	PLAN/DISPOSAL	REMARKS

Table 6-5 Area Casualty state board

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ANNEX 6.J. SUBSUNK CASUALTY REPORTING (CASEREP)

6.J.1. SIGNAL FORMAT

Precedence	IMMEDIATE
Class	RESTRICTED - MEDICAL
SIC	PQV
From	UNIT IDENTIFIER. . . . .
To	OPCON AUTHORITY
	DESIGNATED SUBMARINE COMMAND AUTHORITY
	DESIGNATED MEDICAL AUTHORITY
INFO	FLEET OFFICE, SUBMARINES
	DESIGNATED MEDICAL RECEIVING CENTRE(S)
	DESIGNATED DECOMPRESSION TREATMENT CENTRE(S)
	(Depending on area of DISSUB)

CASREP

1. Following personnel recovered from DISSUB

A. Name/Inits/Rank/Service No/Triage category/Description of Injuries

B.

C.

D.

E.

2. More to follow

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ANNEX 6.K. SUBSUNK CASUALTY EVACUATION (CASEVAC)

Precedence	IMMEDIATE
Class	RESTRICTED - MEDICAL
SIC	PQV
From	UNIT IDENTIFIER. . . .
To	OPCON AUTHORITY
	DESIGNATED SUBMARINE COMMAND AUTHORITY
	DESIGNATED MEDICAL AUTHORITY
INFO	FLEET OFFICE, SUBMARINES
	DESIGNATED MEDICAL RECEIVING CENTRE(S)
	DESIGNATED DECOMPRESSION TREATMENT CENTRE(S)
	(Depending upon area of DISSUB)

CASEVAC

1. Following personnel CASEVACED to.....via .....

A. Name/Inits/Rank/Service No/Triage category /Description of Injuries

B.

C.

D.

E.

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ANNEX 6.L. SMERAT MEDICAL EMERGENCY CASE AND CONTENTS

1. **Local Emergency Orders**

2. **NATO Publications**

   a. ATP/MTP-57 Submarine Search and Rescue Manual

   b. AJP-4.10(B) Allied Joint Medical Support doctrine.

   c. ADIVP-2 Allied Guide to Diving Medical Disorders'

   d. AMedP-6 NATO Handbook on Medical Aspects of NBC Defensive Operations'

3. **National Publications (when applicable)**

   a. National Reference: Submarine Escape and Rescue Handbook

   b. National Reference for Air Purification in Submarines

   c. National Reference: Diving Manual

   d. National Reference for Radiological Controls in Nuclear

   e. National Submarine Guard Books (All Classes)

4. **Stationery Equipment**

a.	Reporters Notebooks	x 8
b.	Pens	x 24
c.	Indelible Marker Pens	x 12
d.	Pencils	x 24
e.	Paper Clips	x 1 box
f.	Stapler	x 1
g.	Staples	x 1 box
h.	Hole Punch (single)	x 1
i.	Casualty Log sheets	x 40 (of each)
j.	Case Contents List	x 1

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ANNEX 6.M. REFERENCE VALUES AND CONVERSION FACTORS

6.M.1. GENERAL

ATA stands for Atmosphere Absolute. At sea level the atmosphere exerts a pressure of 1 ATA. (Historically, ATA has been used within the NATO Submarine Escape and Rescue Working Group).

One ATA is approximately equivalent to:

1 Bar

100 kPa

10 msw

33 fsw

760 mmHg

760 Torr.

6.M.2. PRESSURE UNIT CONVERSION TABLE

Unit		ATA	Bar	KPa	mmHg	psi	msw	Fsw
Atmospheres Absolute	ATA	1	1.0132	101.32	760	14.696	10.079	33.066
Bar	Bar	0.9869	1	100	750.06	14.504	9.9472	32.633
Kilo-Pascal	KPa	9.8692 x 10 -3	1 x 10 –2	1	7.5006	0.14504	0.99472	3.2633
Millimetres of Mercury	mm Hg	1.3158 x 10 –3	1.3332 x 10 –3	0.13332	1	0.01934	0.01326	0.04351
Pounds per square inch	psi	0.06805	0.06895	6.8948	51.7149	1	0.6858	2.25
Meters of seawater	msw	9.9216 x 10 –2	0.10053	1.0053	75.404	1.4581	1	3.2807
Feet of seawater	fsw	3.0243 x 10 –2	3.0644 x 10 –2	0.30644	22.984	0.4444	0.3048	1

Table 6-6 Pressure unit conversion table

1. **Instructions for use.** Start at the left hand side of the table with the unit you wish to convert from and read along the row to the column headed by the unit you wish to convert to. Multiply the original value by the number at the intersection.

Example: to convert 1.8 atmospheres absolute (ATA) to metres of seawater (msw), read along the 'ATA' row to the 'msw' column to get the conversion factor of 10.079. Multiplying 1.8 by 10.079 gives 18.142 msw.

Note: Standard Temperature & Pressure (STP): 0°C and 760 Torr

2. **Normal constituent of air at 1 ATA**

Constituents	Volume %	Approx. p.p. at 1 ATA
Nitrogen	78	0.78
Oxygen	21	0.2
Carbon dioxide	0.03	0.0003

3. **Partial Pressure (p.p.)**: the pressure a gas would exert if it alone occupied the same volume as the whole gas mixture. The sum of the partial pressures of nitrogen, oxygen and carbon dioxide in air make up the total ambient pressure of the air.

4. **High concentrations** are normally expressed in volume percent (Vol.%) i.e. 1 part of a substance in 100 parts of air. Air consists of 21Vol.% oxygen. (i.e. 100 parts of air contain 21 parts of oxygen).

5. **In smaller concentrations** the engineering unit 'parts per million' is used (ppm). The concentration ppm means 1 part of a substance in 1 million parts of air. 1Vol.% = 10,000 ppm.

6. **DISSUB oxygen usage**: 27 litres /man / hour at STP

7. **DISSUB carbon dioxide production**: 23 litres / man / hour at STP

CHAPTER 7 - TRAINING AND EXERCISES TABLE ORDERS

Source/Reference: MXP-1

7.1. TRAINING

1. Training is a national responsibility which each country undertakes to train its own units with its own facilities to the limits of its own capabilities. Coordination between units and assets/Elements of different nationalities is facilitated if training is based on the doctrine and procedures promulgated within this document.

2. The state of training of submarines and Rescue/Intervention Elements taking part in SMER exercises is presumed to be such that SAR operations may be undertaken.

7.2. SCOPE OF THE EXERCISES

1. The standard exercises listed in ANNEX 7.A are provided to facilitate the training of different submarine classes, Rescue and Intervention Elements, both independently and in coordination, in the various aspects of SMER. Exercise standards progress from the elementary stage through the more advanced coordinated stage, and culminate in the standards required should a real life disaster occur.

2. The individual SMEREX provides a framework to progress fundamental training aims. It is the responsibility of the planner to ensure that this framework is broadened as required to encompass the particular training requirements of individual participants. This can be achieved by the use of the existing Table Orders, integrated with appropriate exercise instructions and/or special instructions.

3. Authorities and individual units should also, wherever possible, evaluate new procedures during SMER exercises. Where a new procedure appears to contravene the safety rules, guidance should be obtained from higher authority and in particular, the appropriate Submarine Operating Authority (SUBOPAUTH).

7.3. CONFERENCES/DISCUSSIONS/INSPECTIONS

Pre-sail conferences, in-port system surveys, inspections and familiarization procedures between the various participating units are beneficial in saving exercise time and avoiding mistakes. When these surveys and inspections cannot be conducted then detailed technical information, photographs and video should be exchanged well in advance to guarantee compatibility. Post-exercise discussions are most valuable if they take place immediately after an exercise. Many exercises can be analyzed on the spot, and the lessons identified from them can be passed on immediately to other units.

7.4. ANALYSIS

Exercise analysis may take longer if it requires the examination of records and reports, but it is important that the results be extracted and passed on as quickly as possible. Details of exercises are soon forgotten, and valuable training lessons can be lost when post-exercise analysis is conducted late and results are slow reaching exercise participants. The ISMERLO Lesson Learned database is the depository of lessons learned from all SMER exercises. It should be used to register and monitor analysis through the lessons learned and subsequent actions.

7.5. COMMAND AND CONTROL

1. Officer Scheduling the Exercise (OSE). The OSE originates the exercise and orders it to take place. He will issue basic instructions which will include the objectives of the exercise, the designation of the exercise areas, the allocation of forces and the necessary coordinating instructions. He will also designate the Officer Conducting the Exercise (OCE). He will ensure that the existence of submarine diving areas and Submarine Bottoming Areas inside the exercise area are highlighted in the EXPLAN or exercise instruction. The OSE specifies the process for the integration and control of submarine assets in the exercise. He will arrange the nomination of one or more SUBOPAUTH to assume operational control of all submarines participating in the exercise.

2. Officer Conducting the Exercise (OCE). The OCE is responsible to the OSE for the conduct of the exercise. He will issue such necessary supplementary instructions as:

a. detailed orders to all participating units;

b. safety precautions; and

c. conduct of the exercise as it develops.

3. Officer in Tactical Command (OTC). The OTC is the senior officer present eligible to assume command, or the officer to whom he has delegated tactical command.

4. Officer Conducting the Serial (OCS). The OCS is the officer designated to exercise tactical control over assigned forces for a specific exercise serial.

5. Submarine Operating Authority (SUBOPAUTH). The SUBOPAUTH is the Command exercising operational control over submarines, and is normally a submarine force commander. nder special circumstances tactical control may be delegated to another shore command or to a command afloat.

6. Tasks of the OSC, CRF and REC are contained in Chapter 3 -.

7.6. DEFINITIONS

The definitions contained in this section are considered particularly important. For the purpose of rescue exercises, as described in this Chapter, they may slightly differ from those contained in AXP-1/MXP-1 they are therefore intended to be used only during Rescue/Intervention exercises. Additional definitions relevant to the exercises are also contained in the Glossary:

a. **Go Time**. The start of a serial.

b. **Stop Time**. The end of a serial.

c. **Surfacing Procedure**. The method used by a submarine, ship or helicopter to bring a submarine from Bottom or Safe Depth to Periscope Depth (PD).

d. **Submarine Depth**.The depth of a submarine is measured from the surface to the keel depth.

e. **Safety Course**. A pre-arranged course included in the detailed orders for the exercise. It must be one of the cardinal points of the compass, and it is always signaled as "NORTH", "SOUTH", "EAST" or "WEST". It is the course to be steered when a submarine is coming to PD using surfacing procedures or in an emergency.

f. **Relaxation**. A modification of safety precautions and operating restrictions laid down in this publication in order to make the training more realistic (See paragraph 7.7).

g. **Starred Relaxation**. A relaxation which may be used subject to prior approval of the SUBOPAUTH.

h. **Time**. Zone time to be used throughout the exercises (GMT is to be used whenever possible to avoid confusion).

i. **Daylight**. Daylight is defined as extending from sunrise to sunset.

j. **Night**. Night is defined as extending from sunset to sunrise.

