

Oil & Natural Gas Technology

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2007 Annual Progress Report (Period Ending 1-31-08)

Microhole Coiled Tubing Bottom Hole Assemblies

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Office of Fossil Energy

2007 Annual Progress Report

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1.0 Executive Summary

Ultima Labs continued work on this project in 2007. Work began in April, 2005 following award of financial assistance in February, 2005. Project completion is now scheduled for June, 2008.

Efforts during 2007 focused on Detailed Design. The Bottom Hole Assembly now consists of four separate sub-assemblies: a Near Bit Measurement Sub, located below the mud motor and above the drill bit; the Upper Short Hop Receiver Sub, located directly above the mud motor; the Resistivity Collar, located directly above the Upper Short Hop Receiver Sub; and Probe-Based MWD, located above the Resistivity Collar in a non-magnetic drill collar. The Probe-Based MWD includes the Mud Pulser and Directional Measurements.

We made significant progress on detailed design and test of the Near Bit Measurement Sub during 2006. In early 2007, we decided to separate the Resistivity and Short Hop Communications functions into two separate, modular collars. This decision makes the Resistivity collar design simpler and easier to manufacture. This also allows us to begin field testing the Resistivity Collar with Probe Based MWD prior to completion of the Short Hop Communications Sub.

For the Upper Short Hop Communications Sub, we completed conceptual design and are nearly complete with the detailed mechanical design. Detailed electronics and firmware design are also underway.

For the Resistivity Collar, we completed the detailed design of four of the six printed circuit boards (PCB's) as well as the wiring harness. We also completed the detailed mechanical design and have received all mechanical parts required to complete the collar. We are currently assembling the first two prototypes.

For the Probe-based MWD, we are currently completing the detailed design of the mechanical and electrical interface between the Resistivity Collar and the MWD probes. The Probe-based MWD system is commercially available from our parent company, Sondex. The Probe-based MWD gear has been procured and is ready for field test with the Resistivity Collar.

For Technology Transfer, details of the product have been made available to customers globally by our parent company, Sondex, which is now part of GE Energy. One customer has already placed a significant order for 3.5" Resistivity collars with Probe-

based MWD, which will be based on the technology developed for the 3 1/8" Microhole BHA. The slightly larger 3.5" tool size will support higher mud flow rates required by the customer. The 3.5" BHA is scheduled for delivery in Q3 2008. We will begin assembly of the 3.5" collars following completion of the 3 1/8" collars for the Microhole program.

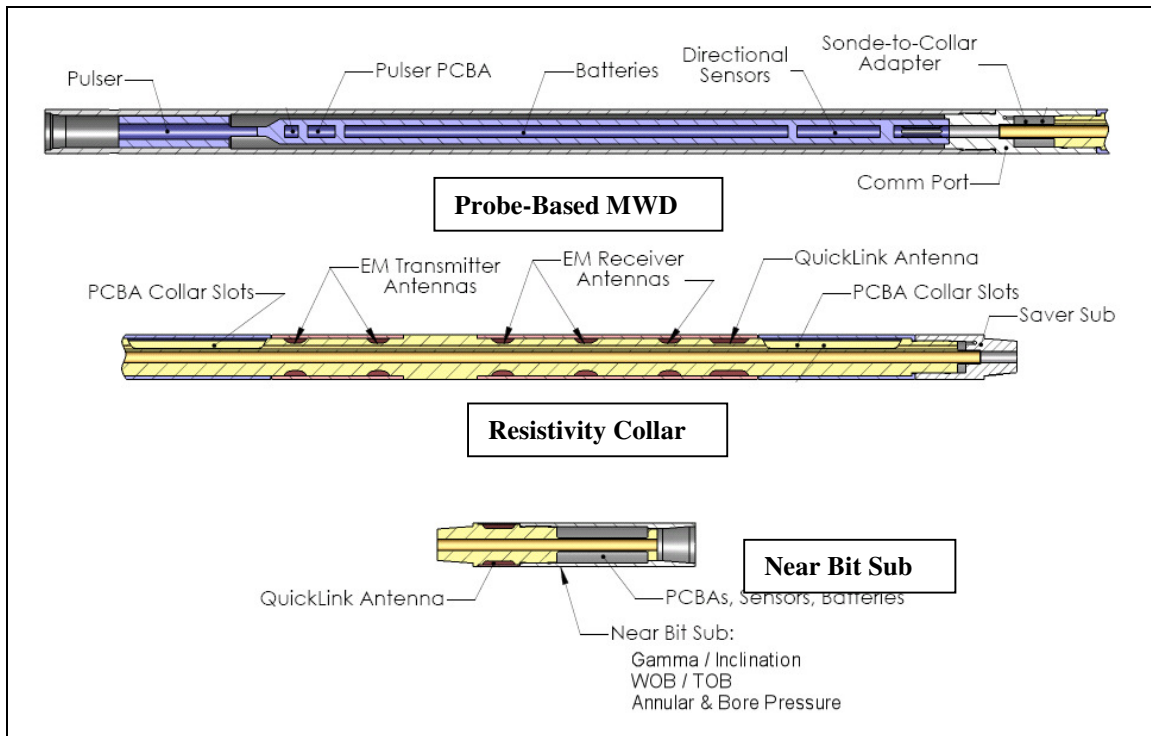
In September, 2006, Ultima Labs was acquired by Sondex plc, a publicly traded company headquartered in Great Britain. The acquisition by Sondex resulted in the sale of the 3.5" tools described previously to an existing Sondex customer, and also provided the project with proven Probe-based MWD technology. In October, 2007, Sondex was acquired by GE, and is now part of the GE Energy group of companies. GE is committed to growing the MWD/LWD product line and has retained all personnel involved in the project and continued support. In February, 2008, Ultima Labs relocated from our original location in Houston to a much larger GE facility in Sugar Land, Texas just outside of Houston and approximately seven miles from our original location.

