SMERAS Capabilities

Submarine Escape, Rescue, Abandonment & Survival

INTRODUCTION

Over the past 30 years JFD has become a leading organisation in the design, manufacture, support and operation of submarine rescue systems.

Already established as a provider to 35 navies, JFD is now at the forefront of developing equipment and services that improve safety and preserve life in the event of a submarine incident.

JFD's capabilities span the entire submarine escape, rescue, abandonment and survival environment. JFD offers a full range of services in support of a SUBSUNK operation to nations with an established SMERAS capability, and to those looking to establish or develop their own capabilities.

CONTENTS

INTRODUCING JFD

JFD is a highly capable organisation which brings together the operational pedigree of James Fisher Defence and the quality for which Divex is rightly renowned. It combines world-class training services with the accreditation and expertise of the National Hyperbaric Centre.

It is led by a highly capable, committed and experienced leadership team which truly understands the SMERAS requirement and naval service delivery. A rigorous set of management systems and processes and an unblemished safety record ensure that the company delivers high quality services around the clock around the world.

This brochure offers a high-level summary of JFD's capabilities and illustrates how it can provide bespoke solutions for SMERAS equipment provision, training, operation, personnel resource and through-life support requirements.

JFD can also undertake detailed policy or capability reviews and equipment and system inspections.

Aberdeen | Bremen | Cape Town | Singapore | Glasgow
Perth | Rome | Sydney | Vaxholm | Virginia

WHAT IS SMERAS?

All submarine operating nations place great emphasis on submarine safety. Submarine design, build and operating procedures are carefully developed and controlled so as to reduce the risk of an accident occurring to as low as reasonably practicable (ALARP). Nevertheless it is recognised that the possibility of an accident can never be entirely dismissed, and that there is a duty of care to provide systems, equipment and resources to minimise the loss of life in the event of a DISSUB.

SMERAS is an internationally organised 'capability' which will involve almost any nation that can provide some assistance to the National Authority (NA) - the nation that owns the submarine. This will include assets, people and support to the Submarine Search and Rescue Authority (SSRA) - the command and control organisation that will direct operations from naval headquarters, and the On Scene Commander (OSC) - the senior naval representative at sea.
A DISSUB incident will require the assembly of a wide number of assets, people and organisations to undertake a successful recovery operation, illustrated in the image below.

Along with their proven submarine rescue expertise JFD is the only commercial organisation in the world with experience in designing, manufacturing and operating the equipment necessary to support this capability. The company is passionate and committed in establishing long-term relationships with Customers, where it can work alongside them to identify their needs and develop highly practical and robust solutions which are cost-effective and deliver the highest standards of reliability and safety.

SPAG

Medical Support
Survival Stores

Alertment

Indicator Buoys
PLBs
SEEPIRBS
SUBOPAUTH

Sea Survival

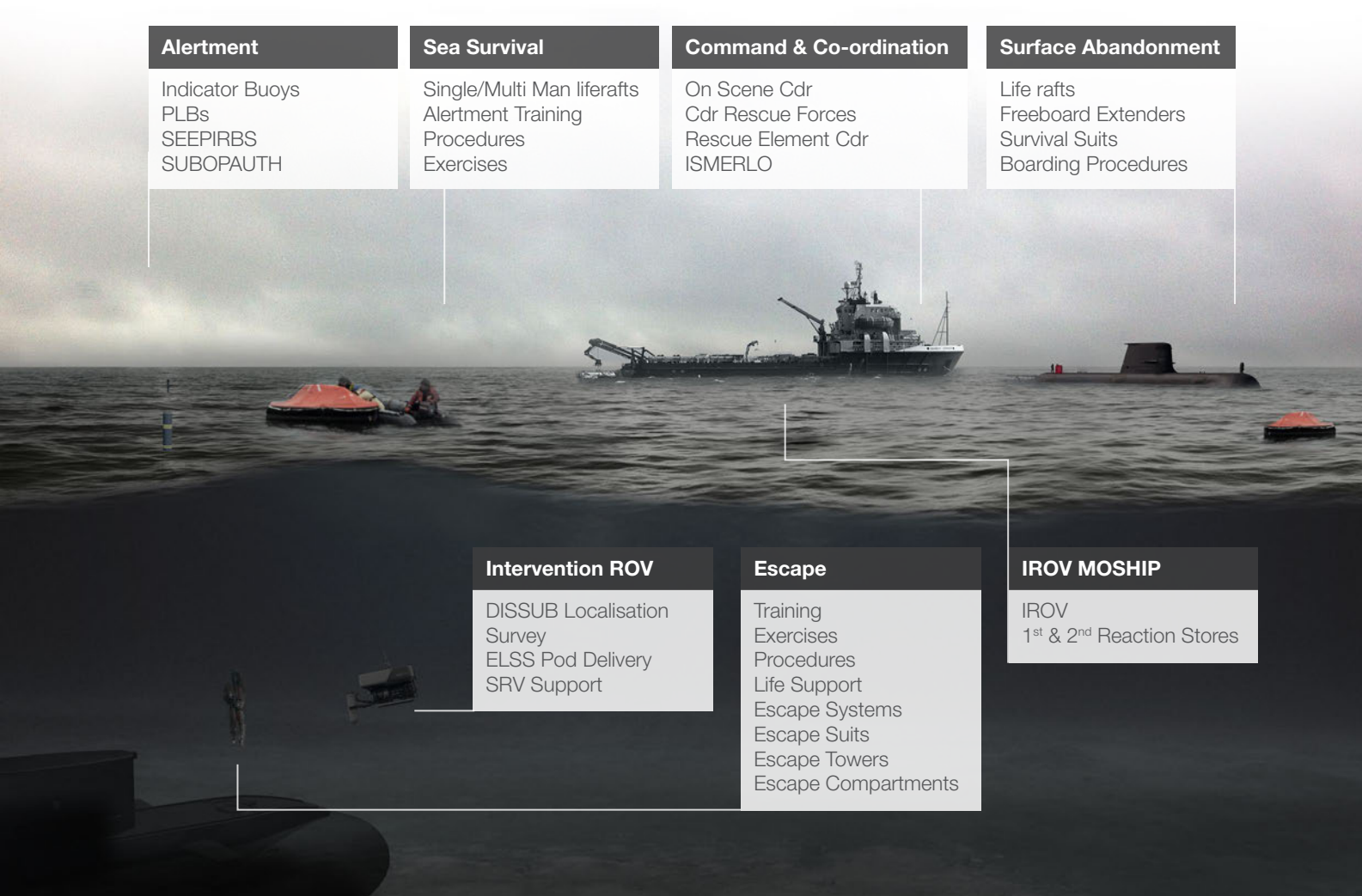
Single/Multi Man liferafts
Alertment Training
Procedures
Exercises

