

# **The Gulf of Mexico**

## **Deepwater Drilling**

The Deepwater area – defined by the U.S. Minerals Management Service as water depths of 1,000 feet or greater – is one of the most promising U.S. oil and gas exploratory trends in decades. Approximately 90 discoveries have been made to date, containing an estimated 10 billion barrels of potential resources, with another 30 billion barrels believed awaiting discovery. Meanwhile, drillers are now operating in the “ultra deep” – waters deeper than 5,000 feet – and some wells have been drilled in depths approaching 10,000 feet. Deepwater reservoirs are also highly productive, and are considered “world-class” in quality. For example, in 1999 BP discovered the billion-barrel Crazy Horse field, which is the largest ever found in the Gulf. Shell holds the record for production from a single well in the Gulf, at 50,150 barrels equivalent per day from a well on the Ursa platform. Currently, rising industry oil and gas production from the deepwater is helping offset some of the declines occurring in the nation’s older and gradually depleting producing regions.

## **Offshore Pipeline Routing**

Pipelines planned for the Gulf of Mexico are subject to the regulations and jurisdiction of several federal agencies, including the departments of Interior and Transportation, the U.S. Army Corps of Engineers, the Federal Energy Regulatory Commission and the U.S. Coast Guard. Pipeline permit applications must contain the pipeline location drawing, profile drawing, safety schematic drawing, and the pipeline design data to scale. A shallow hazard survey report and/or archeological report must also be filed. This information is reviewed by the U.S. Minerals Management Service, which is part of the Department of the Interior.

## **The Okeanos Pipeline**

BP and Shell have announced plans to build a \$150-million pipeline to gather natural gas from new producing fields currently under development in the ultra-deepwater Gulf of Mexico. The 100-mile-long Okeanos Pipeline will have a capacity of at least one billion cubic feet of gas per day, and will be the Gulf’s first gas pipeline in water depths exceeding 6,000 feet. BP will own two-thirds interest and serve as operator, with one-third interest owned by Shell Gas

Transmission. The pipeline will connect with the Destin Pipeline, which comes onshore in Mississippi. After processing, the gas transported to shore by the Okeanos Pipeline will flow into five interstate pipelines that serve the eastern U.S. Construction will begin in 2002, with Shell managing the first segment, consisting of a 74-mile, 24-inch pipeline serving the Shell and BP Na Kika field complex 150 miles southeast of New Orleans. Production will begin in 2003. Construction of the second phase, which BP will manage, will consist of a 26-mile segment serving the Crazy Horse field. Production will begin in 2005.

# Finding the Shipwrecks

## The Surveying Technology

The *U-166* as well as the previously known wreckage of the *S.S. Robert E. Lee* were detected during a survey of the ocean bottom conducted by an autonomous underwater vehicle (AUV), which is a highly advanced unmanned, untethered computer-controlled submarine developed by C & C Technologies of Lafayette, Louisiana. The AUV is about 18 feet long and three feet in diameter. A three-bladed carbon fiber propeller drives it at four knots in water depths up to 10,000 feet, with small mechanically controlled fins enabling it to navigate along preprogrammed survey lines. A fuel cell battery enables up to 40 hours of operations. The AUV carries such state-of-the-art survey sensors as a side scan sonar, which acquires acoustic imagery of the ocean floor; a multibeam echo sounder, which takes soundings every few feet in all directions as the AUV proceeds, determining exact water depths across an 800-foot-wide corridor; and a sub-bottom profiler, which acoustically examines the sediments immediately below the seabed for geologic faults or hazardous shallow gas pockets. In addition, a fiber optic gyrocompass, an inertial navigation system and a Doppler velocity log to help accurately position the AUV determine its location. An offshore survey vessel monitors the AUV, with computers on the AUV and vessel communicating through the water, enabling surveyors to see the data collected in real time. Development of this AUV capability resulted from an early commitment by BP to use the technique, and a coordinated technical effort by C & C Technologies and Kongsberg Simrad of Norway. It represents a tremendous advance in surveying efficiency and data quality.

## C & C Technologies, Inc.

C & C Technologies of Lafayette, Louisiana, provides a wide range of offshore and land-based survey services. The company has 170 employees and operates five ships worldwide that perform surveys for the oil industry, the submarine telecommunications industry and the U.S. government. These surveys are used to generate maps of the ocean bottom so that historic shipwreck sites and environmentally sensitive areas can be avoided, enabling underwater pipelines, cables and production equipment to be installed and operated safely. C & C Technologies is the first company to offer commercial autonomous underwater vehicle (AUV)

survey services, and is the undisputed leader in this technology, which utilizes an unmanned, untethered computer-controlled submarine to survey the ocean floor. The company recently earned the Marine Technology Society's "Corporate Excellence Award" for its pioneering efforts in AUV technology.

