

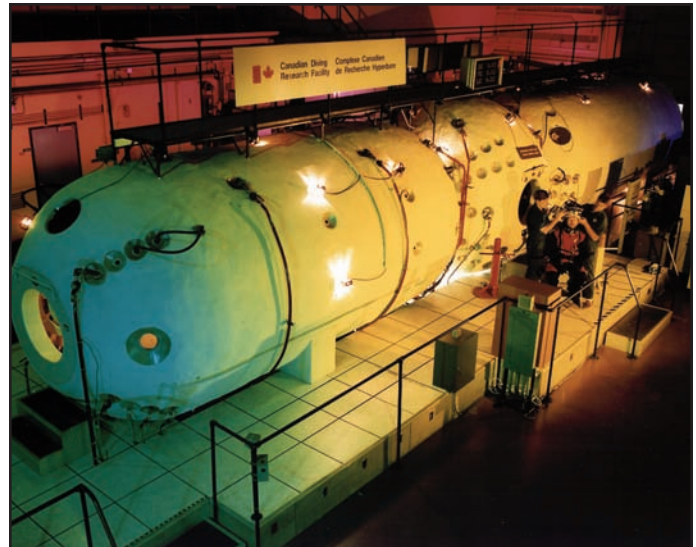


Diving Research Facility

The Diving Research Facility is a Canadian-designed and built deep-ocean simulator capable of being pressurised to over 1700 meters below sea level.

Background

Since its installation in 1978, DRDC Toronto's Diving Research Facility (DRF) has been used to further a broad range of national sub-sea research objectives for the Canadian Forces (CF) and other clients. Over 2100 manned and several hundred unmanned dives have been conducted for the CF, the Royal Navy, the Canadian Space Agency, Atomic Energy of Canada Ltd, and commercial clients such as Off-shore Systems Engineering Ltd and Fullerton Sherwood Engineering Ltd (now a division of Carlton Life Support Technologies).



Facts and figures

The DRF was designed as a saturation diving complex. It can accommodate four personnel for saturation dives and as many as 26 for "bounce" dives. The DRF is normally pressurized with compressed air but may be dived with helium or other pure gases. Its Built-in Breathing System (BIBS) – a series of breathing gas manifolds – can be used to deliver specialized breathing mixtures or in emergencies.

The DRF pressure hull consists of three independent but interconnected chambers:

- The *diving chamber* (7.3 m long x 2.4 m dia.) is used for underwater tests of equipment and procedures. Approximately half of this chamber is flooded with fresh water (over 20,000 litres) which can be chilled to temperatures as low as 3°C to simulate Canadian underwater marine and estuarine environments.
- The *living chamber* (6.4 m long x 2.4 m dia.) contains bunks, a fold-away eating area and provision for entertainment video. Doppler monitoring equipment allows scientists and medical



Diving operations are directed and monitored using a state-of-the-art control panel.

Diving Research Facility

personnel to monitor the divers' decompression stress during the dive.

- The central *transfer sphere* allows personnel to enter and exit the DRF while the living and diving chambers remain at depth. It contains a sink, shower, and toilet.

Each chamber has an equipment/medical lock to enable the transfer of diving equipment, food and medical supplies while the chamber is at depth. A multiple-channel communications system provides two-way voice communications with all three chambers. The system also provides entertainment audio and a helium voice unscrambler.

Applications

Procedures: The DRF was used to validate the DCIEM/CF Air and HeO₂ Diving Decompression Tables, which are in wide use among sport, commercial, and foreign military divers.

Equipment: The DRF has been used in the development of:

- Canadian Underwater Mine-countermeasures Apparatus (CUMA), a specialized breathing apparatus which enables CF divers to neutralize influence-type sea mines
- new non-freezing divers' breathing regulators for Canadian cold water operations



In 1994, the DRF was used by the Canadian Space Agency for a simulated space mission. Four Canadian astronauts – Mike McKay, Dave Williams, Julie Payette and Robert Thirsk – spent a week of isolation in the chamber.



The diving chamber is used to test diving equipment and procedures.

- active heating for Mine Countermeasures (MCM) divers
- the CF MCM diving system, including weight-vests, lighting, navigation, and diver information displays
- a contaminated water diving ensemble for CF divers

Future activities: The DRF will be used for research in pressure acclimatization, development of a non-freezing scuba regulator, and application of probabilistic (predictive) models of decompression, and tri-mix decompression tables.

Availability

The DRF is available under memoranda of understanding to other national governments and government agencies or under contract to civilian and commercial organizations.

For more information

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