7.7. RELAXATION OF SAFETY RESTRICTIONS

To provide added realism in training or to enable the exercise to become progressively more realistic, certain safety relaxations may be used. Starred safety relaxation(s) may be used only with the prior approval of the SUBOPAUTH and are dependent on the state of training of the participating units, their equipment and capabilities. It is important when considering major or advanced exercises that the planners and the SUBOPAUTH/nations jointly review the relaxations to be used, since failure to allow the maximum relaxations consistent with submarine safety may impair unnecessarily the value of the exercise. When the SUBOPAUTH has the Operational Control of a submarine from another nation, approval of any starred relaxation(s) should only be given with the concurrence of the appropriate national authority. The Relaxation Table to be used for SMEREXs is as follows:

Number	Meaning
3B	Submarines may remain at Safe Depth until Stop Time
3*G	When Submarines are coming to periscope depth, Ships may proceed at less than 12 kts, but must cavitate
3*J	Surfacing Method Bravo is approved
7*D	All ships may slow below cavitation speed, operate radiated noise masking systems or stop their screws by day
7*E	All ships may slow below cavitation speed, operate radiated noise masking systems or stop their screws by night
12*F	Submarines may bottom
13*B	Submarines equipped with surface warning radar, which is working efficiently, may dive under all conditions of periscope visibility, day or night
21*F	Submarines may change depth through a depth zone allocated to another submarine
24*C (xxx)	Radius of special safety circle around bottomed submarine is (xxx) yards
26*A	Ships need not inform submarines of the presence of fishing vessels

Table 7-1 Relaxations

7.8. SAFETY PRECAUTIONS, OPERATING RESTRICTIONS AND CASUALTY PROCEDURES

The safety precautions, Operating restriction and casualty procedures are described in AXP-1/MXP-1 - Chapter 2. They are not duplicated here for reasons of space. However, it is not to be

forgotten that communication between all the participants is paramount and NO SMEREX shall be conducted without establishing a strong communication net between all units.

ANNEX 7.A. STANDARD EXERCISES AND METHOD OF ORDERING

7.A.1. SUMMARY OF STANDARD EXERCISES

1. Standard SMER Exercises (SMEREXs) are listed in this Annex and are grouped as follows:

a. E Series – Escape Exercises

b. I Series – Intervention Exercises

c. P Series - Pod Posting Exercises

d. R Series - Rescue Exercises

e. S Series – SPAG Exercices

f. V Series - Ventilation Exercices

2. Within the above series, the exercises have been grouped in an approximate degree of complexity and taking into account the Rescue/Intervention Element involved.

See table below.

SMEREX	PURPOSE	RECOMMENDED DURATION	REMARKS
E-1	Submarine Escape Exercise	2 hours	Basic exercise
I-1	Survey	4 hours	
I-2	Debris Clearance	4 hours	
P-1	(Mini) Pod Posting	4 hours	With ADS
P-2	(Mini) Pod Posting	4 hours	With ROV
P-3	(Mini) Pod Posting	4 hours	With Divers
R-1	Basic Rescue Exercise	8 hours	With a Rescue Vehicle
R-2	Basic Rescue Exercise	8 hours	With a Rescue Chamber
R-3	Co-ordinated Rescue Exercise	12 hours	With multiple Rescue Elements
S-1	Basic SPAG Insertion Exercise	8-12 Hours	With jumping
S-2	Basic SPAG Medical & C2 Exercise	8-12 Hours	Without jumping
S-3	Coordinated SPAG Exercise	8-12 Hours	With jumping
V-1	Basic Ventilation	6 hours	With ADS
V-2	Basic Ventilation	6 hours	With ROV
V-3	Basic Ventilation	6 hours	With Divers

Table 7-2 List of SMEREXs

3. When the term Unit is used it signifies a ship, either military or VOO.

4. When the term Aircraft is used it includes both fixed-wing aircraft and helicopters.

5. SMEREXs may be carried out by day or night unless otherwise specified.

7.A.2. METHOD OF ORDERING EXERCISES

This section contains information on the method of ordering the various SMEREXs listed in this Annex.

7.A.3. RELAXATIONS

The relaxations shown in Para 7.A.3 should be used to modify the Safety Precautions, Operating Restrictions and Procedures to make the training more realistic. The use of relaxations will depend on the equipment, capabilities and state of training of the participating Units. Those relaxations marked with an asterisk (*) may only be used subject to the prior approval of the SUBOPAUTH. These are referred to as 'starred' relaxations. Exercise planners must obtain this approval before including starred relaxations in Table Orders.

7.A.4. SPECIAL INSTRUCTIONS

1. When exercises require special instructions they should be included in paragraph 'U' (Special Instructions) of the Order Table.

2. These instructions should be written clearly and concisely and, if possible, should be discussed with all participants before the exercise.

7.A.5. ORDER TABLES

Individual SMEREXs list the procedure to be followed for starting, conducting and stopping the exercise. The Order Table should then be used by the authority ordering the exercise.

The authority ordering the exercise should always consider the whole Order Table when compiling his orders, but omitting those headings not applicable or required.

Although keeping the same structure, this Order Table differs slightly from that contained in AXP-1/MXP-1 and is to be used only for the conduct of SMEREXs.

Designator Meaning

A. SMEREX .. . . . . and/or purpose of the exercise and/or description of the exercise

B. Officer Scheduling the Exercise (OSE)

C. Officer Conducting the Exercise (OCE)

D. Officer Conducting the Serial (OCS)

E.1 On Scene Commander (OSC)

.2 Coordinator of Rescue Forces (CRF)

.3 Rescue Element Commander(s) (REC)

F. Rescue/Intervention Forces

.1 Mother Ship-VOO

.2 Name, hull number, of cooperating Units and their functions

.3 Participating Aircraft

G. Submarine(s) designated as DISSUB

H. Zone time to be used throughout the exercises. (GMT to be used whenever possible to avoid confusion)

J. Date and time the exercise is to start (Go Time)

JJ. Date and time the exercise is to stop (Stop Time)

KK. Out-of-action period

L. Assigned exercise area and Water Space Management

LL.1 Rendezvous

.2 Bottoming position of submarine(s)

M. Reference Positions

P. Safety Course. (Must be expressed as one of the four cardinal points of the compass, i.e. North, South, East or West)

Q. Relaxations (paragraph 7.7)

RR. Start position of Rescue/Intervention Forces.

SS. Start position of submarine(s)

T. Exercise Instructions (AXP-1/MXP-1 Table 3-3)

U. Special Instructions

V. Communications means available

.1 Radio (Voice frequency and callsigns)

.3 UWT (with frequency and callsigns)

X. Records:

.1 Authorities designated for analysis and reporting

.2 SMEREX Forms or FORMEX (specified by FORMEX number) required

Z Movements on completion

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Appendix 7.A.1.
SMEREX E-1 SUBMARINE ESCAPE EXERCISE

Purpose

1. To exercise submarine crews in different aspects of submarine escape.

2. To exercise recovery assets in procedures and rules to conduct escape from submarines.

Forces Required

1. One surface Rescue Support Vessel fitted with decompression chamber(s) and associated equipment and UWT.

2. One submarine, capable of bottoming or suspension at a known depth and fitted with an escape system.

3. One or more escapers.

4. The following is typical recovery team; however actual make up will be in accordance with national regulations:

   a. 1 x Submarine Officer, as Liaison Officer onboard the Rescue Support Vessel.

   b. 3 x Medical Officers, 1 each onboard the Rescue Support Vessel, assistance boat and the submarine.

   c. 6 x divers (2 onboard zodiacs - ready to dive, 2 onboard assistance boat, 2 submerged – close to the escape tower and connected by UWT to the assistance boat).

5. One helicopter ready to transfer injured personnel to the nearest capable hospital. (optional)

Situation

1. Rescue Support Vessel and submarine rendezvous in designated area. At Go-Time submarine will be on the surface or at periscope depth. Rescue Support Vessel will always be at a safe distance from the initial position to facilitate submarine and diver operations. If the Rescue Support Vessel wishes to anchor/moor for safety reasons this should typically be not less than 300 yards from the submarine bottoming position.

Procedure

1. Prior to Go-Time Submarine and Rescue Support Vessel will establish communications and will agree initial positions, ensuring not to interfere with submarine movements and maintaining UWT communications when possible. Submarine will be marked with a marker buoy to show her position at any time.

2. Once the submarine is in the initial position and the rescue personnel are ready, the submarine dives and establishes UWT communications with the Rescue Support Vessel and is cleared to bottom by the OCS. This is acknowledged by the submarine.

3. When safely bottomed or suspended/in a hovering condition, the submarine reports QQQ.

4. One diver team will be stationed on the surface at the marked position of the submarine. Inflatable boats will be in the vicinity, keeping clear of escapers during their buoyant ascent. The

OCS will report to the submarine “divers and boats ready” and clear the submarine to conduct the first escape.

Note: The first escape will normally be a rehearsal with a ‘dummy’ in order to verify the correctness of the whole procedure.

5. Each escape cycle is to be authorized by the OCS. Once the first escaper reaches the surface, a team will recover the escaper to the recovery boat for a first medical check-up and immediate transfer to the Rescue Support Vessel for a second, more thorough, medical check-up. When the escaper is safely aboard the Rescue Support Vessel and medically cleared, the OCS will establish UWT communications with the submarine to proceed with the next escape. This routine will be repeated until the last escaper arrives on the surface.

6. When the submarine has reported its last escaper clear, the exercise is complete. All personnel are to clear the area returning to the Rescue Support Vessel.

7. The OCS will call FINEX and pass a Surfacing Sitrep to the submarine.

8. Once cleared, the Submarine will return to PD/surface.

Safety

1. Personnel safety is paramount over any other exercise objectives.

Emergency procedures must be developed as part of the exercise planning to include all personnel escaping and all nations involved.