We requested and received a no-cost extension for the project in Q4 2007. Progress during 2007 was slower than expected due to unprecedented demand for design resources and also machining capacity within the oil well service sector. The project end date was extended from October, 2007 to June, 2008.

2.0 Results During Reporting Period

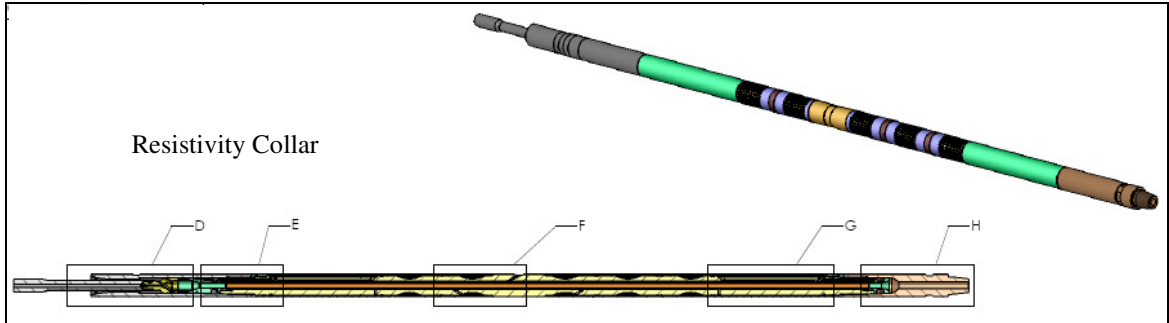
The Microhole Coiled Tubing Bottom Hole Assembly (BHA) now consists of four distinct subassemblies. Starting from the bottom of the BHA, the Near Bit Measurement Sub is immediately above the drill bit and connects to the bottom of the mud motor. The Upper Short Hop Transceiver Sub is above the mud motor. The Upper Short Hop Transceiver Sub provides a wireless communications link between the Near Bit Measurement Sub below and the remainder of the system above the mud motor. The wireless link eliminates the need for a wired connection through the mud motor. The Upper Short Hop Transceiver Sub includes an antenna on the outer diameter for the wireless link and electronics for detecting the wireless signal and transferring the data to memory and the mud pulse telemetry link in the Probe-Based MWD system. The Resistivity Collar includes antennas on the outer diameter for the Resistivity measurement as well as Resistivity electronics. Immediately above the Resistivity Collar are the Measurement While Drilling Probes and Mud Pulser. The probes are in the bore of a non-magnetic drill collar. The probes contain batteries for the mud pulser, directional sensors, and Resistivity Collar; electronics for Inclination and Azimuth measurements; mud pulser control electronics; and non-volatile memory for system data. Optionally, the MWD probes may include a gamma ray measurement for customers who choose not to include the Near Bit Sub in the system.