Command & Co-ordination

On Scene Cdr
Cdr Rescue Forces
Rescue Element Cdr
ISMERLO

Surface Abandonment

Life rafts
Freeboard Extenders
Survival Suits
Boarding Procedures



Intervention ROV

DISSUB Localisation
Survey
ELSS Pod Delivery
SRV Support

Escape

Training
Exercises
Procedures
Life Support
Escape Systems
Escape Suits
Escape Towers
Escape Compartments

IROV MOSHIP

IROV
1st & 2nd Reaction Stores

BENCHMARKING

SMERAS is a complex subject and requires a wide-ranging portfolio of diverse functions and services to provide total capability. Accordingly, in addition to the full range of products and solutions outlined below, JFD is able to offer individual nations an initial assessment of their ability to respond in the event of a submarine accident. This can be undertaken by an Escape Inspection, primarily looking at the submarine and onboard systems, or with an Interim Capability Review which will cover the wider aspects of organisation and reactive response.

On completion, JFD can provide a full report with findings, recommendations, proposals and options for any necessary improvements.

ESCAPE INSPECTIONS

Escape Inspections form an essential part in maintaining the ability of a submarine to conduct an escape, rescue or surface abandonment during an emergency. Conducted by JFD's shore-based personnel with extensive submarine operating experience and specific additional qualifications in escape training, the Inspection is a fully-independent assessment of the escape compartments and escape towers including all fixed and consumable items; 1st and 2nd Reaction SUBSUNK Stores will also be inspected if held.

Functional testing of the submarine fitted Escape Tower breathing and/or Hood Inflation System will be conducted to confirm everything is in working order, critical safety defects will be identified and corrective actions recommended. Further advice will be provided on best practice to maintain, operate and document safety critical systems.

JFD staff have been directly responsible for conducting Escape Inspections during previous naval careers and a typical inspection will take approximately two days to complete, checking all necessary documents including breathing air certification documents, any lifting equipment and lifed items.

INTERIM CAPABILITY REVIEW

Military capability is designed to meet national requirements after a thorough review of existing capability. The JFD Interim Capability Review will provide nations with an overview of their existing ability to respond to a submarine accident and interact with the well-established international organisation and procedures, as detailed in Figure 2.

INTERNATIONAL SMERAS STANDARD

On-going technical and operational developments across the SMERAS portfolio are leading to gradual and continuous improvements in many areas. International submarine forums such as the annual Submarine Escape and Rescue Working Group (SMERWG) play a key role in acknowledging such advances, and provide impetus to those navies where adequate resource is available to remain at the forefront of capability.

JFD is now looking to develop an international advisory standard for SMERAS capability, which would enable individual submarine operating nations to attain a common level of capability for escape, rescue and abandonment. The basis of this standard would be the completion of an initial on-board inspection of all SMERAS-related equipment and systems, and identify improvements.

This pathway would lead to establishing a through-life support capability encompassing all aspects of maintenance, support and training as detailed in Figure 3.established international organisation and procedures, as detailed in Figure 2.

The first on-board inspection would be undertaken by JFD free of charge. Subsequent inspections would be charged at an appropriate fee relevant to the class of vessel and the types of SMERAS systems fitted.

TOTAL CAPABILITY

JFD can provide equipment and traning solutions
for all aspects of submarine escape, rescue, surface abandonment and survival.