The following aspects should be considered:

- An emergency occurs whilst the escaper is in the escape trunk with the hatch shut;
- An emergency occurs whilst the escaper is in the escape trunk with the hatch open;
- An emergency occurs whilst the escaper is on the surface;
- An emergency occurs post recovery;
- The submarine experiences an emergency.

2. The Rescue Support Vessel has to be fitted with a decompression chamber and at least one hyperbaric medical specialist is to be embarked.

3. Three inflatable boats are to be permanently available in the water:

a. 1 x boat will carry a swimmer and medical personnel.

b. 1 x boat will carry the standby diving team, to assist the escapers.

c. 1 x boat will be in charge of the safety zone and act as replacement for the other 2 boats if required.

4. The Rescue Support Vessel will be fitted with a fixed UWT and a portable UWT as a backup. If the Rescue Support Vessel is not fitted with a fixed UWT, two portable UWTs must be available.

5. The submarine is not to unbottom, except in an emergency, without the permission of the OCS.

6. Submarine Emergency

a. In a case of emergency that requires the submarine to surface immediately, the submarine should contact OCS by UWT or may release a red candle/flare.

b. In addition to the above action the submarine crew will hammer on the hull ten times to alert the divers in the water.

c. On receipt of any of these signals, the inflatable boats will immediately recover the divers and clear the submarine's position.

Records

As specified at TABORD Paragraph X or as laid down in the exercise operation order

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Appendix 7.A.2.
SMEREX I-1: SUBMARINE SURVEY EXERCISE (ROV MODE)

Purpose

1. Train a Submarine and ROV team in a survey operation.

2. Train ROV teams in surveying rescue seats on different DISSUB classes.

4. Test and develop procedures for surveys with different DISSUB classes.

Forces Required

1. One DISSUB

2. One MOSHIP with ROV support system.

3. One ROV team.

Situation

1. DISSUB makes rendezvous (RV) with Surface Force. Any stores/personnel transfers can be conducted as required and DISSUB indication system (Buoy or acoustic transponder) can be connected to the submarine structure. OCS clears the DISSUB to dive and bottom.

2. Before bottoming, at PD, DISSUB carries out Comm-check with the MOSHIP via UWT

3. MOSHIP approaches and conducts survey operation in accordance with below procedure

4. On completion of the serial, OCS surfaces the DISSUB.

Procedures

1. All operation must be in accordance with approved procedures and all communication must be in accordance with Chapter 5 - scripts.

2. DISSUB must be kept informed at all times on the progress of the serial and about any changes to the disseminated serial programme.

3. The conduct of a survey exercise using ROV teams should forecast following steps:

   a. Make surface rendezvous with Surface Force and DISSUB in the designated operational area.

   b. OCS clears DISSUB to dive and bottom on surveyed bottoming area (LAT/LONG position to be provided in the Table Order).

   c. Establish UWT communications between MOSHIP and DISSUB prior she leaves Periscope Depth.

   d. DISSUB bottoms and signals OCS “waiting to rescue operation” Chapter 5 - scripts.

   e. MOSHIP positions herself above the DISSUB via a mooring field or via D.P. system.

   f. MOSHIP launches ROV to carry a DISSUB hull survey.

   g. Once ready, ROV proceeds to the submarine rescue seat. The ROV will start survey.

   h. MOSHIP follows the survey with DLT.

i. ROV films the rescue seat on the DISSUB.

j. Once DISSUB rescue seat is filmed, ROV transits to surface for recovery aboard the MOSHIP.

k. On completion of unmooring operation, OCS surfaces the DISSUB.

Special Provisions

Personnel safety must be a paramount during all the exercise. The OCS must ensure that all participating forces are acting iaw mutual agreed procedures al all times.

Records

In order to improve the knowledge all DISSUB data will be required to populate related database as specified at TABORD Paragraph X or as laid down in the exercise operation order.

Appendix 7.A.3.
SMEREX I-1A SUBMARINE SURVEY EXERCISE (ADS MODE)

Purpose

1. Train a Submarine and ADS team in a survey operation.

2. Train ADS teams in surveying rescue seats on different DISSUB classes.

4. Test and develop procedures for surveys with different DISSUB classes.

Forces Required

1. One DISSUB

2. One MOSHIP with ADS support system.

3. One ADS team.

Situation

1. DISSUB makes rendezvous (RV) with Surface Force. Any stores/personnel transfers can be conducted as requires and DISSUB indication system (Buoy or acoustic transponder) can be connected to the submarine structure. OCS clears the DISSUB to dive and bottom.

2. Before bottoming, at PD, DISSUB carries out Comm-check with the MOSHIP via UWT

3. MOSHIP approaches and conducts survey operation in accordance with below procedure

4. On completion of the serial, OCS surfaces the DISSUB.

Procedures

1. All operation must be in accordance with approved procedures and all communication must be in line with Chapter 5 - scripts.

2. DISSUB must be kept informed at all times on the progress of the serial and about any changes to the disseminated serial programme.

3. The conduct of a survey exercise using ADS teams should forecast following steps:

   a. Make surface RV with Surface Force and DISSUB in the designated operational area.

   b. OCS clears DISSUB to dive and bottom on surveyed bottoming area (LAT/LONG position to be provided in the Table Order).

   c. Establish UWT communications between MOSHIP and DISSUB prior she leaves Periscope Depth.

   d. DISSUB bottoms and signals OCS “waiting to rescue operation” iaw Chapter 5 - scripts.

   e. MOSHIP positions herself in vicinity of the DISSUB via a mooring field or via D.P. system.

   f. MOSHIP launches ADS to carry a DISSUB hull survey.

   g. Once ready, ADS proceeds to the submarine rescue seat. The ADS will start survey.

   h. MOSHIP follows the survey with DLT.

i. ADS films the rescue seat on the DISSUB.

j. Once DISSUB rescue seat is filmed, ADS transits to surface for recovery aboard the MOSHIP.

k. On completion of unmooring operation, OCS surfaces the DISSUB.

Special Provisions

Personnel safety must be a paramount during all the exercise. The OCS must ensure that all participating forces are acting iaw mutual agreed procedures al all times.

Records

In order to improve the knowledge all DISSUB data will be required to populate related database as specified at TABORD Paragraph X or as laid down in the exercise operation order.

Appendix 7.A.4.
SMEREX I-1B: SUBMARINE SURVEY EXERCISE (DIVER MODE)

Purpose

1. Train a Submarine and Diving team in a survey operation.

2. Train Diving teams in surveying rescue seats on different DISSUB classes.

4. Test and develop procedures for surveys with different DISSUB classes.

Forces Required

1. One DISSUB

2. One MOSHIP with Diver support system.

3. One Diving team.

Situation

1. DISSUB makes rendezvous (RV) with Surface Force. Any stores/personnel transfers can be conducted as requires and DISSUB indication system (Buoy or acoustic transponder) can be connected to the submarine structure. OCS clears the DISSUB to dive and bottom.

2. Before bottoming, at PD, DISSUB carries out Comm-check with the MOSHIP via UWT

3. MOSHIP approaches and conducts survey operation in accordance with below procedure

4. On completion of the serial, OCS surfaces the DISSUB.

Procedures

1. All operation must be in accordance with approved procedures and all communication must be in accordance with Chapter 5 - scripts.

2. DISSUB must be kept informed at all times on the progress of the serial and about any changes to the disseminated serial programme.

3. The conduct of a survey exercise using diving teams should forecast following steps:

   a. Make surface RV with Surface Force and DISSUB in the designated operational area.

   b. OCS clears DISSUB to dive and bottom on surveyed bottoming area (LAT/LONG position to be provided in the Table Order).

   c. Establish UWT communications between MOSHIP and DISSUB prior she leaves Periscope Depth.

   d. DISSUB bottoms and signals OCS “waiting for rescue operation” iaw Chapter 5 - scripts.

   e. MOSHIP positions herself in vicinity of the DISSUB via a mooring field or via D.P. system.

   f. MOSHIP launches Divers to carry a DISSUB hull survey.

   g. Once ready, Divers proceeds to the submarine rescue seat. The Divers will start survey.

   h. MOSHIP follows the survey with DLT.

i. Divers films the rescue seat on the DISSUB.

j. Once DISSUB rescue seat is filmed, Divers transits to surface for recovery aboard the MOSHIP.

k. On completion of unmooring operation, OCS surfaces the DISSUB.

Special Provisions

Personnel safety must be a paramount during all the exercise. The OCS must ensure that all participating forces are acting iaw mutual agreed procedures al all times.

Records

In order to improve the knowledge all DISSUB data will be required to populate related database as specified at TABORD Paragraph X or as laid down in the exercise operation order.

Appendix 7.A.5.
SMEREX I-2: SUBMARINE DEBRIS CLEARING EXERCISE (ROV MODE)

Purpose

1. Train a Submarine and ROV team in debris clearing operation.

2. Train Diving teams in clearing rescue seats on different DISSUB classes.

3. Test and develop procedures for debris clearing with different DISSUB classes.

Forces Required

1. One DISSUB

2. One MOSHIP with ROV support system.

3. One ROV team.

Situation

1. DISSUB makes rendezvous (RV) with Surface Force. Any stores/personnel transfers can be conducted as requires and DISSUB indication system (Buoy or acoustic transponder) can be connected to the submarine structure. OCS clears the DISSUB to dive and bottom.

2. Before bottoming, at PD, DISSUB carries out Comm-check with the MOSHIP via UWT

3. MOSHIP approaches and conducts debris clearing operation in accordance with below procedure

4. On completion of the serial, OCS surfaces the DISSUB.

Procedures

1. All operation must be in accordance with approved procedures and all communication must be in accordance with Chapter 5 -scripts.

2. DISSUB must be kept informed at all times on the progress of the serial and about any changes to the disseminated serial programme.