An earlier version of the BHA is shown below. In this version the Short Hop (or “QuickLink”) antenna is shown integrated into the Resistivity Collar. We decided early in 2007 to separate the Short Hop and Resistivity measurement functions into two separate subs. This makes the design, manufacture, and test of the Resistivity Collar simpler. It also allows customers without interest in the near-bit measurements to purchase to Resistivity collar without the Short Hop option. We have already committed to delivery of 3.5” Resistivity Collars based on this concept for a customer who did not require the Near Bit Measurement option.

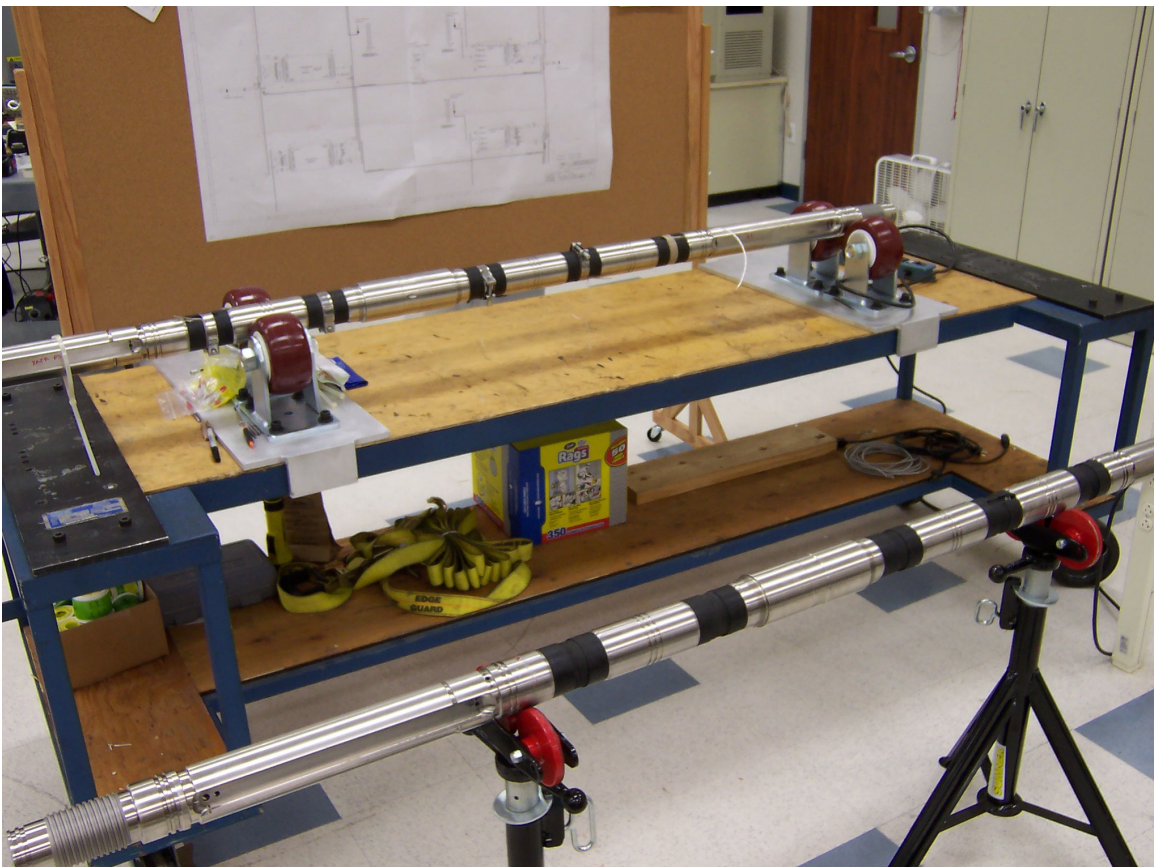


Resistivity Collar

An assembly drawing of the revised Resistivity Collar is shown below. In this illustration the downhole end of the tool is to the right. In this view the Resistivity Collar is shown with a short saver sub (Detail H) in place of the longer Upper Short Hop Transceiver Sub. The 3.5" version of the BHA will be run in this configuration. There are five resistivity antennas on the outer diameter of the collar to provide three different transmitter – antenna spacings with multiple depths of investigation. Resistivity electronics are packaged underneath pressure housings (shown in green). Detail D at the uphole end of the tool shows the crossover connection from the top of the Resistivity Collar to the MWD Probes above.

