INTRODUCES
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CA 19-9™ RIA is an in vitro radioimmunoassay for the
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• Improved performance for detection of pancreatic, liver and
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• Clinical studies indicate CA 19-9™ levels may be elevated in
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  Antigen for the prediction of colorectal cancer recurrence.
• CA 19-9™ provides additional as well as confirmatory
  information for prognostic management of colorectal
  cancer patients when paired with Carcinoembryonic
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...POTENTIAL TO BROADEN THE SCOPE OF CANCER
RESEARCH
• This new tumor marker which is sensitive for gastrointestinal
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Joe Burkhardt helped design a production facility that works on the floor of the sea.

Some of the world’s untapped petroleum may be trapped in rocks under water too deep for conventional platforms. That’s why Joe Burkhardt and teams of Exxon scientists and engineers have pioneered the development of new technology to take production into deeper and deeper waters.

Breaking new ground beneath the sea

In 1968, Exxon leased tracts off the coast of Southern California, including some under 1800 feet of water. This made it necessary to study ways of producing oil in waters too deep to build platforms. These studies began in a flooded pit near Ventura, California, and culminated in the Gulf of Mexico with the 1974-79 pilot test of Exxon’s Submerged Production System—a massive manifold set on the floor of the Gulf.

This prototype SPS controlled three producing wells drilled through openings in its base and delivered the oil to a nearby platform. Although the test was conducted in only 170 feet of water, it proved that the system could produce oil almost anywhere in the sea where a well could be drilled.

Now, three years later, the first commercial application of SPS technology is on the floor of the North Sea, installed by Exxon and another company.

Subsea maintenance by robot

SPSs have the potential to operate in water depths inaccessible to human divers. So Burkhardt and his
colleagues developed sophisticated robotics to perform routine maintenance.

The robot Remote Maintenance System (RMS) lowers itself along a buoyed cable from a surface vessel to the SPS. It then travels along a track which gives it access to critical valves and control components. The RMS can replace faulty parts, perform pressure tests and carry out various other maintenance functions. The entire robot operation is observed on closed-circuit television and remotely controlled from the surface vessel.

**The SPS and the environment**

Safeguards incorporated in the SPS reflect Exxon’s continuing concern for the environment. A high degree of redundancy is built into many of its subsystems. Fall-safe electrohydraulic control and shut-in systems are used throughout. In the unlikely event that leakage should occur, manifolding on the SPS is covered by inverted “pans” which would collect the leaked oil, trigger an alarm, and stop the leak by closing valves.

**The potential of the SPS**

While it is impractical to build conventional offshore platforms for water depths much beyond 1,000 feet, SPS technology could be practical to depths of a mile or more. If this full potential is realized, the SPS could be used to open up new areas for oil and gas recovery—areas that cannot be tapped today.

The design and construction of sophisticated deepwater energy systems is just one example of the research and development carried out by Exxon.

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