3. The conduct of a debris clearing exercise using ROV teams should forecast following steps:

   a. Make surface RV with Surface Force and DISSUB in the designated operational area.

   b. OCS clears DISSUB to dive and bottom on surveyed bottoming area (LAT/LONG position to be provided in the Table Order).

   c. Establish UWT communications between MOSHIP and DISSUB prior she leaves Periscope Depth.

   d. DISSUB bottoms and signals OCS “waiting for rescue operation” iaw Chapter 5 -scripts.

   e. MOSHIP positions herself vicinity of the DISSUB via a mooring field or via D.P. system.

   f. MOSHIP launches ROV to carry a DISSUB hull survey.

   g. Once ready, ROV proceeds to the submarine rescue seat. The ROV will start clearing debris with debris clearing equipment

h. MOSHIP follows the debris clearing with DLT.

i. ROV clears debris from the rescue seat on the DISSUB.

j. Once DISSUB rescue seat is clear ROV transits to surface for recovery aboard the MOSHIP.

k. On completion of unmooring operation, OCS surfaces the DISSUB.

Special Provisions

Personnel safety must be a paramount during all the exercise. The OCS must ensure that all participating forces are acting iaw mutual agreed procedures al all times.

Records

In order to improve the knowledge all DISSUB data will be required to populate related database as specified at TABORD Paragraph X or as laid down in the exercise operation order.

Appendix 7.A.6.
SMEREX I-2A: SUBMARINE DEBRIS CLEARING EXERCISE (ADS MODE)

Purpose

1. Train a Submarine, and ADS team in debris clearing operation.

2. Train ADS Intervention Systems in clearing rescue seats on different DISSUB classes.

3. Test and develop procedures for debris clearing with different DISSUB classes.

Forces Required

1. One DISSUB

2. One MOSHIP with ADS support system.

3. One ADS Intervention System.

Situation

1. DISSUB makes rendezvous (RV) with Surface Force. Any stores/personnel transfers can be conducted as requires and DISSUB indication system (Buoy or acoustic transponder) can be connected to the submarine structure. OCS clears the DISSUB to dive and bottom.

2. Before bottoming, at PD, DISSUB carries out Comm-check with the MOSHIP via UWT

3. MOSHIP approaches and conducts debris clearing operation in accordance with below procedure

4. On completion of the serial, OCS surfaces the DISSUB.

Procedures

1. All operation must be in accordance with approved procedures and all communication must be in accordance with Chapter 5 - scripts.

2. DISSUB must be kept informed at all times on the progress of the serial and about any changes to the disseminated serial programme.

3. The conduct of a debris clearing exercise using ADS Intervention System (IS) should forecast following steps:

a. Make surface RV with Surface Force and DISSUB in the designated operational area.

b. OCS clears DISSUB to dive and bottom on surveyed bottoming area (LAT/LONG position to be provided in the Table Order).

c. Establish UWT communications between MOSHIP and DISSUB prior she leaves Periscope Depth.

d. DISSUB bottoms and signals OCS “waiting for rescue operation” iaw Chapter 5 - scripts.

e. MOSHIP positions herself in vicinity of the DISSUB via a mooring field or via D.P. system.

f. MOSHIP launches ADS to carry a DISSUB hull survey.

g. Once ready, ADS connects a safety line to the DISSUB structure as near as to the submarine rescue seat. The safety line will be used to send the debris clearing equipment

h. MOSHIP sends the debris clearing equipment by safety line on the DISSUB deck.

i. ADS clears debris from the rescue seat on the DISSUB.

j. Once DISSUB rescue seat is clear ADS disconnects safety line before transits to surface for recovery aboard the MOSHIP.

k. On completion of unmooring operation, OCS surfaces the DISSUB.

Special Provisions

Personnel safety must be a paramount during all the exercise. The OCS must ensure that all participating forces are acting iaw mutual agreed procedures al all times.

Records

In order to improve the knowledge all DISSUB data will be required to populate related database as specified at TABORD Paragraph X or as laid down in the exercise operation order.

Appendix 7.A.7.
SMEREX I-2B: SUBMARINE DEBRIS CLEARING EXERCISE (DIVER MODE)

Purpose

1. Train a Submarine and Diver team in debris clearing operation.

2. Train Diving teams in clearing rescue seats on different DISSUB classes.

3. Test and develop procedures for debris clearing with different DISSUB classes.

Forces Required

1. One DISSUB

2. One MOSHIP with Diver support systems.

3. One Diving team.

Situation

1. DISSUB makes rendezvous (RV) with Surface Force. Any stores/personnel transfers can be conducted as requires and DISSUB indication system (Buoy or acoustic transponder) can be connected to the submarine structure. OCS clears the DISSUB to dive and bottom.

2. Before bottoming, at PD, DISSUB carries out Comm-check with the MOSHIP via UWT

3. MOSHIP approaches and conducts debris clearing operation in accordance with below procedure

4. On completion of the serial, OCS surfaces the DISSUB.

Procedures

1. All operation must be in accordance with approved procedures and all communication must be in line with Chapter 5 - scripts.

2. DISSUB must be kept informed at all times on the progress of the serial and about any changes to the disseminated serial programme.

3. The conduct of a debris clearing exercise using Diver teams should forecast following steps:

   a. Make surface RV with Surface Force and DISSUB in the designated operational area.

   b. OCS clears DISSUB to dive and bottom on surveyed bottoming area (LAT/LONG position to be provided in the Table Order).

   c. Establish UWT communications between MOSHIP and DISSUB prior she leaves Periscope Depth.

   d. DISSUB bottoms and signals OCS “waiting for rescue operation” iaw Chapter 5 - scripts.

   e. MOSHIP positions herself in vicinity of the DISSUB via a mooring field or via D.P. system.

   f. MOSHIP launches Divers to carry a DISSUB hull survey.

   g. Once ready, Divers connect a safety line to the DISSUB structure as near as to the submarine rescue seat. The safety line will be used to send the debris clearing equipment

h. MOSHIP sends the debris clearing equipment by safety line on the DISSUB deck.

i. Divers clears debris from the rescue seat on the DISSUB.

j. Once DISSUB rescue seat is clear Divers disconnect safety line before transits to surface for recovery aboard the MOSHIP.

k. On completion of unmooring operation, OCS surfaces the DISSUB.

Special Provisions

Personnel safety must be a paramount during all the exercise. The OCS must ensure that all participating forces are acting iaw mutual agreed procedures al all times.

Records

In order to improve the knowledge all DISSUB data will be required to populate related database as specified at TABORD Paragraph X or as laid down in the exercise operation order.

Appendix 7.A.8.
SMEREX P-1: (MINI) POD POSTING EXERCISE WITH ADS

Purpose

1. To exercise ADS divers in delivering and recovering of (mini) pod to a DISSUB.

Forces Required

1. One DISSUB

2. One DIVING VESSEL

Situation

One of either:

1.

- DISSUB makes rendezvous (RV) with Surface Forces. Any stores/personnel transfers can be conducted as required. OCS clears the DISSUB to dive and bottom.
- Once bottomed, DISSUB indicates position typically with a Smoke/Grenade, and awaits intervention operations
- Intervention forces approach and conduct minipod posting in accordance with scripts.

Or:

2.

- DISSUB bottomed in connection with other serials
- Intervention forces approach and conduct (mini) pod posting in accordance with scripts.

Procedure

1. All activity must be in accordance with approved procedures and all communications must be in accordance with the Chapter 5 - scripts.

2. Any step in the script given from the surface to the DISSUB must be given in good time

3. If possible, the mini-pod should be pushed out slightly from the signal ejector prior to the recovering of it.

Safety

POD buoyancy should be considered as required by the objectives of the exercise.

Records

As specified at TABORD Paragraph X or as laid down in the exercise operation order.

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Appendix 7.A.9.
SMEREX P-2: (MINI) POD POSTING EXERCISE WITH ROV

Purpose

1. To exercise ROV pilots in delivering and recovering of (mini) pod to a DISSUB.

Forces Required

1. One DISSUB

2. One MOSHIP

Situation

One of either:

1.

- DISSUB makes rendezvous (RV) with Surface Forces. Any stores/personnel transfers can be conducted as required. OCS clears the DISSUB to dive and bottom.
- Once bottomed, DISSUB indicates position typically with a Smoke/Grenade, and awaits intervention operations
- Intervention forces approach and conduct minipod posting in accordance with scripts.

Or:

2.

- DISSUB bottomed in connection with other serials
- Intervention forces approach and conduct (mini) pod posting in accordance with scripts.

Procedure

1. All activity must be in accordance with approved procedures and all communications must be in accordance with the ATP/MTP-57 scripts.

2. Any step in the script given from the surface to the DISSUB must be given in good time

3. If possible, the mini-pod should be pushed out slightly from the signal ejector prior to the recovering of it.

Safety

POD buoyancy should be considered as required by the objectives of the exercise.

Records

As specified at TABORD Paragraph X or as laid down in the exercise operation order

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Appendix 7.A.10.
SMEREX P-3: (MINI) POD POSTING EXERCISE WITH DIVERS

Purpose

1. To exercise divers in delivering and recovering of (mini) pod to a DISSUB.

Forces Required

1. One DISSUB

2. One DIVING VESSEL

Situation

One of either:

1.

- DISSUB makes RV with Surface Forces. Any stores/personnel transfers can be conducted as required. OCS clears the DISSUB to dive and bottom.
- Once bottomed, DISSUB indicates position typically with a Smoke/Grenade, and awaits intervention operations
- Intervention forces approach and conduct minipod posting in accordance with scripts.

Or:

2.

- DISSUB bottomed in connection with other serials
- Intervention forces approach and conduct (mini) pod posting in accordance with scripts.

Procedure

1. All activity must be in accordance with approved procedures, and all communications must be in accordance with the ATP/MTP-57 scripts

2. Any step in the script given from the surface to the DISSUB must be given in good time

3. If possible, the mini-pod should be pushed out slightly from the signal ejector prior to the recovering of it.

Safety

POD buoyancy should be considered as required by the objectives of the exercise.

Records

As specified at TABORD Paragraph X or as laid down in the exercise operation order

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Appendix 7.A.11.
SMEREX R-1: BASIC SUBMARINE RESCUE EXERCISE WITH RESCUE VEHICLE

Purpose

1. Basic training for submarines, MOSHIP and SRV crews in rescue operations.

2. Test and develop Rescue procedures

3. Check compatibility using a SRV with different submarine classes

4. Rescue crew members from a simulated DISSUB

5. Carry out basic medical training scenarios

6. Carry out basic C2 and Medical training, rescue movement between DISSUB, MOSHIP and shore authorities by SMERAT/CRF.

Forces Required

1. One DISSUB.

2. One SRV.

3. One MOSHIP.

4. Designated SMERAT

Situation

1. DISSUB is on surface or dived at periscope depth. MOSHIP is in the vicinity of the rendezvous point.

2. Hatch fairings should remain unless an exercise artificiality is identified to remove it/them.

3. All activity must be in accordance with below described procedures and all communications must be in accordance with Chapter 5 scripts

4. Activity plan for serial should be included at Para Uniform of OPORD.

5. DISSUB must be kept informed at all times, particularly when there are changes to the disseminated serial programme.

6. All necessary testing and maintenance of the mating seat of the submarine must be done prior to the exercise.

7. Medical serials should be developed by the medical team including detailed understanding of capabilities to be evaluated in the various rescue vehicles.