JFD'S CAPABILITIES

For both established and newly emerging submarine operating nations, JFD is able to advise on solutions across the entire SMERAS spectrum, ranging from low cost, intermediary solutions which fulfil the minimum requirements, through to highly integrated solutions encompassing all aspects of capability upgrade and training, with the aim being to maximise operational effectiveness. JFD is able to undertake or provide the following:

- ✓ **Studies.** Reviewing current and desired capability requirements; undertaking a detailed Strategic Policy Review.
- ✓ **Designs.** Developing solutions to meet customer-specific requirements.
- ✓ **Equipment.** Supplying equipment to meet all training and operational needs.
- ✓ **Training.** Providing a wide range of SMERAS-related training courses for new entry and experienced submariners, escape and rescue support personnel and those with overall command and control responsibilities for SUBSUNK.
- ✓ **Facilities.** Design and delivery of shore-based SMERAS support and training facilities.
- ✓ **Personnel resource.** Permanent contractor or surge team personnel for all aspects of maintenance, training and operation, including medical support.
- ✓ **Integrated Logistics Support.** Offering cradle-to-grave through life support of equipment, systems and capability delivery.
- ✓ **CONOPS.** Developing a clear illustration and definition of how the system will be delivered to meet the User requirements in terms of processes, procedures and operational deployment.
- ✓ **Contracting for Availability.** Providing the equipment, training and through-life support for part or all of a particular SMERAS requirement, and working with the Customer to maximise cost-savings and delver maximum safety and reliability.

JFD's capabilities are underpinned by over 30 years of providing submarine rescue operations and services to the Royal Navy, and more recently for the NATO Submarine Rescue System, jointly owned by France, Norway and the United Kingdom.

Similar agreements are in place with the Republic of Singapore Navy, and the Royal Australian Navy where JFD provide CO/CO (Contractor Owned/ Contractor Operated) capability.

The company is constantly increasing global presence with established and emerging navies, as well as developing wider interests in subsea engineering design, manufacturing, commissioning, project management, training and emergency hyperbaric recovery responses for the offshore oil and gas sectors

NATO RESCUE SERVICE

The NSRS requires JFD to perform a **Time to First Rescue** of 72 hours for any given global DISSUB location.

STUDIES

Each submarine operating nation is responsible for the provision of adequate escape, rescue and survival equipment and procedures for their submariners. Such nations are also encouraged to develop capabilities that provide mutual assistance to other nations in the event of a SUBSUNK. The annual SMERWG provides the leading forum where such ideas and information are discussed and developed into common capability and capacity, with the aim of improving the overall SMERAS capability.

Working closely with the Customer, JFD can undertake a full range of feasibility and project definition studies to assess existing SMERAS capability, identify requirements and propose the most cost-effective and low-risk solutions to achieving desired SMERAS objectives. This can include all aspects of on-board escape equipment and associated platform systems, as well as shore-based equipment, training, infrastructure and organisation. Maintenance and through life support are also essential to ensuring operational readiness and availability to deliver an effective capability.

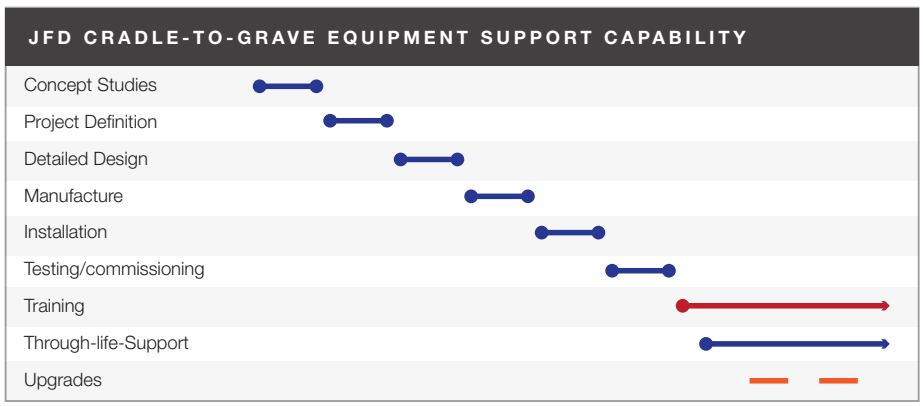
IDENTIFYING CUSTOMER NEEDS

JFD has extensive knowledge across the entire SMERAS spectrum and regularly undertakes studies to identify specific customer needs which offer cost-effective, low-risk solution.

EQUIPMENT

SMERAS equipment encompasses on-board equipment within the platform itself, as well as equipment which remains shore-side and deployed at short notice in support of a DISSUB incident. JFD has considerable knowledge of the Naval Submarine Code and can offer design, manufacturing and support to meet all SMERAS requirements. Equipment can be adapted as necessary to integrate with existing on-board ship systems such as escape suits pressure regulating valves.

JFD can offer a cradle-to-grave approach in the design and supply of SMERAS-related equipment and systems:



INTERVENTION ROVS
Provided by JFD form an integral part of many subarine rescue systems.

This capability can be applied to developing solutions across a wide range of equipment and systems including the following:

