ADVANCED RESOURCES INTERNATIONAL

Final Progress Report

Remote Sensing Applications for Antrim Shale Fracture Characterization, Michigan Basin

MIS No. NAS13-625

Submitted by:

Advanced Resources International, Inc.

July 10, 1997

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EOCAP FINAL PROGRESS REPORT

Preparer

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Date: July 15, 1997

I. Cover Sheet

Company:

Advanced Resources International, Inc. (ARI)

Project Title:

Remote Sensing Applications for Antrim Shale Fracture Characterization, Michigan Basin

MIS #:

NAS13-625

Contract Year #:	Current Year Contract Investment:		Prior Year Contract Investment:	
1 2 **3** 4 5	NASA	Company And Partners	NASA	Company and Partners
	$54,484	**$90,000**	**$212,790**	**$250,000**

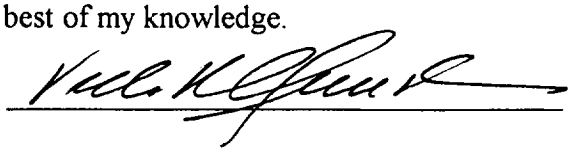
Quarter:

1 2 3 **4 (Annual)**

Report Period:

From: **March 1, 1997**
To: **June 7, 1997**

Certification: I hereby certify that the work progress, expenditure status, and other entries are true and correct to the best of my knowledge.

Signature of preparer:  Date: **July 10, 1997**

II. Highlights This Quarter

(A) Describe task milestones achieved this period.

Key business/market results:

ARI sent seven staff members to the 1997 International Coalbed Methane Symposium, held in Tuscaloosa, Alabama from May 12-17. ARI gave a short course on risk reduction strategies, including remote fracture detection, for coalbed methane exploration and development that was attended by about 25 coalbed methane industry professionals; and presented a paper entitled "Optimizing coalbed methane cavity completion operations with the application of a new discrete element model." We met with many potential clients and discussed our fracture detection services.

Dr. David Campagna gave a one-week workshop on geologic remote sensing techniques and applications to a group of 15 state geologists in Xian, China. China has vast coalbed methane resources, but is still highly dependent on coal- and wood-burning. This workshop, sponsored by the United Nations, was intended to help China develop its less-polluting energy reserves.

ARI is successfully finding new applications for its fracture detection services. Coalbed methane exploration became an important market in this quarter, with the inception of a joint industry/government collaboration between ARI, Texaco and DOE to use remote fracture detection to identify areas with good potential for coalbed methane production in the Ferron Coal Trend of central Utah; the contract value for ARI is $30K. Geothermal energy exploration is another emerging market for ARI, where fracture detection is applied to identify pathways for groundwater recharge, movement, and the locations of potential geothermal reservoirs. Unocal awarded ARI a $12K contract for geothermal exploration in Costa Rica.

Key technical results:

ARI continued work on two industry/government collaborations to demonstrate fracture detection to potential clients: oil and gas exploration with Chevron and DOE in the San Joaquin basin (Buena Vista Hills - Elk Hills Naval Petroleum Reserve) and tight-gas exploration with Barrett Resources and DOE in the Piceance basin. ARI began work on a new collaboration with Texaco and DOE, applying fracture detection to coalbed methane exploration in the Ferron Coal Trend of central Utah; and completed a proprietary project that applied remote fracture detection to geothermal energy exploration for Unocal in Costa Rica.

ARI completed the technical content layout for a multimedia CD-ROM that describes our remote fracture detection service, using coalbed methane exploration in the San Juan basin of New Mexico as an example. Lockheed Martin (Stennis) is finalizing the design. The CD should be complete and ready for production and distribution during the fall of 1997.

(B) What are the implications of this quarter's results in reaching the project's business/technical goals and objectives?

Meeting reporting year objectives:

The main objectives of this second option year were to market, sell and conduct additional fracture analysis studies, and disseminate fracture detection technology. Fracture analysis marketing was aggressively pursued at the International Coalbed Methane Symposium. New contracts, in addition to the continuation of collaborative industry/government projects in the San Joaquin basin, Piceance basin, and Ferron Coal Trend, occupied significant staff resources.