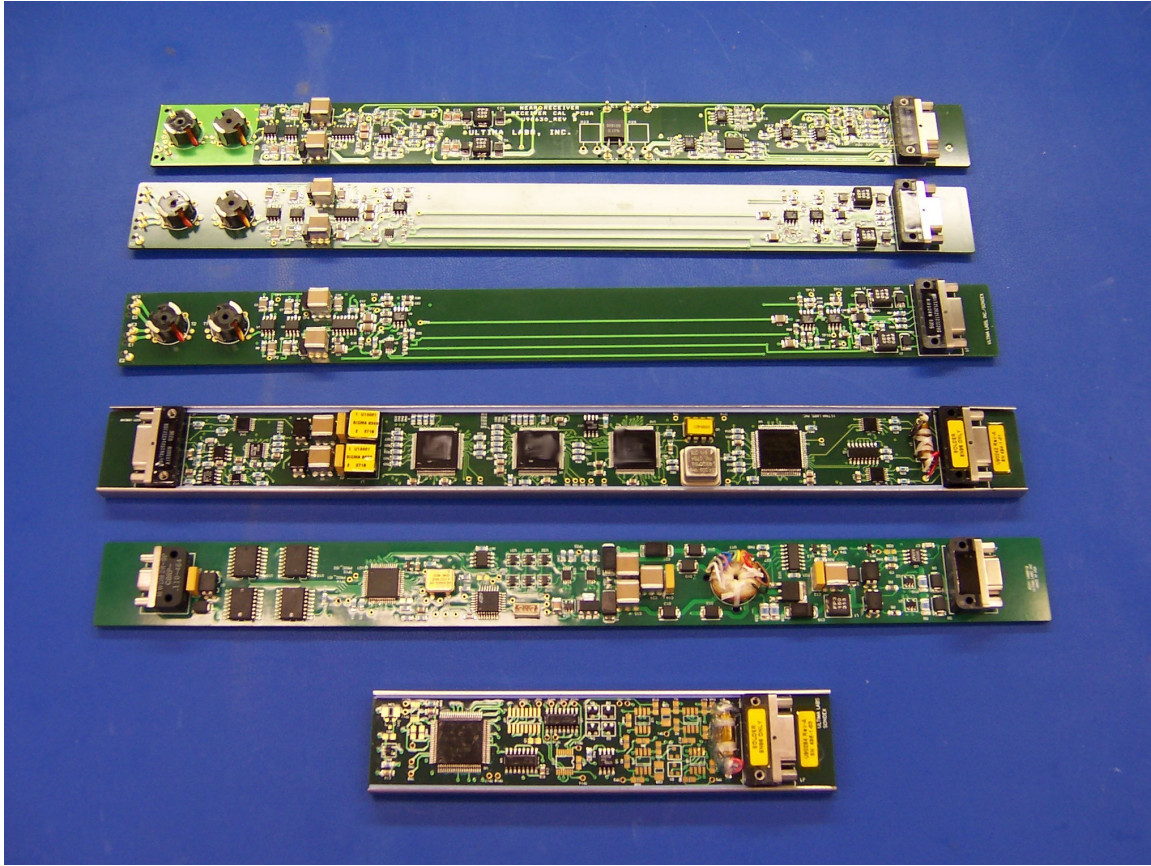


We have received all mechanical components required to complete the assembly of two 3 1/8" Resistivity Collars. A photo of the two collars in process is shown below.



Resistivity Collars Ready for Final Assembly

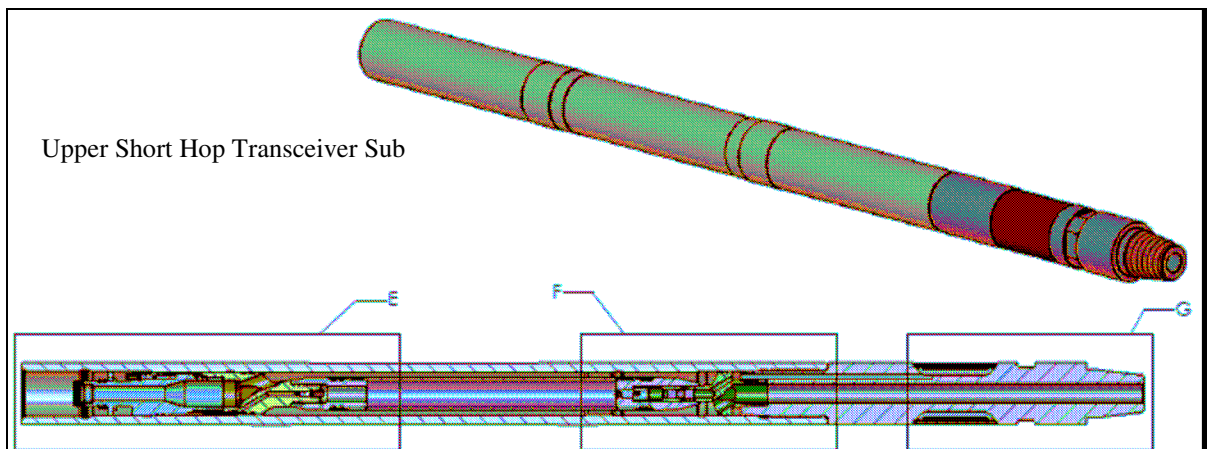
We have also completed detailed design and assembly of four of the six printed circuit boards (PCB's) required for the Resistivity measurement. The four boards are shown in the photo below. Design of the wiring harness is also complete and assembly is underway. Detailed design is underway for the two remaining PCB's.