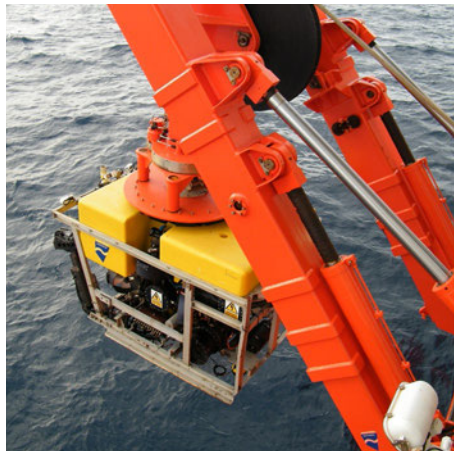
- ✓ **Escape Towers.** The primary method of escape, these may also be combined with routine access on and off the submarine for special forces operations, and be surrounded by the rescue mating seat. Single-man and twin-man towers are in service with many navies. They are fitted with upper and lower hatches which form part of the submarine's pressure-tight boundary. Each tower is outfitted with systems and fixtures to enable escape and re-supply of Emergency Life Support Stores (ELSS) by pod-posting to be safely conducted including all flood, drain and venting
- ✓ **HP Air Systems.** Escape from the Escape Towers using SESSPE is currently dependant on suitable HP Air supplies from the submarine. As a finite supply the use of HP Air has to be minimised as far as reasonably practicable during each escape cycle.
- ✓ **Escape Stores.** Stowed in dedicated lockers within the Escape Compartments and containing those items of equipment to initiate alertment, manage the Escape Compartment atmosphere, and provide adequate provisions to sustain the crew until either rescue arrives, or to prepare the crew to commence escape.
- ✓ **Life Rafts for Abandonment.** Stowed either within the submarine, or a suitable under-casing location, these multi-man life rafts provide additional safe refuge whilst awaiting surface rescue assets to arrive.

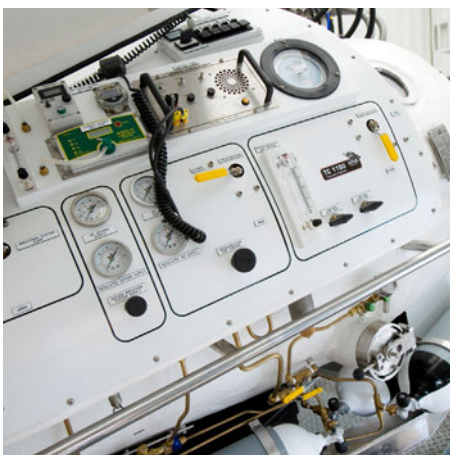
EQUIPMENT CONTINUED

- ✓ **Freeboard Extenders.** Fitted within the cofferdam/hatch cavity recess and encompassing the upper parts of the escape tower, these are inflated during surface abandonment to reduce the risk of water ingress into the Escape Towers in rough weather or high angles of pitch and heel.
- ✓ **Submarine Escape and Surface Survival Personnel Equipment (SESSPPE).** Consisting of a suit with thermal base layers and a dedicated 1-man life raft and stowed within the Escape Compartments. Used for individual escape and subsequent sea survival. In some navies, the SESSPE is also used for surface abandonment.
- ✓ **Intervention ROV (IROV).** This provides the operator with a first-on-scene capability to locate and survey the DISSUB, prepare for rescue and undertake ELSS pod-posting. The IROV is deployed with a dedicated underwater navigation, tracking and communications system which JFD is also able to supply, support and operate.
- ✓ **1st and 2nd Reaction Stores.** Deployed on board the Escape Gear Ship and Rescue (or Intervention) MOSHIP respectively, these include escape support chambers and ELSS (e.g. for atmosphere control and medical care) to extend life before and during the rescue operation.
- ✓ **Escape Support Chambers.** Provide an on-scene capability for DISSUB escapers who reach the surface and require immediate hyperbaric assistance.
- ✓ **Modular Option** As an innovative solution, JFD is designing a modular unit to be integrated with a submarine escape compartment to meet all onboard functional requirements. This will be based around a one or two-man escape tower and may include life raft, freeboard extenders and communications buoys. A unit will interface with existing electrical, air and water systems.

EQUIPMENT SUPPLY

JFD offers a broad portfolio of bespoke and off-the-shelf products related to submarine escape, rescue, abandonment and survival. A few examples are pictured below.





DSAR Class Submarine Rescue Vehicle | ELSS Pods | Intervention ROVs
Equipment Upgrades | TUP Interface Equipment | Decompression Systems
Transfer Chambers | Training Targets | Launch & Recovery Systems

FACILITIES

Escape training represents one of the most challenging types of course offered by any military or civilian training establishment. Safety is of paramount importance and JFD is able to offer escape training which is directly drawn on the knowledge and experience developed from over 60 years of submarine escape training developed within the Royal Navy. The company is able to offer two types of escape training which both offer realistic experiential training whilst taking into account Customer needs and affordability.

SIMULATED ESCAPE TOWER

The Simulated Escape Tower is a portable low-cost method of providing realistic through-water escape training without subjecting the student to any pressurised ascent. The Simulated Escape Tower comprises of a lightweight cage containing two generic Escape Towers, within which the student can experience the effects of hood inflation, tower flooding, and buoyant ascent. The student is accompanied by a fully qualified diver throughout his time in the water and, most importantly, will be subjected to the absolute minimum increase in pressure.
This type of training is low risk and can be undertaken in any normal swimming pool with a depth of 4 metres and with suitable access for the cage hoisting equipment. The adjacent image illustrates a typical simulated escape tower system.

PRESSURISED ESCAPE TRAINING

Pressurised Escape Training is performed using a fully functioning escape tower designed to replicate as closely as possible the Escape Towers installed on the Customer's platforms. The towers can be pressurised internally up to maximum of 3 Bar(G) and will be accessed from below via a representative Submarine Escape Compartment.