Procedures

1. DISSUB makes rendezvous with Surface Forces in the designated operational area. Any stores/personnel transfers as well as equipment (i.e. beacon) install can be conducted as required.

2. OCS clears DISSUB to dive and bottom on surveyed bottoming area (LAT/LONG position to be provided in the Table Order).

3. DISSUB bottoms, gains negative buoyancy and indicates position.

4. When ready to start the exercise, DISSUB indicates so by signalling QUEBEC-QUEBEC-QUEBEC to the MOSHIP and awaits rescue operations

5. MOSHIP establishes comms with DISSUB and launches the SRV to conduct rescue operations.

6. SRV approaches the DISSUB

7. DISSUB informs SRV of the internal absolute pressure (in bar))

8. SRV lands on the rescue seat and starts the hard seal procedure (mating and de-watering)

9. Once the skirt is dewatered and pressure equalized, personnel transfer starts.

10. On completion SRV breaks hard seal, lifts off and moves clear

11. SRV reaches the surface and is recovered by MOSHIP

12. When rescue activity is completed, OCS may surface the DISSUB

Special Provisions

1. Submarine, SRV, MOSHIP and personnel safety must be of highest importance during this basic training serial.

2. If more than one cycle is scheduled, SRV will notify the DISSUB of the start of the new cycle with code QUEBEC-QUEBEC-QUEBEC.

3. Simple, non-interfering, Intervention Operations may be included. In this case detailed instructions should be given at TABORD paragraph U of TABORD.

4. The Transfer Under Pressure (TUP) concept can be exercised within the R series of exercises. If so appropriate instructions should be given at TABORD paragraph U.

Records

As specified at TABORD Paragraph X or as laid down in the exercise operation order.

Appendix 7.A.12.
SMEREX R-2: BASIC SUBMARINE RESCUE EXERCISE (SRC MODE)

Purpose

1. Train Submarine, MOSHIP and SRC crews in basic rescue operations using a Submarine Rescue Chamber (SRC).

2. Train Intervention Systems (ADS, ROV or DIVERS) in connecting/disconnecting the SRC downhaul cable onto DISSUB escape hatch.

3. Rescue crew members from a simulated DISSUB.

4. Test and develop Rescue procedures

5. Check compatibility using a SRC with different submarine classes.

6. Carry out basic medical training scenarios

7. Carry out basic C2 and Medical training, rescue movement between DISSUB, MOSHIP and shore authorities by SMERAT/CRF.

Forces Required

1. One DISSUB

2. One MOSHIP

3. One or more intervention system when required (ROV, ADS or DIVERS)

4. One SRC

5. Designated SMERAT

Situation

1. DISSUB is on surface or dived at periscope depth. MOSHIP is in the vicinity of the rendezvous point

2. All activity must be in accordance with below described procedures, and all communications must be in accordance with Chapter 5 scripts

3. Activity plan for serial should be included at Para Uniform of TABORD.

4. DISSUB must be kept informed at all times, particularly when there are changes to the disseminated serial programme

5. All necessary testing and maintenance of the mating seat of the submarine must be done prior to the exercise.

6. Medical serials should be developed by the medical team including detailed understanding of capabilities to be evaluated in the various rescue vehicles.

Procedures

1. DISSUB makes rendezvous with Surface Forces in the designated operational area. Any stores/personnel transfers as well as equipment (i.e. beacon) install can be conducted as required.

2. OCS clears DISSUB to dive and bottom on surveyed bottoming area (LAT/LONG position to be provided in the Table Order).

3. DISSUB bottoms, gains negative buoyancy and indicates position.

4. When ready to start the exercise, DISSUB indicates so by signalling QUEBEC-QUEBEC-QUEBEC to the MOSHIP.

5 MOSHIP positions herself in the vicinity of the DISSUB.

6. Designated Intervention System connects the downhaul cable to the DISSUB if required.

7. MOSHIP launches the SRC which dives to the DISSUB.

8. SRC lands on the rescue seat and carries out a hard seal procedure (mating and skirt dewatering).

9. Once the skirt is dewatered hatches are opened and personnel transfer starts.

10. SRC breaks hard seal and transits to surface for recovery aboard the MOSHIP.

11. SRC reaches the surface and is recovered by MOSHIP.

12. Intervention system disconnects the downhaul cable from the DISSUB.

13. MOSHIP clears DISSUB position. Once clear, OCS may surface the DISSUB.

Special Provisions

1. Submarine, SRC, MOSHIP and personnel safety must be of highest importance during this basic training serial.

2. If more than one cycle is scheduled, OCS will notify the DISSUB the start of the new cycle with code QUEBEC-QUEBEC-QUEBEC

Records

As specified at TABORD Paragraph X or as laid down in the exercise operation order.

Appendix 7.A.13.
SMEREX R-3: CO-ORDINATED SUBMARINE RESCUE EXERCISE

Purpose

1. Advanced training for submarines, MOSHIPs and SRVs/SRCs crews in co-ordinated rescue operations.

2. Co-ordinated submarine bottoming.

3. Rescue crew members from an Exercise DISSUB using multiple Rescue Elements

4. Test and develop Rescue procedures, including provision of mutual support.

5. To train command personnel in complex C2 scenarios and surface and sub-surface PMI

6. Carry out advanced medical evaluation and training scenarios

7. Carry out advanced C2 and Medical training, personnel movement and tracking from DISSUB to MOSHIP and shore authorities testing and utilizing SMERAT/CRF/OSC roles.

Forces Required

1. At least one DISSUB.

2. At least one SRV/SRC and associated MOSHIP/s

3. One or more CRFs

4. One or more RECs

5. SMERAT Team

Note: Intervention Systems may be combined in these serials.

Situation

1. DISSUB is on surface or dived at periscope depth. MOSHIP is in the vicinity of the rendezvous point.

2. RECs and MOSHIPs are positioned in own standby areas as established at paragraph RR of TABORD. MOSHIPs have to be geographically separated as specified at paragraph T of TABORD. As an example:

   a. NORTH and SOUTH of paragraph LL.2 (Bottoming position of TABORD) if two MOSHIPS involved;

   b. Sector 1 (000-090) – Sector 2 (090-180), Sector 3 (180-270), Sector 4 (270-000) if more than 2 MOSHIPS are involved, centred on LL.2.

3. All activity must be in accordance with below described procedures, and all communications must be in accordance with Chapter 5 scripts

4. Activity plan for serial should be included at Para Uniform of TABORD.

5. DISSUB(s) must be kept informed at all times, particularly when there are changes to the disseminated serial programme.

Note: No more than one SRV/Intervention system is allowed free in the water column at any time unless starred relaxation 21*F is in force.

6. All necessary testing and maintenance of the mating seat of the submarine must be done prior to the exercise.

7. Medical serials should be developed by the medical team including detailed understanding of capabilities to be evaluated in the various rescue vehicles.

Procedures

1. DISSUB(s) rendezvous with Surface Forces in the designated operational area iaw TABORD instructions. Any stores/personnel transfers as well as equipment (i.e. beacon) install can be conducted as required.

2. OCS clears DISSUB(s) to dive and bottom in surveyed bottoming area (LAT/LONG position to be provided in the Table Order) for each submarine with relaxations 21*F and 24*C (xxx) in force

3. DISSUB(s) bottom, gain negative buoyancy, indicate position typically with a Smoke/Grenade and awaits rescue operations.

4. OCS will have to update LL.2 based on the effective DISSUB bottoming position(s). OCS will start the serial once RECs have acknowledged the updated LL.2s.

5. When ready to start the exercise, DISSUB indicates so by signalling QUEBEC-QUEBEC-QUEBEC to the MOSHIP

6. First designated MOSHIP positions herself in the vicinity of the DISSUB via a mooring field or via D.P. system. Other MOSHIPS standby in the waiting area within assigned sectors

7. MOSHIP launches the SRV/SRC. Depending on the Element, procedures as per SMEREX R-1 or R-2 apply.

8. On completion MOSHIP clears LL.2 and sits, in standby, in own assigned waiting sector.

9. OCS clears second designated MOSHIP to approach LL.2 and start operation as per paragraph 5 and 6.

10. On completion MOSHIP clears LL.2 and OCS surfaces the DISSUB(s).

11. The designation of the MOSHIP order of intervention will be evaluated by the OCS and based on the capability of MOSHIPS (DP capable, mooring requirements, weather forecast, length of the exercise, timeframe (day light/night), etc.

12. The exercise ends at Stop Time or when the exercise objectives have been achieved.

Special Provisions

If there is any doubt as to ongoing safety management, all activity is to cease until the CRF authorises resumption.

Records

As specified at TABORD Paragraph X or as laid down in the exercise operation order.

Appendix 7.A.14.
SMEREX S-1
BASIC SUBMARINE PARACHUTE ASSISTANCE GROUP (SPAG) INSERTION EXERCISE

Purpose

1. Basic training for the Submarine Parachute Assistance Group.

2. Conduct loading drills of equipment.

3. Carry out Submarine rendezvous training for flight crew.

4. Undertake insertion of full SPAG team plus boats and life rafts.

5. Carry out C2 and Medical training, involving SPAG, DISSUB and shore authorities/SMERAT/OSC.

Forces required

1. One aircraft/helicopter suitably rigged or configured for dispatch of boats and personnel.

2. Drop zone safety officer

3. Simulated DISSUB.

4. Shore authorities/SMERAT as required.

Situation

1. Establish rendezvous at simulated DISSUB site.

2. Air Dispatch Boats and personnel onto drop zone, (DZ).

3. Rig boats and UWT.

4. Establish UWT communications between surface unit(s) and simulated DISSUB in accordance with scripts.

5. Air dispatch necessary number of multi-man life rafts onto DZ, and construct “life raft village”.

6. Air dispatch a further team of 6 parachutists to act as medical team.

7. Carry out rescue and triage of simulated DISSUB personnel.

8. SPAG C2 to keep shore authorities/SMERAT informed and seek further advice, in accordance with script.

Procedures

1. All activity must be in accordance with approved procedures, and all communications must be in accordance with the ATP/MTP-57 scripts

2. Activity plan for serial should be included at Para Uniform of TABORD.

3. Water Safety Vessel(s) must be kept informed at all times, particularly when there are changes to the disseminated serial programme.