Technical content of a multimedia CD-ROM was finalized. The CD explains how remote fracture detection can be applied to coalbed methane exploration, and will be used as a marketing and educational tool to facilitate technology transfer to potential clients and other interested parties.

Contributing to overall project success:

In the renewal proposal for the second option year, we discuss the potential obstacles to success for this project: lack of information available to prospective clients, and skepticism regarding the value and reliability of ARI's fracture detection service. Continued marketing and technology transfer efforts during this quarter have significantly improved our market penetration. We've strengthened our position in the coalbed methane exploration market and entered a new marketing arena for geothermal exporation.

Final production of the CD-ROM will give us a new tool for rapid technology transfer.

(C) 1. What interaction have you had with your customers, Product Advisory Board members or other customer-related groups this quarter? Did they make any specific recommendations about your product/service?

ARI had extensive marketing contact with current and potential customers during this quarter (see above), resulting in new commercial applications for coalbed methane and geothermal exploration and development.

2. What new marketplace developments, such as new competition or changes in customer attitudes, have you seen this quarter that are relevant to your EOCAP project?

None.

(D) Describe specific hurdles or difficulties encountered during this quarter (e.g., data unavailability, legal/regulatory hurdles, and business/technical shortfalls).

None.

(E) Describe any proposed changes in your business or technical strategy, tactics, or tasks during this period and the reasons for such changes.

No changes in our business or technical strategy occurred during this quarter.

(F) Discuss any gains in company productivity (such as time, labor, materials, or other cost savings) as a result of EOCAP. Please be quantitative if possible.

Productivity gain:

ARI productivity: ARI purchased an additional image processing workstation during this quarter that significantly enhanced our company productivity, adding 67% to our capability to perform on-screen fracture analysis.

Dollar estimate of value of productivity gain or cost savings:

During the fourth quarter, we estimate a $50K increase in company productivity related to fracture detection services.

III. Quarterly Progress and Expenditures Table

Tasks[1]	Task Status[2]													
	Planned	Actual	Next Quarter	This Quarter				Cumulative to Date				Cumulative Variance from Planned		Next Quarter (Planned)	
				Planned		Actual		Planned		Actual					
				NASA	Co.	NASA	Co.	NASA	Co.	NASA	Co.	NASA	Co.	NASA	Co.
TASK 1	100%	100%	100%	0	0	0	0	213	100	213	100	0	0	0	0
TASK 2	100%	100%	100%	0	0	0	0	50	150	50	150	0	0	0	0
TASK 3	100%	100%	100%	8	30	8	31	54	90	54	107	0	17	0	0
TASK 4	0%	0%	0%	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	--	--	--	**8**	**30**	**8**	**31**	**317**	**340**	**317**	**357**	**0**	**17**	**0**	**0**

[1]Tasks are defined in Work Task and Budget Summary.

[2]Enter <25%, 25%, 50%, 75%, or 100% to describe the status of each task and subtask.

[3]Use whole $1,000 to describe the status of planned/actual expenditures of NASA, co-funded dollars/in-kind, and variance from annual projections.

TASK DESCRIPTIONS

TASK 1: Fracture Characterization, Detection and Optimization Projects
TASK 2: Data Compilation and Integration
TASK 3: Technology Transfer
TASK 4: Evaluation

IV. Quarterly Co-Funding Breakdown

Include all sources (e.g., associate partners, etc.)

Cost Category	Co-Funding Sources		Totals
	Cash Amount ($)	In-Kind Resource Amount ($)	
Direct Labor	0	0	0
Direct Overhead (57.0%)	0	0	0
Other Direct Costs	*12,000	**18,000	30,000
Total Direct Costs	12,000	18,000	30,000
General & Admin. (9.2%)	1,104	0	1,104
Total Cost This Quarter	**13,104**	**18,000**	**31,104**
Cumulative Total Cost	**34,230**	**64,000**	**98,230**

Explanation of Cost Categories:

Direct Labor - Include the Principal Manager and other significant labor categories (e.g., Engineer, Administrative Assistant).

Direct Overhead - Use current rate negotiated with the DCAA. Multiply Direct Labor by the Direct Overhead rate to determine Direct Overhead.