Electronics for Resistivity Collar and Memory Probe

Upper Short Hop Transceiver Sub

We completed the conceptual design of the Upper Short Hop transceiver and began the detailed design. The conceptual design is shown below.



The antenna for communications with the Near Bit Sub below the mud motor is on the outer diameter of the tool and shown in Detail G. The pin connection in Detail G makes

up to the top of the mud motor. The electronics for the Short Hop communications link are housed in a probe shown in purple. Detail E shows the crossover connection to the bottom of the Resistivity Collar.

Probe-based MWD

The initial project plan for the mud pulser and probe-based MWD was to develop all new equipment. A new design would have required significant engineering effort and testing. In September, 2006, Ultima Labs was acquired by a U. S. subsidiary of Sondex. The existing Sondex product line included a 3 1/8" pulser, probe-based directional sensors and batteries, and surface instrumentation for mud pulse decoding and log plotting. The decision was made soon after the acquisition to use existing Sondex designs for these components. Two sets of mud pulsers, directional probes, battery probes, and surface software have been procured and are ready for field test.

The communications interface between the Ultima Labs sensors under development and the existing Sondex equipment was completed and tested with larger tool sizes early in 2007. Due to space limitations of the 3 1/8" resistivity collar, the resistivity Memory and Interface printed circuit boards (PCB) will be relocated to the probe-based MWD section. The Memory PCB has been assembled and is undergoing test and additional firmware development. The Memory PCB includes a new high speed communications interface for dumping the 16Mbyte memory. The new interface uses a reduced signal count compared to the interface used in the 4.75" and 6.75" tools. Detailed mechanical design of a probe section to house the Memory and Interface PCB's is nearing completion.

Near Bit Measurement Sub

Most of the detailed design for the Near Bit Measurement Sub was completed in 2006. The existing mechanical design is currently being revised to improve pressure sealing. Downhole parts will be ordered in the next few weeks.