To achieve maximum experiential realism the tower will include:

- ✓ Accurate dimensions and general appearance of the escape tower as fitted to the platform.
- ✓ Lower and upper hatches with similar opening mechanisms, resistance to opening, closing, and mass.
- ✓ Internal fixtures and fittings including ladders, Stole charging connections, guard rails, foot plates, flood valve, lighting, and ELSS Pod handling equipment.
- ✓ External features including access ladders, flood, drain, and vent valves.

The training tower can be located within a representative Submarine Escape Compartment, similarly equipped with fixtures and fittings to replicate the Customer's requirements.

JFD can also offer the design and build of a complete pressurised escape training facility based on those operated by leading navies. In this instance a pool of water (nominally 12m in diameter x 20m deep) is provided with an escape tower at the base of the structure, thereby allowing students to undertake a full pressurised ascent. Sea survival and surface abandonment skills can be taught at the surface. Other features within the structure enable ascents from shallower depths. Such a facility readily lends itself to support the training needs of other military organisations (i.e. Special Forces) and other diving-related commercial interests.

SUPPORT BASE

Nations may wish to consider a bespoke facility either within an existing naval or training base or in an appropriate forward operating location to support SMERAS. This would provide maintenance and storage for equipment, SUBSUNK Reaction Stores, intervention pod posting systems. JFD can advise as appropriate to provide a facility commensurate with a nation's requirements.

Conference Facilities

for 180 persons, including bar and dining area overlooking the Pool Training Area.

Classrooms

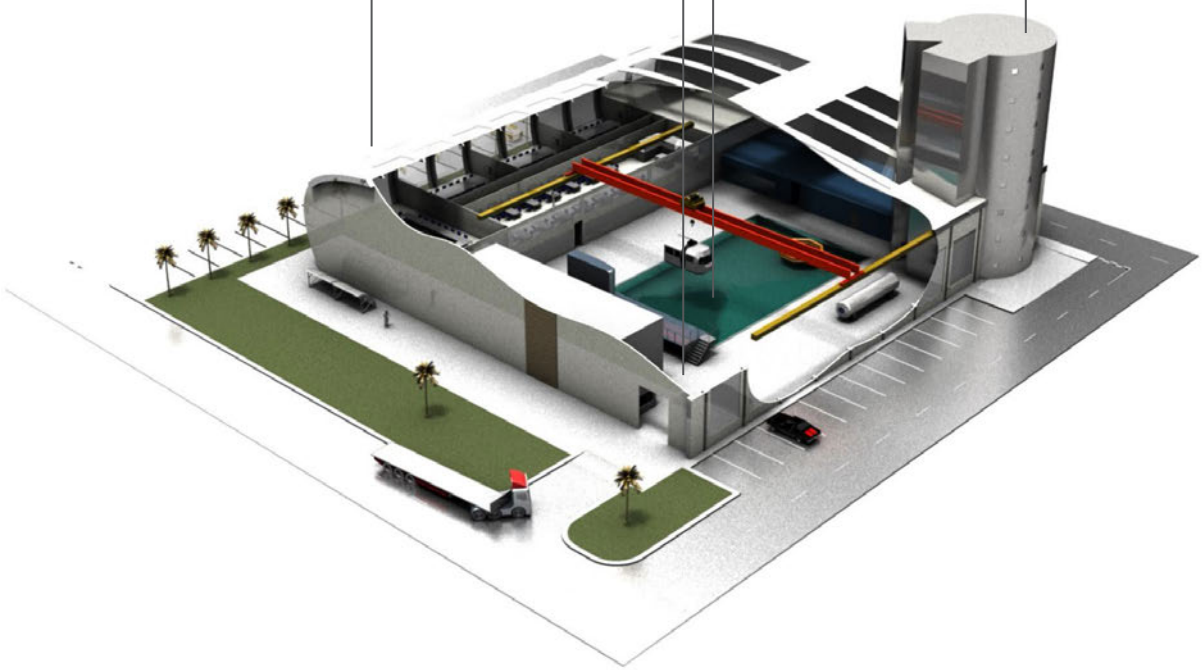
Changing and admin facilities for staff and trainees

Pool Training Area

with environmental simulation, and a wide variety of training facilities.

15m Escape Tower

Provides pressurised training, with associated decompression facilities.



SMERAS TRAINING CENTRES

JFD is able to offer multi-functional facilities which encompass all elements of SMERAS training within the single facility. These provide high-fidelity realism and experiential learning within a safe and highly regulated environment. They bring together the entire range of training as outlined in the previous sections with the added advantage of offering excellent opportunities for adjacent military organisations such as divers and Special Forces.

Subject to Customer requirements a typical SMERAS training centre would include the following:

- ✓ Large pool with wave machine and wind generators.
- ✓ Chlorination and filtration plant, HP Air Compressors, flood and drain systems.
- ✓ Representative Submarine Escape Compartments and Escape Towers for dynamic training.
- ✓ Un-pressurised escape training rig (located within the pool).
- ✓ Representative submarine casing mock-up alongside the pool for surface abandonment training.
- ✓ Overhead handling systems for ELSS Pod delivery training.
- ✓ Submarine Rescue Vehicle (SRV) mock-up to practice egress and patient handling from Escape Compartment into the SRV.
- ✓ Centralised monitoring facility for controlling multiple use of the SMERAS facility.
- ✓ Lecture facilities for all theory-based teaching and hands-on equipment familiarisation.
- ✓ IT-based Media Training programmes.
- ✓ Workshop facilities for teaching testing, maintenance and overhaul.
- ✓ Administration and welfare facilities.
- ✓ Dedicated mechanical and electrical plant for all services within the facility.