Safety considerations

1. Water Safety Vessel (WSV), required for entire serial and will also recover boats and life rafts from DZ.

Note: This can also act as simulated DISSUB.

2. Drop Zone Safety Officer (DZSO), and Water Safety Officer (WSO), to be embarked on WSV for entire serial.

3. Minimum 3 Rigid Inflatable Boats (RIB), to act as catcher craft for the parachute descents.

4. Clear range of 1km radius is required around the Impact Point (IP), during parachute serial.

Special provisions

Personnel safety must be of highest importance during this basic training serial.

Records

As specified at TABORD Paragraph X or as laid down in the exercise operation order.

Appendix 7.A.15.
SMEREX S-2: BASIC SUBMARINE PARACHUTE ASSISTANCE GROUP (SPAG), MEDICAL & C2 EXERCISE

Purpose

1. Basic training for the Submarine Parachute Assistance Group and supporting forces in rescue operations.

2. Undertake simulated insertion of full SPAG team plus boats and life rafts.

3. Exercise C2 aspects incorporating SPAG, DISSUB, SMERAT and shore authorities.

4. Co-ordinate and conduct simulated escape from DISSUB.

5. Carry out triage and pre hospital treatment of escapers.

6. Co-ordinate and conduct medical evacuation to EGS.

Forces required

1. Simulated DISSUB.

2. Shore authorities/SMERAT as required.

3. Simulated Escape Gear Ship (EGS).

Situation

1. Establish rendezvous at simulated DISSUB site.

2. Rig boats and UWT.

3. Establish UWT communications between surface and simulated DISSUB in accordance with scripts.

4. Dispatch necessary number of multi-man life rafts onto DISSUB site, and construct “life raft village”.

5. Dispatch a medical team onto scene, recovering to life raft village.

6. SPAG C2 to keep shore authorities/SMERAT informed and seek further advice, in accordance with script.

7. Recover escapers from DISSUB as required and transfer to “life raft village.”

8. Carry out rescue and triage of simulated DISSUB personnel using advice from SMERAT medical team as appropriate.

9. Conduct evacuation of casualties to simulated EGS.

Procedures

1. All activity must be in accordance with approved procedures, and all communications must be in accordance with the ATP/MTP-57 scripts

2. Activity plan for serial should be included at Para Uniform of TABORD.

3. Water Safety Vessel must be kept informed at all times, particularly when there are changes to the disseminated serial programme.

Safety considerations

Water Safety Vessel (WSV), required for entire serial.

Note: This can also act as simulated DISSUB/EGS.

Special provisions

Personnel safety must be of highest importance during this basic training serial.

Records

As specified at TABORD Paragraph X or as laid down in the exercise operation order.

Appendix 7.A.16.
SMEREX S-3: CO - ORDINATED SUBMARINE PARACHUTE ASSISTANCE GROUP (SPAG) EXERCISE

Purpose

1. Advanced training for the Submarine Parachute Assistance Group and supporting forces in rescue operations.

2. Conduct callout and transfer of SPAG and equipment.

3. Conduct callout of personnel and stores from other authorities.

4. Carry out Submarine rendezvous training for flight crew.

5. Undertake insertion of full SPAG team plus boats and life rafts.

6. Exercise C2 aspects incorporating SPAG, DISSUB, SMERAT and shore authorities.

7. Co-ordinate and conduct simulated escape from DISSUB.

8. Carry out triage and pre hospital treatment of escapers.

9. Co-ordinate and conduct medical evacuation to EGS.

Forces required

1. One aircraft/helicopter suitably rigged or configured for dispatch of boats and personnel.

2. Drop zone safety officer

3. Simulated DISSUB.

4. Shore authorities/SMERAT as required.

5. SPAG and supporting authorities initial movements

6. Escape Gear Ship.

7. Shore authorities/SMERAT as required.

Situation

1. SPAG is mobilised by SMER/FIRC.

2. Supporting forces are activated by SPAG.

3. SPAG and equipment are transferred to airhead.

4. Aircraft loaded.

5. Establish rendezvous at DISSUB site.

6. Air Dispatch boats and 4 boat following parachutists onto drop zone, (DZ).

7. Rig boats and UWT.

8. Establish UWT communications between surface and simulated DISSUB in accordance with scripts.

9. Air dispatch necessary number of multi-man life rafts onto DZ, and construct “life raft village”.

10. Air dispatch a further team of 6 parachutists to act as medical team.

11. SPAG C2 to keep shore authorities/SMERAT informed and seek further advice, in accordance with script.

12. Recover escapers from DISSUB as required and transfer to “life raft village.”

13. Carry out rescue and triage of simulated DISSUB personnel using advice from SMERAT medical team as appropriate.

14. Conduct evacuation of casualties to simulated EGS.

Procedures

1. All activity must be in accordance with approved procedures, and all communications must be in accordance with the ATP/MTP-57 scripts.

2. Activity plan for serial should be included at Para Uniform of TABORD.

3. Water Safety Vessel must be kept informed at all times, particularly when there are changes to the disseminated serial programme.

Safety considerations

1 .Water Safety Vessel (WSV), required for entire serial.

Note: This can also act as simulated DISSUB.

2. Drop Zone Safety Officer,(DZSO), and Water Safety Officer,(WSO), to be embarked on WSV for entire serial.

3. Minimum 3 Rigid Inflatable Boats (RIB), to act as catcher craft for the parachute descents.

4. Clear range of 1km radius is required around the Impact Point (IP), during parachute serial.

Special provisions

Personnel safety must be of highest importance during this basic training serial.

Records

As specified at TABORD Paragraph X or as laid down in the exercise operation order.

Appendix 7.A.17.
SMEREX V-1: SUBMARINE VENTILATION EXERCISE (ADS MODE)

Purpose

1. Train a Submarine, MOSHIP and ADS team in ventilation operation.

2. Train ADS Intervention Systems in connecting/disconnecting ventilation connectors on different DISSUB classes.

3. Monitoring the atmospheric DISSUB internal data during the ventilation operation in order to evaluate the ventilation efficacy.

4. Test and develop procedures for ventilation operation with different DISSUB classes.

Forces Required

1. One DISSUB

2. One MOSHIP with ventilation capability.

3. One ADS Intervention System.

Situation

1. DISSUB makes rendezvous with Surface Force. Any stores/personnel transfers can be conducted as requires and DISSUB indication system (Buoy or acoustic transponder) can be connected to the submarine structure. OCS clears the DISSUB to dive and bottom.

2. Before bottoming, at PD, DISSUB carries out Comm-check with the MOSHIP via UWT

3. MOSHIP approaches and conducts ventilation operation in accordance with below procedure

4. On completion of the serial, OCS surfaces the DISSUB.

Procedures

1. All operation must be in accordance with approved procedures and all communication must be in line with Chapter 5 - scripts.

2. DISSUB must be kept informed at all times on the progress of the serial and about any changes to the disseminated serial programme.

3. The conduct of a ventilation exercise using ADS Intervention System (IS) should forecast following steps:

a. Rendezvous with Surface Force and DISSUB in the designated operational area.

b. OCS clears DISSUB to dive and bottom on surveyed bottoming area (LAT/LONG position to be provided in the Table Order).

c. Establish UWT communications between MOSHIP and DISSUB prior she leaves Periscope Depth.

d. DISSUB bottoms and signals OCS “waiting to rescue operation” iaw Chapter 5 - scripts.

e. MOSHIP positions herself in the vicinity of the DISSUB via a mooring field or via D.P. system.

f. MOSHIP launches ADS to carry a DISSUB hall survey.

g. Once ready, ADS connects a safety line to the DISSUB structure as near as to the submarine ventilation valves position. The safety line will be used to send the ventilation equipment

h. MOSHIP sends the ventilation equipment (Inlet and outlet hoses with connectors) by safety line on the DISSUB deck.

i. ADS connect the ventilation connector on the DISSUB ventilation valve.

j. Once DISSUB opens the ventilation valves MOSHIP starts ventilation procedure.

k. Ventilation operation stops when CO2, O2 and internal pressure are within required limits.

l. DISSUB shuts valves and ADS disconnects ventilation connectors and safety line before transit to surface for recovery aboard the MOSHIP.

m. On completion of unmooring operation, OCS surfaces the DISSUB.

Special Provisions

Personnel safety must be paramount during the exercise. The OCS must ensure that all participating forces act iaw mutually agreed procedures at all times.

Records

In order to improve the knowledge all DISSUB internal microclimate data will be required to populate related database as specified at TABORD Paragraph X or as laid down in the exercise operation order.

Appendix 7.A.18.
SMEREX V-2 : SUBMARINE VENTILATION EXERCISE (ROV MODE)

Purpose

1. Train a Submarine, MOSHIP and Remote Operated Vehicle (ROV) team in ventilation operation.

2. Train ROV team in connecting/disconnecting hoses with ventilation connectors on different DISSUB classes.

3. Monitoring the atmospheric DISSUB internal data during the ventilation operation in order to evaluate the ventilation efficacy.

4. Test and develop procedures for ventilation operation with different DISSUB classes.

Forces Required

1. One DISSUB

2. One MOSHIP with ventilation capability.

3. One ROV.

Situation

1. DISSUB makes rendezvous with Surface Force. Any stores/personnel transfers can be conducted as requires and DISSUB indication system (Buoy or acoustic transponder) can be connected to the submarine structure. OCS clears the DISSUB to dive and bottom.

2. Before bottoming, at PD, DISSUB carries out Comm-check with the MOSHIP via UWT

3. MOSHIP approaches and conducts ventilation operation in accordance with below procedure

4. On completion of the serial, OCS surfaces the DISSUB.

Procedures

1. Operations must be in accordance with approved procedures and all communication must be in line with Chapter 5 - scripts.

2. DISSUB must be kept informed at all times on the progress of the serial and about any changes to the disseminated serial programme.

