# Canadian technology gives access to hard-to-find ocean resources

With three oceans washing its shores, and with 152000 miles of coastline (one of the longest in the world), Canada is very much a maritime nation.

In recent years, it has benefitted greatly from the wealth its oceans contain, and by exporting its skills, ideas and technology, it has shown other maritime countries how they can benefit too.

In the articles below, we feature three areas – offshore oil and gas, ocean-floor minerals, and fishing – where new developments in Canadian ocean technology are beginning to pay big dividends. In all three areas, the trick is first to *find* the

In all three areas, the trick is first to *find* the resource in question, and in all three areas, Canadian enterprise is developing new technology which is making the search that much easier.

## One-man submarine searches for oil on ocean bottom

Deep in the sea off the Nova Scotia coast, a Canadian-built one-man submarine called *Deep Rover* has been undergoing manned trials. More recently, it has been used to check out volcanic activity near Hawaii and to examine portions of the new ANZCAN underwater cable, before returning to the Nova Scotia coast where it is to be used by Petro-Canada to explore for oil as deep as 800 metres.

Because Petro-Canada wants television pictures, *Deep Rover* will not be cut off from surface contact. Instead, it will be tethered to a platform floating near the surface, and an umbilical cable will carry television signals up from the bottom.

Normally, the *Deep Rover* is propelled along the ocean floor by battery-powered motors, allowing a diver to explore nearly a kilometre under the sea without any link to the surface.

#### Several problems solved

The *Deep Rover* – the most advanced of deep-ocean research vessels – solves several problems facing



Pressurised submarines and diving spheres are useful for long dives, but they are ponderous and they do not give divers much chance to study or interact with the things they encounter.

Micro-submarines such as *Deep Rover* offer the advantages of both diving suits and submarines. Manoeuvrable and usable at depths of 1000 metres or more, they can dive quickly and return to the surface without problems of decompression, because the atmosphere inside the bubble is maintained at surface pressure.

Deep Rover has already spent more than 4000 hours underwater, testing the ability of its molded plastic bubble to stay watertight and withstand high pressure. Graham Hawkes, who developed the Deep Rover concept, says that, ultimately, it will be possible 'to have comfortable, affordable access to the ocean in a manner as commonplace and accepted as driving an automobile or flying an airplane.'

#### Robotic arms have delicate touch

The robotic arms at the front of the submarine can move in five ways and the hands can move in four ways, making it possible to do very delicate building tasks and to pick up scientific specimens.

In laboratory tests, the mechanical claws picked up eggs and served glasses of champagne without breakage. The controls are so simple to use and so precise they can make the mechanical arms draw intricate pictures and even sign names.

Deep Rover was built in a joint venture by Can-Dive Services Ltd. of Vancouver and by Hawkes' Deep Ocean Engineering Inc.

### Unmanned torpedo in hunt for minerals

It's long been known that one of the world's largest, untapped sources of minerals is to be found in the 'nodules' that are scattered over the oceans' floors. Now, researchers in Canada have developed an underwater vessel that can be used to search the oceans' floors for these nodules.

The vessel – an unmanned, torpedo-like machine about ten metres in length and one metre in diameter – can move underwater without any on-going guidance from the surface. That means it can be adapted to serve a number of functions. Searching the sea floor is one. (Another, which is likely to prove just as useful, is inspecting underwater pipelines for leaks and fractures.)

#### Movements controlled by computer

Most unmanned vessels that serve similar functions have two main drawbacks. They are controlled from the surface by cable (which reduces their freedom of movement); and they require the full-time attention of skilled operators who must guide their every movement.



Deep Rover: *exploring the ocean without links to the surface.* 