From such a facility the following courses could be undertaken:

- ✓ DISSUB Survival Training
- ✓ Escape Training (incl. Rush, Non-Pressurised, and Pressurised)
- ✓ Surface Abandonment Training
- ✓ Sea Survival Training in single and multi-man life rafts.
- ✓ Train the Trainers

JFD would provide the necessary training instructors, maintainers and administrative personnel to operate the facility.

THROUGH-LIFE SUPPORT

JFD is able to offer a full through life support package for each of the key areas detailed above. This includes:

- ✓ **Training.** Establishing the initial training package; updates to the training syllabus, training manuals and course materials; re-qualification of training instructors and support staff; training of Customer personnel (i.e. train-the-trainers).
- ✓ **Equipment.** Establishing local repair, maintenance calibration and testing capability; training and re-qualification of maintenance personnel; ranging and scaling of spares; undertaking upgrades and refits. Maintenance, configuration and obsolescence management.
- ✓ **Facilities.** Providing administrative and facility management personnel; managing repairs and routine maintenance, coordination of local suppliers; ensuring all classification and certification is maintained.
- ✓ **Personnel.** JFD, in conjunction with other specialist companies, can provide qualified personnel to meet all the functions of SMERAS including diver and medical support.

JFD would provide the necessary training instructors, maintainers and administrative personnel to operate the facility.

IN-FIELD SUPPORT
JFD's Electrical Technicians proiding in-field support to customer operations.

PRESSURISED SUBMARINE ESCAPE TRAINING

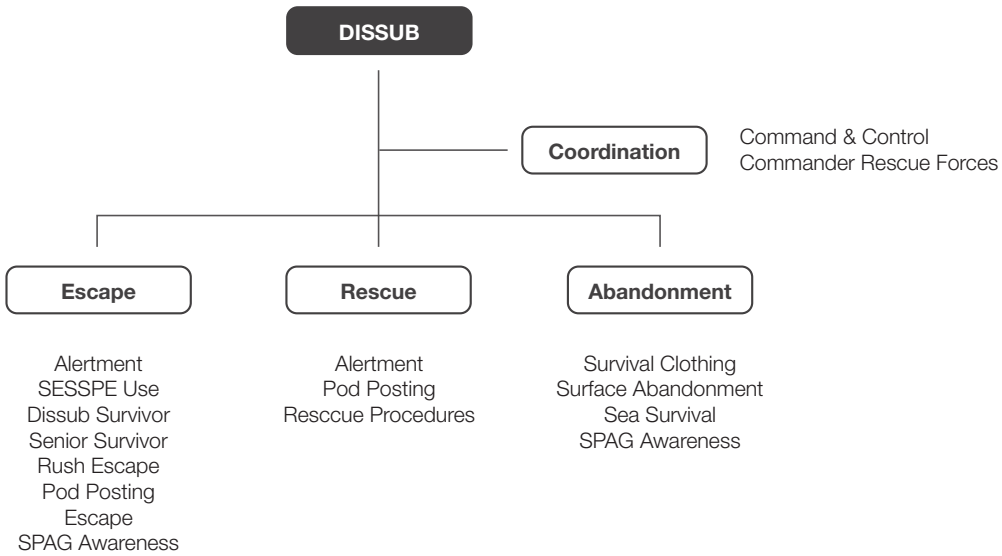
JFD is one of the world's only commercial providers of pressurised submarine escape training.

TRAINING

In the event of a DISSUB incident, effective training will provide vital skills in the ability of the crew to survive the initiating event and to subsequently undertake a series of protocols to preserve life on board the DISSUB whilst preparing for escape or rescue.

JFD can provide a wide range of bespoke courses that enable submarine personnel to be trained across all aspects of SMERAS. It also includes courses designed for senior on-scene commanders and those closely associated with the overall coordination and management of major exercises and SUBSUNK operations.

The courses are a combination of classroom-based theory and practical learning, as well as hands-on high-fidelity experiential training whilst removing risks and hazards. Individual courses cover the following:



All training course plans, documentation and material will be provided with appropriate qualification notations and records supplied to the Customer. Further details are provided overleaf.

ESCAPE TRAINING

Escape represents perhaps the most onerous of any emergency scenario facing a submariner. JFD recognise the importance of ensuring that every effort is made to replicate and teach this technique under close instructor supervision in as closely a controlled environment as possible in order to instil confidence and familiarity within each student. It will offer the student realistic conditions in which to rehearse the full evolution from entering the Escape Tower to climbing abourd a life raft on the surface.

RUSH ESCAPE

Dedicated Escape Towers are not fitted to some of the smaller classes of submarine, which tend to be single compartment platforms. Under these circumstances escape is achieved using the Rush Escape method, whereby the entire submarine is flooded to equalise with the outside pressure. Rush escape is currently limited to 60m.
Many navies are now looking to include a diver lock-out capability to support Special Forces operations. JFD are able to apply their knowledge to identify suitable adaptions to the diver lock-outs to further support the rush-escape method and improve survival rates.