3. The conduct of a ventilation exercise using a ROV should forecast following steps:

   a. Rendezvous with Surface Force and DISSUB in the designated operational area.

   b. OCS clears DISSUB to dive and bottom on surveyed bottoming area (LAT/LONG position to be provided in the Table Order).

   c. Establish UWT communications between MOSHIP and DISSUB prior she leaves Periscope Depth.

   d. DISSUB bottoms and signals OCS “waiting to rescue operation” iaw Chapter 5 - scripts.

   e. MOSHIP positions herself in vicinity of the DISSUB via a mooring field or via D.P. system.

f. MOSHIP launches ROV to carry a DISSUB hull survey.

g. Once ready, ROV connects a safety line to the DISSUB structure close to the submarine ventilation valves position.

h. MOSHIP deploys the ventilation equipment (Inlet and Outlet hoses with connectors) by safety line to the DISSUB casing.

i. ROV connects the ventilation connector to the DISSUB ventilation valves.

j. Once DISSUB opens the ventilation valves the MOSHIP starts ventilating.

k. Ventilation operation stops when CO2, O2 and internal pressure are within the required limits.

l. DISSUB shuts valves and ROV disconnects ventilation connectors and safety line before transiting to surface for recovery aboard the MOSHIP.

n. On completion of unmooring operation, OCS surfaces the DISSUB.

Special Provisions

Personnel safety must be paramount during the exercise. The OCS must ensure that all participating forces act IAW mutually agreed procedures at all times.

Records

In order to improve the knowledge all DISSUB internal microclimate data will be required to populate related database as specified at TABORD Paragraph X or as laid down in the exercise operation order.

Appendix 7.A.19.
SMEREX V-3 : SUBMARINE VENTILATION EXERCISE (DIVERS MODE)

Purpose

1. Train a Submarine, MOSHIP and a Diving Team in ventilation operation.

2. Train a Diving Team in connecting/disconnecting ventilation connectors on different DISSUB classes.

3. Monitoring the atmospheric DISSUB internal data during the ventilation operation in order to evaluate the ventilation efficacy.

4. Test and develop procedures for ventilation operation with different DISSUB classes.

Forces Required

1. One DISSUB

2. One MOSHIP with ventilation capability.

3. A Diving Team with a suitable diving system.

Situation

1. DISSUB rendezvous with Surface Force. Any stores/personnel transfers can be conducted as requires and DISSUB indication system (Buoy or acoustic transponder) can be connected to the submarine structure. OCS clears the DISSUB to dive and bottom.

2. Before bottoming, at PD, DISSUB carries out Comm-check with the MOSHIP via UWT

3. MOSHIP approaches and conducts ventilation operation in accordance with below procedure

4. On completion of the serial, OCS surfaces the DISSUB.

Procedures

1. All operation must be in accordance with approved procedures and all communication must be in line with Chapter 5 - scripts.

2. DISSUB must be kept informed at all times on the progress of the serial and about any changes to the disseminated serial programme.

3. The conduct of a ventilation exercise using Diving team/system should forecast following steps:

   a. Rendezvous with Surface Force and DISSUB in the designated operational area.

   b. OCS clears DISSUB to dive and bottom on surveyed bottoming area (LAT/LONG position to be provided in the Table Order).

   c. Establish UWT communications between MOSHIP and DISSUB prior she leaves Periscope Depth.

   d. DISSUB bottoms and signals OCS “waiting to rescue operation” iaw Chapter 5 - scripts.

   e. MOSHIP positions herself in vicinity of the DISSUB via a mooring field or via D.P. system.

f. Diving operation starts. Divers connect a safety line to the DISSUB structure as close as possible to the submarine ventilation valves position. The safety line will be used to send the ventilation equipment.

g. MOSHIP sends the ventilation equipment (Inlet and Outlet hose with connectors) by the safety line on the DISSUB deck.

h. Divers connect the ventilation connectors on the DISSUB ventilation valves.

i. Once DISSUB opens the ventilation valve MOSHIP start ventilating.

j. Ventilation operation stops when CO2, O2 and internal pressure are within the required limits.

k. DISSUB shuts valves and Divers disconnect ventilation connectors and safety line.

l. On completion of unmooring operation, OCS surfaces the DISSUB.

Special Provisions

Personnel safety must be paramount during the exercise. The OCS must ensure that all participating forces act IAW mutually agreed procedures at all times.

Records

In order to improve the knowledge all DISSUB internal microclimate data will be required to populate related database as specified at TABORD Paragraph X or as laid down in the exercise operation order.

GLOSSARY

Terms and definitions from AAP-6 are in italics

A

Alerting Authority (AA)

The military commander who first raises the alert for a possible SUBSAR incident. Typically this is the SUBOPAUTH who is responsible for initiating Submarine Safety COMCHECK procedure and operation SUBLOOK/SUBMISS/ SUBSUNK

Arrival Report

A signal transmitted by a submarine immediately upon its arrival in port. This signal may be required by the SUBOPAUTH.

Atmospheric Diving System (ADS)

A one person hardsuit and associated Launch And Recovery System (LARS), that allows the occupant to work underwater while still in a one atmosphere self contained environment. The ADS is tethered to a surface ship from which it is launched and recovered.

Articulated-Frame (A-Frame).A lifting device that allows movement through as many as three separate axis and allows for the launch and recovery of equipment – typically submarine rescue vehicles and associated equipment – from a platform on a ship into the ocean. Such devices are commonly permanently fitted, although they may also be portable. Dependent on the size of the platform and the capability of the A-frame, launch and recovery activity may be possible in higher sea states than would otherwise be the case with less sophisticated systems.

B

C

COMCHECK

The signal originated by SUBOPAUTH when the safety of a submarine is in doubt.

Coordinator Rescue Forces (CRF)

The Officer with responsibility for coordinating and controlling the recovery of escapees and/or the rescue of the crew from the DISSUB. The most appropriate person will be nominated as CRF by the SSRA/SMC.

Cospas-Sarsat System

A satellite system designed to detect distress beacons transmitting on the frequency of 406 MHz.

D

Datum

Any numerical or geometrical quantity or set of such quantities which may serve as reference or base for other quantities. For SAR purposes, a geographic point, line, or area used as a reference in Submarine search planning.

Datum Area

Area in where it is estimated that the search object is most likely to be located.

Datum Line

A line, such as the distressed craft's intended track line or a line of bearing, that defines the center of the area where it is estimated that the search object is most likely to be located.

Datum point

Any reference point of known or assumed coordinates from which calculation or measurements may be taken.

Dead Reckoning (DR)

Determination of position of a vessel by adding to the last fix the distance based on the craft's course and speed for a given time.

Distressed Submarine (DISSUB)

A submarine in distress on the seabed unable to surface. It may also include a surfaced submarine requiring assistance following an incident.

DISSUB De-pressurization System (DSDS)

A system designed to connect a DISSUB to the surface, via hose(s) and specially designed fittings, such that ambient pressure within the DISSUB may be relieved in controlled manner.

Such a system serves to reduce or eliminate the requirement for extensive decompression when rescuees arrive on the surface.

DISSUB Depressurization and Ventilation System (DSVDS)

A surface-supplied system designed to simultaneously supply breathing-quality air to intact compartments within the DISSUB, while at the same time allowing for a controlled adjustment of ambient pressure within those same compartments. Such systems, which connect to the submarine via special hoses and hull-penetrating fittings, serve to reduce or eliminate the requirement for extensive decompression when rescuees arrive on the surface and provide survivors inside the submarine with air.

Diving Signal

A signal transmitted by a submarine before it dives, indicating the date and time of dive, date and time of completion, position and reason for diving. Some nations do not send a diving signal when operating on a Subnote.

E

Element

Any asset able to carry on an Intervention or a Rescue.

Emergency Life Support Stores (ELSS)

Items of stores for use by the personnel in the DISSUB to enable them to survive whilst awaiting rescue. Stores include such items as carbon dioxide absorbent, oxygen candles and medical stores for emergency treatment of casualties. The ELSS are pre-stored on board the submarine and may be re resupplied to the DISSUB by Pod-posting.

Escape

Any method by which a person leaves a DISSUB and makes his way to the surface without direct assistance from outside agencies.

Escapee

Escapee – a person who makes their way to the surface by some buoyant means which has already been incorporated into the DISSUB

Escape Gear Ship (EGS)

Any ship nominated by the SSRA/SMC to carry the search area medical stores and equipment to facilitate the recovery and treatment of escapees on reaching the surface.

Emergency Position Indicating Radio Beacon (EPIRB)

A device, usually carried aboard maritime vessel, that transmits a signal that alerts search and rescue authorities and enables rescue units to locate the scene of the distress.

Expendable Communications Buoy (ECB)

A communications buoy which can be released by a DISSUB.

F

First Reaction Stores (1RS)

Those SUBMISS/SUBSUNK stores deployed in the EGS and used by the SMERAT in the recovery and treatment of escapees. It includes recompression facilities

G

Global Maritime Distress and Safety System (GMDSS)

A global communications service based on automated systems, both satellite-based and terrestrial, to provide distress alerting and promulgation of maritime safety information for mariners.

H

I

International Submarine Escape & Rescue Liaison Office (ISMERLO)

Multinational coordinating office for Submarine Escape and Rescue related issues. The office provides coordination through its web site management system on Internet at www.ismerlo.org

Intervention

The external provision of survivability to a DISSUB. It also indicates any survey/preparatory activities prior Rescue Operations.

J

K

L

Launch and Recovery System (LARS)

A system designed to launch, handle and recover rescue assets.

M

MEDEVAC

Evacuation of a person for medical reasons.

MASC

MOSHIP/Airport/Seaport combination used for delivery and embarkation of SMER Elements.

MOPORT

Any port from which submarine escape and rescue systems and equipment are dispatched, either aboard dedicated vessels or vessels of opportunity, to the DISSUB location.

MOSHIP

A ship used to carry a Submarine Rescue Element to the scene of the submarine accident. When the Element carrier is a submarine, the ship is called MOSUB (mother submarine).

Moving Havens (MHN)

The normal method by which submarines are routed. The standard MHN is an area 20 Nautical Miles (NM) ahead, 30 NM behind, and 5 NM on either side of the submarine's planned track position. The size of the MHN is stated in the SUBNOTE.[7]

N

National Authority (NA)

The State or Command Authority that sovereignty overe the DISSUB.