3.0 Milestones Not Met

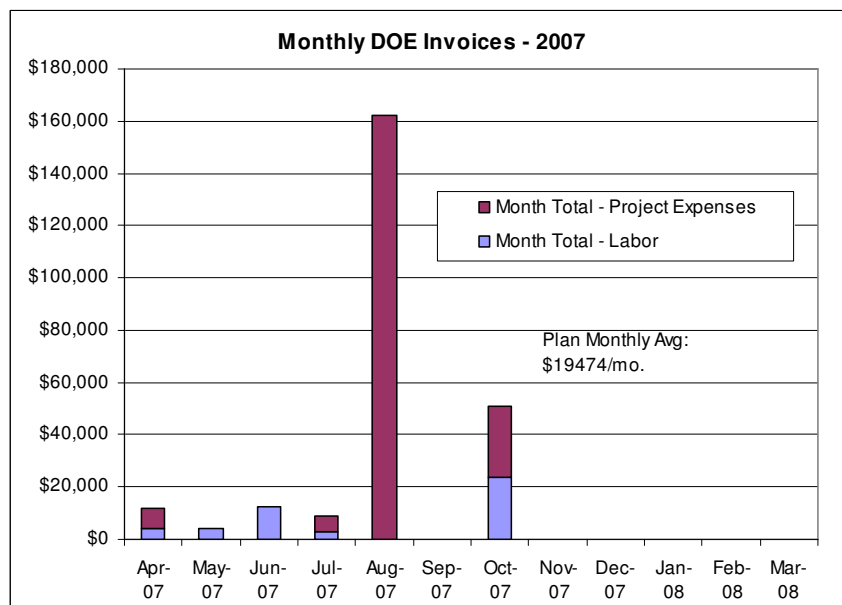
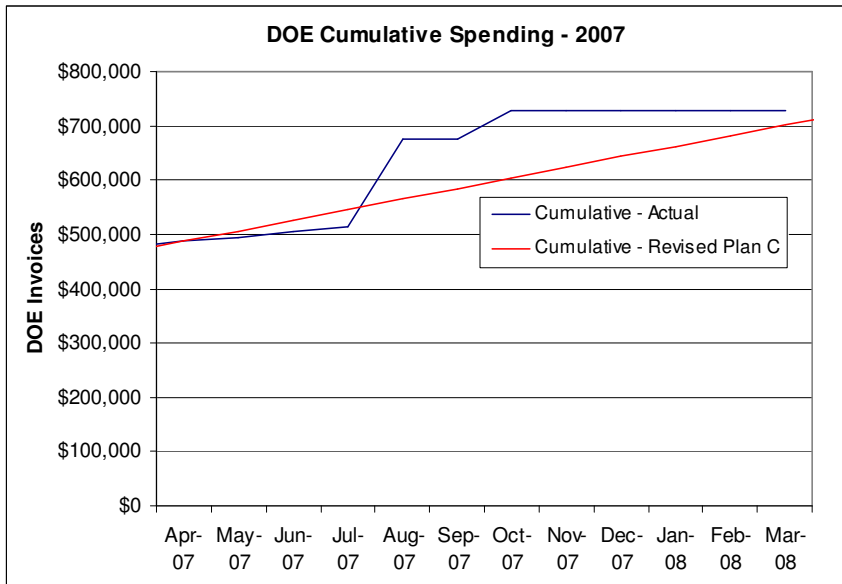
We again missed our milestone for beginning of field testing during 2007. We missed the milestone primarily due to a continuing shortage of design resources. Also, assembly of downhole prototypes was delayed while waiting on delivery of key mechanical

components. Only a limited number of machine shops are capable of machining the resistivity collar and all such shops are busy satisfying orders to existing customers.

We requested and received an extension of the project until June 30, 2008.

4.0 Cost and Schedule Status

The following graphs show monthly invoices to DOE for 2007.



In 2007 expenses shifted from labor (mostly engineering design hours) to project expenses. The largest project expenses were for procurement of the Probe-based MWD equipment and progress payments for procurement and machining of the materials for the Resistivity Collars.

The following table shows the original budget and actual expenditures for 2007 with DOE and Ultima Labs shares.

Participant	FY 2007 Plan	FY 2007 Actual
DOE	\$233,693	\$264,133
Ultima Labs	\$58,423	\$66,033
Total	\$292,116	\$330,166

The remaining balance of DOE funds is \$32,216. We expect to invoice this amount during Q2 of 2008, prior to the scheduled end of project in June, 2008. Resources are available internally to complete the project should additional funding be required after all DOE funds are used up. Existing orders for 3.5" collars will insure completion of the project.

Now that the Resistivity Collars have finally arrived we expect to be able to complete final assembly and begin field test of the combined Probe-based MWD and Resistivity Collar system by the end of June, 2008.

5.0 Summary of Significant Accomplishments

- Completed Detailed Mechanical Design of Resistivity Collar
- Received Delivery of all Mechanical Components for Resistivity Collar
- Completed Design and Assembled First Prototypes of 4 of 6 Printed Circuit Boards for Resistivity Collar
- Completed Conceptual Design and made good progress on detailed mechanical design of Upper Short Hop Transceiver Sub.
- Completed Design and Testing of Communications Interface from Resistivity Collar to Probe-based MWD system.
- Procured Probe-based MWD System.
- Began Detailed Mechanical Design of Memory Probe.

6.0 Actual or Anticipated Problems

Competition for design and machining resources continues to be the primary challenge to the project. This competition for resources has resulted in delay of completion of the project until June 30, 2008. When resources are available, we have made good progress.

7.0 Technology Transfer Activities

Our parent company, Sondex, has already received orders for a 3.5" version of the Resistivity Collar with Probe-based MWD. After successful field testing of the first 3 1/8" system we plan to display the equipment at the Society of Petroleum Engineers convention September 21-24 in Denver.

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