

# PROJECT FACT SHEET

**CONTRACT TITLE:** Development of Single Well Imaging Systems (PARTNERSHIP)

**ID NUMBER:** P-44

**CONTRACTOR:** Sandia National Lab  
Idaho Nat'l Engr Lab

**B & R CODE:** AC1005000

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**PROJECT SITE**

**CITY:** Albuquerque

**STATE:** NM

**CITY:** Idaho Falls

**STATE:** ID

**CITY:**

**STATE:**

**CONTRACT PERFORMANCE PERIOD:**

06/30/1996 to 05/31/1997

**PROGRAM:** Supporting Research

**RESEARCH AREA:** Partnership/Borehole Seismic Technol

FUNDING (\$1000'S)	DOE	CONTRACTOR	TOTAL
PRIOR FISCAL YRS	500	0	500
FISCAL YR 1998	0	0	0
FUTURE FUNDS	0	0	0
<b>TOTAL EST'D FUNDS</b>	<b>500</b>	<b>0</b>	<b>500</b>

**OBJECTIVE:** Develop source and receiver system interfaces and upgrades that will allow testing of different combinations of sources and receivers in single-well data acquisition systems.

**METRICS/PERFORMANCE:**

**Products developed:** (1) Generic analog-to-digital converter and fiber-optic interface (Task 1); (2) Two sets of hardware (Task 1); (3) Modified Sandia/OYO clamp (Task 4).

**PROJECT DESCRIPTION:**

**Background:** Single-well seismic imaging has been identified in the petroleum industry as a technology with significant economic potential, particularly in the Gulf of Mexico and Gulf Coast salt basin prospects where much domestic development activity is currently focused. Deploying a seismic energy source and receiver string in a single well may allow imaging with higher resolution than can now be achieved with surface seismic techniques. In a salt basin environment, such images would guide targeted, low-risk development drilling for accumulations of oil and gas trapped against slat flanks, overhangs, and fault surfaces. Single-well imaging technology might also provide useful data in subsalt environments where surface data are often uninterpretable. This emerging single-well technology presents unique technical challenges in the areas of borehole seismic data acquisition, data processing, and interpretation.

**Work to be performed:** Task 1 - Develop an analog-to-digital converter and fiber optic interface compatible with Exxon and Conoco multi-receiver systems. Task 2 - Adapt Conoco orbital source technology to single well fiber optic operation. Task 3 - Analyze existing single-well data to assess coupled source-receiver noise. Task 4 - Assess and redesign clamping system of Sandia/OYO multi-receiver.

**PROJECT STATUS:**

**Current Work:** Four main tasks were established to convert various existing hardware to single-well use. Hardware has been designed and fabricated and laboratory and field testing is continuing.

**Scheduled Milestones:**

Test generic receiver interface	06/97
Complete design of Conoco hardware	05/97
Fabricate Conoco hardware	09/97
Test source/receiver isolation scheme	05/97
Design swing-arm clamp	03/97
Test prototype clamp	09/97
End project; assimilate into new single well seismic imaging project	09/97

**Accomplishments:** Task 1 - A generic analog-to-digital converter and fiber optic interface, based on an earlier Sandia/OYO design, was fabricated by OYO and Amoco for use with any type of analog seismic receiver array. Sandia surveyed numerous companies and worked with OYO to ensure that the new hardware would be compatible with as many systems as possible. Two sets of hardware was fabricated, one for use with Conoco and Amoco's receiver string, and one for use with Exxon's receiver string. Both sets have been tested and used in field surveys, and show a marked performance improvement over the hardware they replaced.

Task 2 - Hardware modifications were designed to adapt Conoco's AC orbital source to run on a fiber optic wireline to facilitate hanging the receivers from Task 1 below the source in the same well. The design is complete, and fabrication will begin next month.

Task 3 - INEEL has planned a field test of a source/receiver isolation scheme using an air cushion beneath a packer.

Task 4 - Laboratory tests were conducted on a modified Sandia/OYO clamp to determine effect on receiver bandwidth, with promising results. A new swing-arm clamp was designed which is a direct replacement for the present horizontal piston clamp. A prototype was fabricated and tested in the lab. Additional testing is planned.