Submarine Escape and Abandonment
Independent Safety Review

**Background**

Submarine Escape, Rescue, Abandonment and Survival (SMERAS) is the escape or rescue of personnel from an uninhabitable submarine on the surface or at depth, and their subsequent recovery and medical treatment if required.

The UK SMERAS capability includes all activity onboard the distressed submarine (DISSUB) and external responses to it.

**The Requirement**

The Head of Defence Equipment and Support, In-Service Submarines, Submarine Escape, Rescue, Abandonment and Survival (DES SM IS SMERAS) directed that an Independent Safety Review (ISR) of the Submarine Escape and Surface Abandonment Safety Management Arrangements be conducted to assess the level of compliance with the Capability Requirements as stated in the Submarine Escape Rescue, Abandonment and Survival User Requirements Document (URD).

BMT Isis Ltd were tasked to conduct an ISR of the Safety Justification for the Escape and Abandonment facilities and arrangements including:

- Onboard Submarine Systems - Escape towers (excluding the rescue seats), life support systems and stores, alertment devices, emergency under water communications and trained personnel;
- External Rescue Assets - Intervention equipment, including additional life support stores (excluding rescue submersibles and decompression chambers as they were included in a previous study);
- Personnel with responsibilities for the delivery of SMERAS capability;
- Support Facilities - Submarine Escape Training Tank (RNSETT), Institute of Naval Medicine (INM), supporting Research and Trials Authorities, etc;
- Procedures - Memorandums Of Understanding (MOUs), Books of Reference (BRs), Standard Operating Procedures (SOPs), Emergency Operating Procedures (EOPs), Standard NATO Agreements (STANAGS), etc

**Our Approach**

The ISR was undertaken using a Claims Arguments (CAE) based methodology to identify a series of Claims and Arguments against which the escape and abandonment body of evidence could be tested.

This approach was complementary to that successfully used by BMT Isis during their ISR of the NATO Submarine Rescue Service (NSRS) Safety Review, which used a CAE technique to demonstrate how each of the NSRS safety claims were being met and allocated a measure of compliance against the underpinning arguments and evidence.

The CAE approach provides a level of confidence in the claim that Escape and Abandonment does not expose personnel to unacceptable levels of safety risk (i.e. risks that are neither As Low As Reasonably Practicable (ALARP) nor either Broadly Acceptable or Tolerable in accordance with JSP430).

This top-level claim is underpinned by supporting claims that:

- Safety has been assured through Asset Selection/Specification/Design;
- Escape and Abandonment equipment is safe during base (training) activities;
- Escape and Abandonment equipment is safe during ship-borne activities

The ISR decomposed the top-level claims into a further series of claims that were developed by BMT Isis.

These claims were underpinned by a body of evidence, which was reviewed to provide a level of confidence in the safety claims that can be made for the Escape and Abandonment systems and equipment.
The Outcome

The output of the ISR was a written report and a copy of the completed CAE diagram. The report was accompanied by a presentation of the review findings to Submarine Escape and Abandonment Stakeholders.

The ISR Report provides a snapshot of the CAE model/diagram on the date of issue and identifies gaps in the safety justification for the Escape and Abandonment arrangements for discussion with the In-service Submarines Project Team.

The final report presented a number of recommendations that BMT Isis believe should be conducted to increase the confidence in the Escape and Abandonment claim for safety.