## **BP and Shell**

### **BP**

BP is one of the world's largest petroleum and petrochemicals groups. Main activities are exploration and production of crude oil and natural gas; refining, marketing, supply and transportation; and manufacturing and marketing of petrochemicals, with growing activities in gas and power and solar power generation. BP is also North America's largest producer of oil and natural gas, and is the leading gasoline marketer in the U.S. In the Gulf of Mexico, BP produces more than 450,000 net equivalent barrels of oil and natural gas per day from all water depths. In the deepwater area, BP's portfolio includes nearly three dozen discoveries or producing fields, and the industry's largest inventory of lease holdings; more than three million acres. BP is also the deepwater's largest holder of reserves, and plans significant increases in production in the future.

### **Shell**

Shell Oil Company is an affiliate of the Royal Dutch/Shell Group of Companies. Including its consolidated companies and its share in equity companies, Shell is one of America's leading oil and natural gas producers, natural gas marketers, gasoline marketers and petrochemical manufacturers.

Shell is the leading oil and gas producer in the deepwater Gulf of Mexico and is a recognized pioneer in oil and gas exploration and production technology. Shell currently has 41 deepwater discoveries and 17 deepwater developments, which are producing a total of 400,000 barrels oil equivalent per day. Shell's developments include five tension leg platforms, four of which broke world water depth records for a drilling and production platform when they were installed. Shell also operates a major system of natural gas pipelines in the Gulf of Mexico and is the leading transporter of gas from the deepwater.

# **Biographies**

**David H. Welch**

**BP America Inc.**

**Houston Region Vice President**

David Welch is BP's Houston Region Vice President and senior representative for Texas and the Gulf Coast area. The Houston Region represents almost 30 percent of BP's worldwide net income and employs approximately 13,000 people in 13 states and the Gulf of Mexico. The company's regional business activities include oil and natural gas exploration and production, refining and chemical manufacturing. Welch has also served in the U.S. Navy, as a professor at Tulane University and as an engineer and economist with the U.S. Geological Survey and Scientific Software Corporation. A New Orleans native, he studied petroleum engineering at Louisiana State University and the Colorado School of Mines, chemical engineering and economics at Tulane University, and business at Harvard University.

**Thomas S. Chance**

**C & C Technologies**

**Founder and President**

Thomas Chance is founder and president of C & C Technologies, a hydrographic surveying company headquartered in Lafayette, Louisiana. Mr. Chance has a bachelor's degree in electrical engineering from Louisiana State University, a master's degree in geodetic surveying from Purdue University, and a master's degree in industrial administration, also from Purdue. He is a member of the Hydrographic Society, the Institute of Navigation, the Society of American Military Engineers, and the Marine Technology Society. In 1996 he was named "Entrepreneur of the Year" in the emerging business category of a nationwide competition sponsored by Ernst & Young and other national organizations.

## The *U-166*

*U-166* was a type IX-C German submarine that sank 7,593 tons of Allied shipping during its first patrol before the submarine was itself sunk in the Gulf of Mexico. The Navy patrol vessel *PC-566*, escorting *Robert E. Lee* when it was sunk on July 30, 1942, immediately dropped depth charges on a suspected submarine after sighting a periscope. An oil slick appeared after the depth charges exploded. The U.S. Coast Guard is credited with sinking *U-166* on August 1, 1942, two days later, after a patrol plane sighted a submarine on the surface and then dropped a depth charge seen to explode nearby. The discovery of what appears to be *U-166* near the *Robert E. Lee* may spur renewed interest in this chapter of World War II maritime history and help determine exactly how *U-166* was sunk – the only German submarine lost in the Gulf of Mexico during the war. German submarines operating there sank 56 Allied ships.

The wreckage of *U-166* is located approximately 45 miles off the tip of the Mississippi River Delta. The submarine lies upright, approximately 5,000 feet northeast of the *Robert E. Lee* wreck site, in about 5,000 feet of water. The submarine's bow section apparently separated during the sinking, and is lying 500 feet away from the main hull. The submarine is facing north.

Sources: <http://www.uscg.mil>, and <http://uboat.net> websites

U.S. Merchant Vessel War Casualties of World War II, Annapolis, Naval Institute Press, 1996

## ***The S.S. Robert E. Lee***

The U.S. passenger freighter *S.S. Robert E. Lee* was torpedoed and sunk in the Gulf of Mexico by the German U-boat *U-166* on July 30, 1942. The ship, headed for New Orleans, Louisiana, had more than 400 passengers and crew onboard. Ten crewmembers and 15 passengers were killed, with the remainder rescued by US Navy ships *PC-566*, *SC-519* and the tugboat *Underwriter*.

The wreck site of the *Robert E. Lee*, which was known previously, is approximately 45 miles off the tip of the Mississippi River Delta. The ship is lying upright and essentially intact in approximately 5,000 feet of water, with what appear to be four lifeboats on the ocean floor nearby.

Sources: <http://www.uscg.mil>, and <http://uboat.net> websites

U.S. Merchant Vessel War Casualties of World War II, Annapolis, Naval Institute Press, 1996