SURFACE ABANDONMENT

Surface abandonment poses a serious challenge to any submarine crew. The urgency of having to exit a submarine (for reasons such as fire, uncontrolled flooding, unstable weapons or propulsion issues) is compounded by the severely limited access via access hatches, and the very small margins of freeboard that might exist in anything except calm conditions.

The JFD Surface Abandonment Course will be tailor-made to suit the Customer-specific platforms. Realistic conditions together with close instructor supervision will ensure each student becomes familiar with this type of scenario.

The training will also include the use of the larger multi-man life rafts.

DISSUB SURVIVAL EXERCISE

The JFD DISSUB Survival Course can be up to a 5-day exercise, which includes placing students inside a pressurised environment and running them through a series of demanding drills under conditions which replicate a DISSUB Escape Compartment. The aim of the course is to teach the students how to make key decisions on life support and whether to await rescue or undertake escape whilst subject to increasing physical and mental fatigue.

The course would be conducted at the National Hyperbaric Centre based in Aberdeen or, alternatively, at a suitable facility owned by the Customer or even a submarine alongside. All the training will remain under close instructor supervision. The course is intended to equip students with additional skills immediately prior to joining a submarine in a position with key maintenance or operational responsibilities.

SENIOR SURVIVOR COURSE

The JFD Senior Survivor Course is designed to enable the most senior post-DISSUB incident survivor take charge of the Escape Compartment and coordinate the stabilisation and well-being of the survivors. The role of the Senior Survivor is critical in achieving a successful escape or rescue. It is of course recognised that a very junior crew member could end up as the senior survivor but the primary aim of this course is to equip the more experienced submariner with additional detail to enable further onboard training.

RESCUE TRAINING COURSE

Rescue Training is a short course designed to inform submariners on the type of rescue systems commonly available to their own navy, how they are deployed and controlled and how they operate with a DISSUB. The course includes information on how to prepare the DISSUB prior to the mating of the submarine rescue vehicle (SRV), the methods of communication between DISSUB and SRV, and how the initial DISSUB entry process is performed. Evacuation into the SRV including the handling of injured personnel is covered, as is the subsequent move from the SRV into the Transfer Under Pressure facility. Details on the level of medical support is also included.

COMMAND & CONTROL COURSE

Effective Command, Control and Communications are vital to the success of the mission. This course is aimed at Commands, Headquarters and national military and civilian organisations and fully reflects the latest doctrine and procedures developed and agreed by the international submarine operating community. It can be provided as stand-alone training for individuals, or in collective form as general familiarisation and can include a Table Top exercise.

COMMANDER RESCUE FORCES COURSE

The Commander Rescued Forces (CRF) has ultimate responsibility for coordinating and controlling the recovery of escapers and/or rescue of survivors from the DISSUB. They will normally be embarked in the most appropriate ship by virtue of equipment and personnel.
Normally be the most experienced rescue expert on scene (although not necessarily from the DISSUB nation), the CRF will direct individual rescue elements which will be controlled by the respective Rescue Element Commander (REC).

The CRF Course can be combined with a course for RECs and the primary aim is to advise on international rescue systems that may be available, rescue planning and conduct and the handling and medical aspects of rescuees.

Both the CRF and Command & Control courses will include detailed examination of all international documentation and familiarisation with the International Submarine Escape and Rescue Liaison Office (ISMERLO) website. The ISMERLO provides a worldwide coordination capability and

OPERATOR TRAINING
JFD provided Maintainer and Operator training for the LR7 Submarine Rescue Vehicle to Chinese Navy personnel.

monitors the availability of Escape and Rescue Elements which may assist any nation facing a submarine disaster.

The website acts as a coordination tool from the initial alertment throughout all stages of a SUBSUNK operation.

SUPPORTING GROUPS

Through in-house experience and working with other specialist companies, JFD is able to offer theoretical and practical training for supporting Groups such as:

- ✓ **DISSUB Liaison Team (DLT).** Provided by the NA to support the OSC and CRF. This team must have available all applicable technical details of the DISSUB and should include submarine officers, medical officers, design authorities, SUBSAR specialists, translators and media advisors.
- ✓ **SPAG (Submarine Parachute Assistance Team).** To provide early communication with the DISSUB and rapid support and multi-man life rafts for escapers.
- ✓ **DISSUB Entry and Medical Triage Team (DET/DMTT).** A small specialist team inserted to the DISSUB via the SRV.
- ✓ **Media and Public Relations.** A key component in any SUBSUNK will be sensitive handling of information to the news media, general public and Next of Kin.

