

**PROJECT FACT SHEET**

**CONTRACT TITLE:** Measuring and Predicting Reservoir Heterogeneity in Complex Deposystems

**DATE REVIEWED:** 01/12/93

**DATE REVISED:** 12/15/92

**OBJECTIVE:** To measure and map reservoir heterogeneity at various scales, and develop techniques and models to predict heterogeneity in existing fields and undrilled areas in the Appalachian Basin suggesting the optimum infill, extension, and deeper pool locations. The approach will be multidisciplinary, involving petroleum engineering, stratigraphy, structural geology, seismic studies, analysis of lineaments, petrology, geochemistry, geostatistics and modeling.

**ID NUMBER:** DE-AC22-90BC14657

**B & R CODE:** AC1510100

**CONTRACT PERFORMANCE PERIOD:**

09/20/90 to 09/19/93

**PROGRAM:** Lt Oil

**RESEARCH AREA:** Geoscience

**DOE PROGRAM MANAGER:**

**NAME:** George J. Stosur

**COMMERCIAL:** (301) 903-2749

**DOE PROJECT MANAGER:**

**NAME:** Edith C. Allison

**LOCATION:** BPO

**COMMERCIAL:** (918) 337-4390

**CONTRACTOR:** Appalachian O&G Research  
West Virginia University

**ADDR:**

P.O. Box 6064  
Morgantown, WV 26506

**CONTRACT PROJECT MANAGER:**

**NAME:** Douglas G. Patchen

**ADDR:** Appalachian O&G Research

P.O. Box 6064  
Morgantown, WV 26506

**PHONE:** (304) 594-2331

**FAX:** 304/293-3749

**PROJECT SITE:**

Morgantown, WV  
Pittsburgh, PA  
Columbus, OH

**SCHEDULED MILESTONES:**

Complete final version of second annual report.	01/93
Complete final version of Rose Run topical report.	01/93
Complete stratigraphic, structural, seismic, petrographic, engineering and modeling studies of the Big Injun.	04/93
Write first draft of the final report.	05/93

FUNDING (1000'S)	DOE	OTHER	CONTRACTOR	TOTAL
PRIOR FISCAL YRS	3,038	0	1,873	4,911
FISCAL YR 1993	0	0	0	0
FUTURE FUNDS	0	0	0	0
<b>TOTAL EST'D FUNDS</b>	<b>3,038</b>	<b>0</b>	<b>1,873</b>	<b>4,911</b>

**PROJECT DESCRIPTION:** This project targets two important Appalachian Basin reservoirs: Big Injun (Mississippian) sandstones of West Virginia and the Rose Run (Ordovician) sandstones of Ohio and Pennsylvania. The project will use a multidisciplinary approach to measure and map heterogeneities at regional, field, between-well, and pore scales, and ultimately to develop tools and techniques to predict heterogeneity. Specific project activities are: 1) map geometry of sandstone bodies within a regional depositional system; 2) map facies changes within several targeted reservoirs and predict the inherent relative heterogeneity of the facies; 3) Correlate structural variations with hydrocarbon production; 4) develop a reliable seismic model of the studied reservoirs; 5) describe pore types and relate them to permeability, fluid flow and diagenesis; 6) study the effects of heterogeneities on fluid flow and reservoir recovery; 7) use geostatistical techniques to detect regional trends in heterogeneity; and, 8) use the study data and analyses to compute the local probability for commercial recovery of new infill wells.

**PRESENT STATUS:** The study of the Rose Run sandstone in Ohio and Pennsylvania has been completed and the first draft of a topical report written and submitted. In the Big Injun study, additional seismic data are being collected over Granny Creek field, and stratigraphic and structural studies of that field are nearing completion. Core descriptions have been completed, and thin section study is nearing completion. Reservoir modeling and geostatistical studies are on schedule.

**ACCOMPLISHMENTS:** Several scales of heterogeneity were recognized in the Rose Run sandstone, and geologic controls (depositional, stratigraphic and structural) of these heterogeneities were determined. At the field scale, seven types of heterogeneity were recognized (faults; discrete genetic units; permeability zonation; baffles to fluid flow; laminations and cross bedding; textural variations and mineralogy; and fractures). Five case studies of Rose Run productive areas indicated that production is associated with six different trapping mechanisms, although erosional truncation and paleotopography are the most significant.

**BACKGROUND:** The Appalachian Basin, due to low estimated future reserves, is dominated by independent operators who do not have the expertise or resources to conduct research necessary to more efficiently develop the remaining reserves. This project will attempt to provide the research support and understanding necessary to develop highly heterogeneous reservoirs.