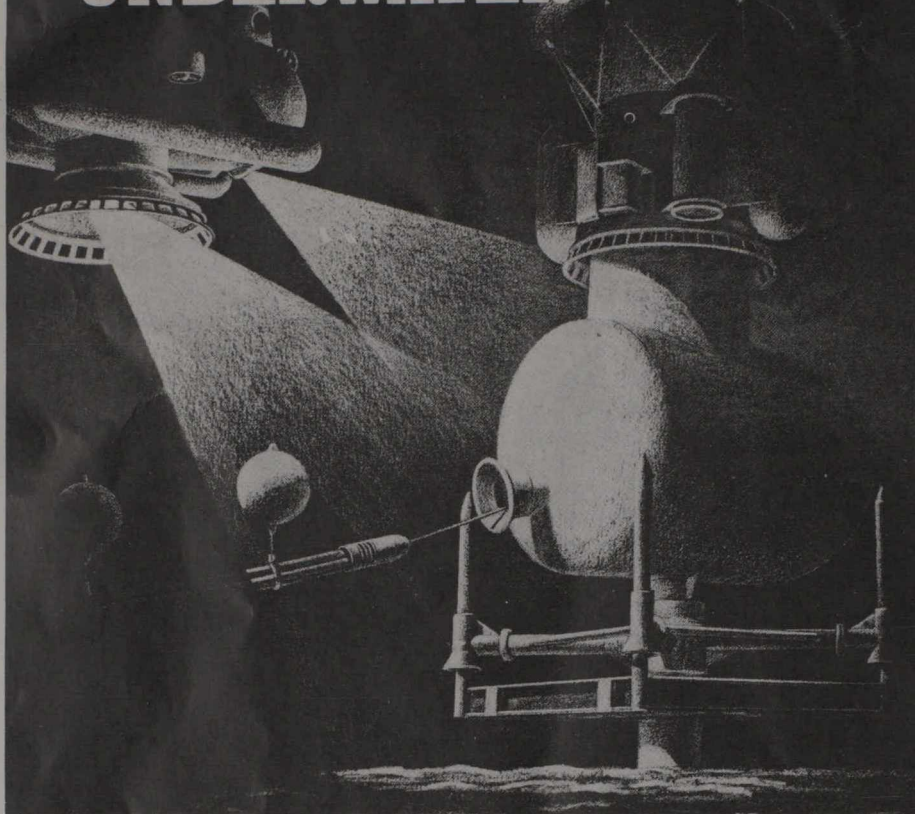


## SEARCH FOR NEW ENERGY SOURCES

# LOCKHEED GOES UNDERWATER



CANADA has been a leading contributor to ocean technology. Canadian drilling crew travel the world's oceans sharing their mining experience with other nations. According to the United Nations, Canada spends more per capita on oceanographic research than any other country. Because she fronts on three oceans and has an unusually large continental shelf, the expenditure is in her own interests, but the benefits are also universal.

At present, Canada is leading all countries in the development of a total subsea oil production system that will provide the most economical means of exploiting deep water wells below the ocean floor.

Currently pumping up oil from a well at 375 feet in the Gulf of Mexico is a semi-spherical chamber, part of a system in which men can descend more than 1,000 feet under water to work at a wellhead in shirtsleeves. Considering that all productive wells until not long ago were located in less than 400 feet of water, the system, developed by Lockheed Petroleum Services of New Westminster (British Columbia) is ahead of its time and paves the way for exploration in deeper waters.

First tested in 1970, the system consists of the wellhead chamber or cellar, a service capsule and a sur-

face support vessel, and eliminates the need for divers, breathing masks and remote manipulation of tools. It also simplifies the procedure for connecting flowlines to wellhead plumbing which has caused the offshore oil industry some problems.

Fitted together, the cellar and capsule, each approximately 10 feet in diameter and 30 feet high, resemble a gigantic steel hourglass. The cellar is lowered to the seabed from a drilling rig until it locks over imbedded piping, and there it stays until the well runs dry.

Extensive testing of the diving bell and flowline connecting techniques has taken place in conjunction with Shell Oil Company. In 1972 a wellhead chamber was placed on an oil well for Shell in the Gulf of Mexico at a water depth of 375 feet. This well has produced almost one million barrels of oil since, requiring only one maintenance visit by the diving bell during that time. Two more such wellhead chambers are currently installed for Shell as well as several more for other companies, all in the Gulf of Mexico. LPS will enter the North Sea in 1976 for the installation of a number of pipeline connection chambers.

The system has great advantages over alternative platform developments. Not only is the overall cost less (depending on water depth),

but the construction lead times are generally much less, resulting in earlier production of much needed oil reserves. The accelerated cash flow can then be used to finance further oilfield development. The maximum capital investment in advance of income from oil production is considerably less with the LPS system.

Conditions in the Bombay offshore area are particularly advantageous to the system, because of the rather shallow depth of the oil bearing limestone formations. This decreases the reach of wells drilled under an angle from a single location, such as a platform. In the Bombay High area, not more than three, or perhaps four, wells could be drilled from a single platform. This would require a large number of these costly structures for a total field development. They would also form quite an obstacle to shipping and other surface hazards, while the LPS chambers would be safely located on the sea bottom.

Canada has introduced other innovations in the production of self-propelled dynamically positioned drilling ships, of mini-submarines and sophisticated oceanographic measuring equipment that we propose to present to our readers in subsequent issues of this magazine.

Early this year Lockheed presented the subsea oil and gas production system to a group of interested Indian Government officials and businessmen at Ashoka Hotel in New Delhi. Mr. K. D. Malaviya, Minister for Petroleum and Chemicals, was present on the occasion.

Offshore drilling rig construction, which requires considerably more skill than conventional shipbuilding and is, therefore, undertaken by fewer countries, is a growing industry on Canada's Atlantic coast. Halifax Shipyards, a division of Hawker Siddeley Canada Ltd., has produced three of the largest rigs in operation; two more of a more sophisticated design are under construction.

Artist's conception of the Lockheed surface support vessel