Other Direct Costs - Include expenditures for Consulting Services, Subcontracts, Marketing Expenses, Data Acquisition, Data Analysis/Computer Services, Equipment, and Travel.

Total Direct Costs - Sum of Total Direct Labor, Direct Overhead, and Other Direct Costs.

General and Administrative - Multiply Total Direct Cost by the G&A rate to determine G&A Cost.

Total Cost - Includes the Total Direct Cost and the G&A Cost.

Cumulative Total Cost - Provide a cumulative total of expenditures for co-funding during all previous quarters, including this report.

***Purchase of a new PC workstation for image analysis, and image analysis software.**

****Co-funding by United Nations to sponsor geologic remote sensing workshop for technology transfer in China.**

V. Discussion

(A) What is the business and technical status of the entire project?[1]

Green.

No significant technical or marketing obstacles were encountered during this quarter. Marketing contacts and projects performed during this quarter have all had significant positive impact on industry familiarity with, and acceptance of, ARI's fracture detection services.

[1] Please begin by evaluating the project status as: **green** (all early progress and results indicate that the project's technical and business tasks are on course, meets or exceeds initial expectations, and will succeed as intended); **yellow** (project has one or more tasks with significant short comings or risks identified during the reporting period (s)); or **red** (a project has tasks about which there is significant risk or uncertainty noted, including potential "show stoppers" (e.g., access to data or other outside dependencies that were not overcome).

(B) What are the key challenges and resulting emphases/activities for the next quarter?

This was the final quarter of contract performance. However, ARI will continue to aggressively pursue new fracture analysis work; investigate alternative data sources and technology solutions for oil and gas exploration; and market our services, educate potential clients, and enhance technology transfer by making direct marketing contacts and presenting our work at conferences and workshops. ARI will report business results to NASA over the next two-year period of evaluation.

VI. Examples of Results

Please attach examples of in-progress results that include samples of brochures, photos of product(s), etc.

(A) Product, process, service prototypes:

No new examples generated this quarter.

(B) Trademarks, copyrights, or other protections:

None.

(C) Papers published, conference presentations given, congressional testimony at state or federal level and other participation in committees, advisory or task groups.

1) Oral presentation: "Optimizing coalbed methane cavity completion operations with the application of a new discrete element model," International Coalbed Methane Symposium, Tuscaloosa, Alabama, May 12-17, 1997.

2) Workshop on risk reduction technologies for colabed methane exploration and development, International Coalbed Methane Symposium, Tuscaloosa, Alabama, May 12-17, 1997.

3) Short course on geologic remote sensing techniques for energy exploration, Xian, China, June 14-21.

(D) New jobs/divisions created within your company as related to project activity: (include number & description)

During this quarter, ARI expanded the Geologic Remote Sensing Group in the Washington, DC headquarters office. Two additional full-time people were hired, including John Amos, Senior Associate, and Brian Kuch, Digital Cartographer. With these additions the geologic remote sensing group increases in size to five full-time positions.

(E) Sales materials (e.g., marketing brochures) generated: (attach samples)

No new materials this quarter.

VII. Business Revenue Matrix (figures in $1000)

		1996*	1997*	1998	1999	2000
Expected Gross Revenue (Receipts)		**1129**	**291**	**420**	**660**	**860**
	Salaries & Wages	282	85	255	400	520
	Fringe Benefits	97	30	--	--	--
	Materials & Equipment (Excluding Data)**	11	5	0	0	0
	Data Acquisition	9	3	75	120	160
	Marketing	***	***	45	65	75
	Other Direct Costs (List)	414	59	0	0	0
	Indirect Costs (List)	297	91	0	0	0
Net Pre-tax Revenue		**19**	**18**	**0**	**0**	**0**
	NASA	0	0	0	0	0
	Partners: Cash in Hand	0	0	0	0	0
	Partners: Cash from Outside Sources	0	0	0	0	0
	Partners: In-Kind Resources	0	0	0	0	0

* Actual revenues and costs accrued as of 6/30/97.

** Purchase of two PC workstations and two image processing software licenses ($25K) contribute to overhead and are not listed separately.

*** Actual marketing costs contribute to overhead and are not listed separately. Assume 10% of gross revenue.