O

On-scene Commander (OSC)

Is the military authority designated to Command assigned units either during the Search and Localisation phase or during the Rescue Operation. The On-Scene Commander may or may not be the same for both phases (Search and Localisation – Escape and Rescue Ops), as well as may be changed any time as the situation demands. The Commander of the unit which first reaches the vicinity of an accident or datum is to act as OSC. In the event that the first unit on the scene is an aircraft, the Aircraft Commander will retain control of SAR operations until the arrival of a surface unit to assume the duties of OSC. In all other cases, in order to maintain continuity of Command, the Officer who subsequently may arrive on the scene is not to assume Command by reason of seniority unless or until:

(1) Ordered to do so by the SSRA/SMC, or

(2) In his judgment, a change of Command is essential.

(3) The OSC will be nominated or confirmed by the SSRA/SMC.

The OSC will be nominated/confirmed by the SSRA/SMC.

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[7] MTP-1 Definition: A moving area of specified dimensions established about a submarine or surface ship, extending about the ordered position along the track, and which is designated for use in transit by the unit to prevent attack by friendly forces in wartime and to prevent or minimize submerged interference among friendly forces in peacetime.

P

Personal Locator Beacon (PLB)

An emergency radio locator beacon, which may have a two-way speech capability, carried by some crew members, either on their person or in their survival equipment, and capable of providing homing signals to assist search and rescue operations.

Pod Posting

The function of delivering ELSS to the DISSUB normally by pressure tight Pods “posted” via Escape Towers by divers or other rescue assets.

Q

R

Recovery

The process of retrieving an escapee from the water for subsequent treatment/management and the process of retrieving a rescue element.

Remotely Operated Vehicle (ROV)

An unmanned underwater vehicle normally powered and controlled via an umbilical from a surface vessel from which it is launched and recovered. ROVs can be used for damage assessment of the DISSUB. If fitted with appropriate tools an ROV can also clear an escape hatch for a Rescue Vehicle and Pod Post ELSS.

Rescue

Rescue is the act of saving life in which personnel are transferred from the DISSUB to a place of safety by a SRV or an SRC.

Rescuee

A DISSUB crewmember who is being or has been rescued.

Rescue Element Commander (REC)

The Officer in charge of a rescue element.

S

Search and Rescue Plan

A general term used to describe documents that may exist at all levels of the national and international SAR structure to describe goals, arrangements, and procedures which support the provision of SAR services.

Search and Rescue Region (SRR)

An area of defined dimensions, associated with an RCC, within which SAR services are provided.

Senior Survivor

The senior submarine qualified member of the ship's company in the DISSUB escape compartment.

SUBCHECK Report

The signal transmitted by a submarine at specified intervals to ensure the SUBOPAUTH of her continued safety.

SUBLOOK

The Codeword of the procedures initiated by the SUBOPAUTH when the safety of a submarine is in doubt, or by a SUBOPAUTH when a Surfacing Signal, Arrival Report or SUBCHECK Report from a submarine under his operational control becomes one hour overdue.

Submarine Escape and Surface Survival Personnel Equipment (SESSPE)

An equipment that aids escape from a submarine, which meets the requirements of STANAG 1476.

Submarine Launched One-way Tactical (SLOT) Buoy

A communications buoy that can be fired by a DISSUB.

Submarine Escape and Rescue Assistance Team (SMERAT)

A team of Submarine Escape and Rescue experts augmented by medical specialists who are available to provide advice and assistance.

Submarine Notice (SUBNOTE)

A message report originated by a submarine operating authority providing operational and movement instructions for submarines in peace and war, including transit and patrol area information.

Submarine Operating Authority (SUBOPAUTH)

The naval commander exercising OPCON of submarines.

It is the Authority responsible for its safe routing and for the release of SUBNOTES. He will be the Alerting Authority.

Submarine Parachute Assistance Group (SPAG)

A team of escape and rescue experts, augmented by medical specialists, available at short notice to parachute into the water.

Submarine Search and Rescue Authority (SSRA/SMC)

The Naval Authority responsible for the planning and conduct of a SUBSAR operation. The SSRA/SMC may be a national or NATO Naval Area/Subarea Commander or appointed maritime commander, depending upon the wishes of the OPCON authority of the submarine or the wishes of the submarine's NA. The SSRA/SMC will operate in coordination with the relevant RCC. The submarine's NA should seek prior agreement with national or NATO Commands concerned. The SSRA/SMC is to be nominated in an OPORD.

Note: Bearing in mind the area within which the DISSUB was operating, the nature of the operation/exercise and the wishes of the NA, the responsibilities of the SSRA/SMC may be passed to or from the relevant national/NATO authorities. However, experience has shown that such changes can lead to confusion.

Submarine Rescue Element

Any equipment or asset specifically designed or used for Submarine Interventions or Rescue Operations.

Submarine Rescue Chamber (SRC)

A bell that can mate with the NATO common rescue seat but in addition has to be fitted with special securing arrangements.

Submarine Rescue Vehicle (SRV)

Any submersible craft which may be used for the rescue of personnel from a DISSUB.

SUBMISS

The Codeword of an operation which will be executed in order to initiate a fully co-ordinated search for a submarine that is believed to be missing.

SUBSUNK

The Codeword of an operation which will be executed in order to initiate a fully co-ordinated search for a submarine that is known to have sunk.

The Codeword of the signal originated by any unit or authority who has positive information that a submarine has sunk or by the OSC when the DISSUB has been located.

Support Authority (SA)

Any authority who provides assistance for the NA and/or the SSRA/SMC.

Surfacing Signal

A signal transmitted by a submarine to indicate the completion of a dived period as covered by a Diving Signal or to conclude a Subnote or portion thereof.

SURFACING/ARRIVAL ZERO TIME

The time at which the SUBOPAUTH must have received the Surfacing Signal or CHECK ARRIVAL Report from a Submarine.

T

Time to first Intervention (TTFI)

The estimated time taken from alertment until the first on-scene intervention activity.

Time to first Rescue (TTFR)

The estimated time calculated from alertment to the transfer of the first rescuee, into the SRV/SRC.

Transfer Under Pressure (TUP)

The ability to transfer rescuees, who have been previously evacuated from a pressurized DISSUB compartment, from a pressurized condition within the rescue vehicle directly into a decompression facility without exposure to normal atmospheric pressure.

Triage

The assignment of a degree of medical urgency to each rescuee/escapee need for treatment so as to decide the order in which they should be treated.

U

V

Vessel of opportunity (VOO)

Any vessel (normally civilian) potentially available to carry on board a Submarine Rescue Element to the DISSUB area. When the Rescue Element is installed/embarked, the VOO is then designated as a MOSHIP.

W

X

Y

Z

INTENTIONALLY BLANK

ABBREVIATIONS AND ACRONYMS

Abbreviation/ Acronym	Meaning
1RS	First Reaction Stores
AA	Alerting Authority
ADS	Atmospheric Diving System
BIBS	Built-in Breathing System
BU	Breathing Unit
CASEVAC	Casualty Evacuation
CCTV	Closed Circuit Television
CDAU	Carbon Dioxide Absorption Unit
CHOD	Chief of Defence
CHOP	Chop Operational Control
COMPLAN	Communications Plan
COSPAS	Comicheskaya Sisttyma Poiska Avariynych Sudov (Space System for Search of Vessels in Distress)
CRF	Coordinator Rescue Forces
DCI	Decompression Illness
DCC	Decompression Chamber
DCS	Decompression Sickness
DISSUB	Distressed Submarine
DLT	DISSUB Liaison Team
DP	Dynamic Positioning
DSDS	DISSUB Depressurization System
DSRV	Deep Submergence Rescue Vehicle
DSV	Dive Support Vessel
DSVDS	DISSUB Ventilation and Depressurization System
EBS	Emergency Breathing System
ECB	Expendable Communications Buoy
EGS	Escape Gear Ship

Abbreviation/ Acronym	Meaning
ELSS	Emergency Life Support Stores
HIS	Hood Inflation System
HP - LP	High Pressure – Low Pressure
IAMSAR	International Aeronautical and Maritime Search and Rescue
ICAO	International Civil Aviation Authority
ISMERLO	International Submarine Escape and Rescue Liaison Office
LARS	Launch and Recovery System
LIVEX	Live Exercise
MASC	MOSHIP Airport/Seaport Combination
MCASB	(NATO) Military Committee AIR Standardization Board
MCMSB	(NATO) Military Committee Maritime Standardization Board
MEDEVAC	Medical Evacuation
MOD	Ministry of Defence
MOSHIP	Mother Ship (for a SMER Element)
MOSUB	Mother Submarine (for a SMER Element)
NA	National Authority
NSA	Nato Standardization Agency
NSRS	NATO Submarine Rescue System
OSC	On Scene Commander
PLARS	Portable Launch and Recovery System
PLB	Personal Locator Beacon
RCC	Rescue Co-ordination Centre
REC	Rescue Element Commander
RHIB	Rigid-Hulled Inflatable Boat
RIB	Rigid Inflatable Boat
ROV	Remotely Operated Vehicle
SAR	Search and Rescue
SESSPE	Submarine Escape and Surface Survival Personnel Equipment
SEPIRB	Submarine Emergency Position-Indicating Radio Beacon

Abbreviation/ Acronym	Meaning
SITREP	Situation Report
SLOT	Submarine Launched One-way Transmission
SMER	Submarine Escape and Rescue
SMERAT	Submarine Escape and Rescue Advisory Team
SPAG	Submarine Parachute Assistance Group
SRC	Submarine Rescue Chamber
SRDRS	Submarine Rescue Diving and Recompression System
SRS	Submarine Rescue System
SRV	Submarine Rescue Vehicle
SSE	Submarine Signal Ejector
SSRA/SMC	Submarine Search and Rescue Authority
SUBLOOK	The code word of the procedures initiated by the Subopauth when the safety of a submarine is in doubt
SUBMISS	The code word of an operation which will be executed in order to initiate a fully coordinated search for a submarine that is believed to be missing. It also identifies the related signal.
SUBSUNK	The code word of an operation which will be executed in order to initiate a fully coordinated search for a submarine that is known to have sunk. It also identifies the related signal.
SUPSUB	Support Submarine
TTFI	Time To First Intervention
TTFR	Time To First Rescue
TUP	Transfer Under Pressure
UWT	Underwater Telephone
VOO	Vessel of Opportunity

ATP/MTP-57(C)(2)