MEDICAL AND CASUALTY HANDLING

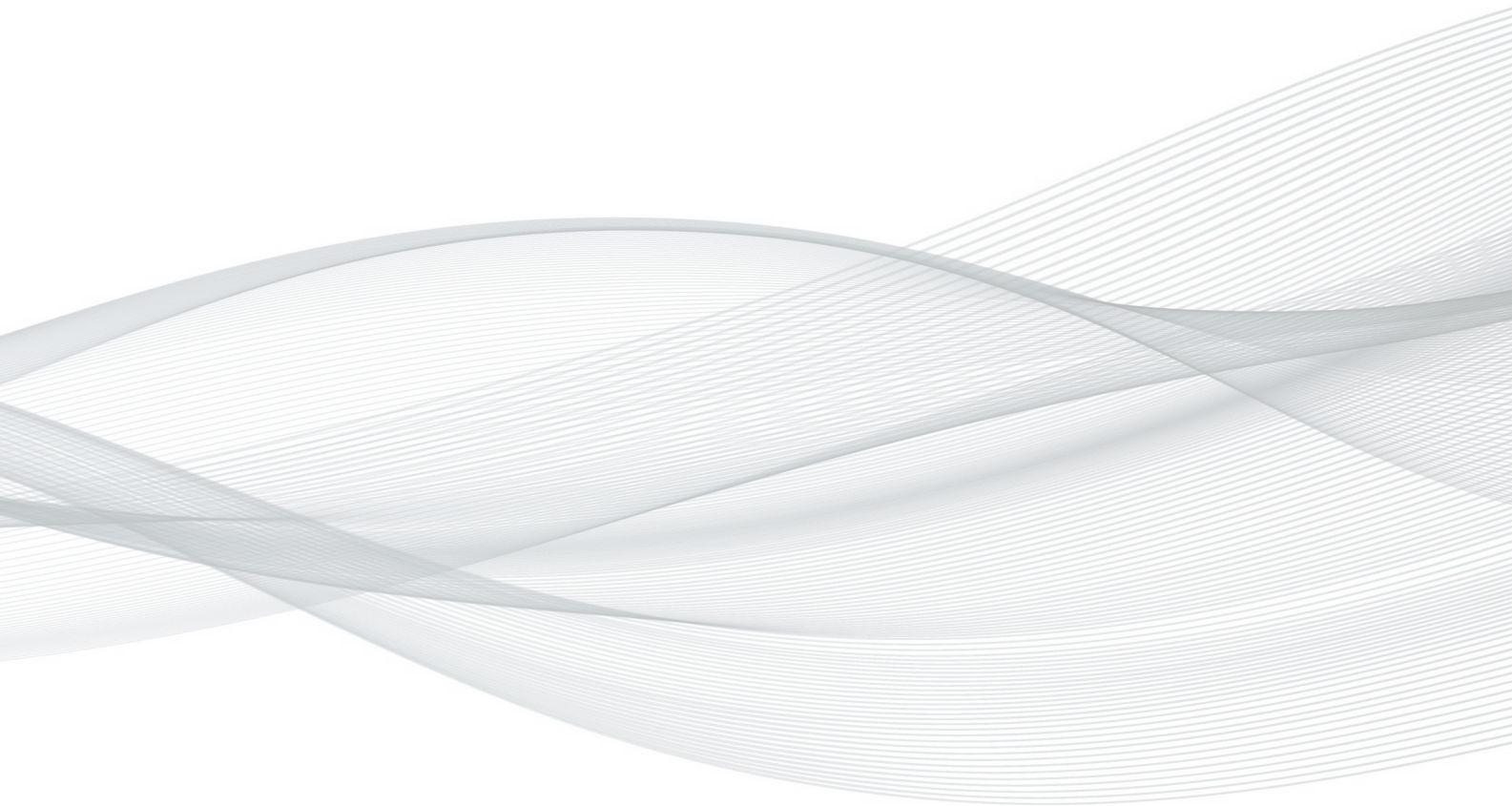
The medical condition of escapers and rescuees may include decompression illness, physical injuries and trauma. Again, using specialist commercial sources, JFD can provide specific training in hyperbaric medicine, casualty coordination and Patient Tracking.

EXERCISES

Regular exercises form an essential part in developing and maintaining the core skills of personnel involved in submarine operations. Equally, those organisations involved in supporting a DISSUB incident gain valuable knowledge and experience from realistic scenario-based training. Such exercises are regularly conducted by leading submarine operating nations - often as part of joint exercises with NATO, where non-NATO nations are regularly invited to participate.

JFD is able to support the undertaking of the following types of exercise:

- ✓ **ESCAPEX.** An ESCAPEX is a live exercise - using in-service assets and serving crew members - to practice the process of escaping from a bottomed submarine. An ESCAPEX tests the ability of crew to correctly follow procedures and to properly operate escape equipment whilst subject to conditions as realistic as possible to an actual DISSUB incident. An ESCAPEX therefore provides the ultimate in training fidelity and can be viewed as a final validation of a Navy's escape training programme. JFD's submarine escape personnel have vast experience in the delivery of high-fidelity escape training, including first-hand experience coordinating ESCAPEX activities. JFD are able to provide this expertise to assist Navies wishing to conduct a safe ESCAPEX
- ✓ **SMASHEX.** Submarine Search and Rescue Exercise. SMASHEX 1, 2 and 3 replace SUBLOOK, SUBMISS and SUBSUNK respectively during submarine Search and Rescue (SAR). Live assets are used as far as possible and this can be combined as a precursor to an ESCAPEX and/or a RESCUEX involving the mobilisation and deployment of a rescue system.
- ✓ **Table Top.** A walk through simulation primarily to test organisation and procedures and documentation. This will include Alert and call-out, manpower allocation, command and control initiation, outstation response and reporting, theoretical mobilisation of assets, casualty handling, publicity and media. It can involve full participation from all units using standard and emergency communication methods (a Command Post Exercise (CPX) or be limited to a group of specialists collocated for the training; ideally a Table Top should be scheduled ahead of any SMASHEX.
- ✓ **Tower Functioning Trials.** This provides a means of testing the functionality of the flood, vent and drain systems of the Escape Tower under realistic conditions. It can be a fully instrumented as part of the Platform Acceptance Trials.



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