

**U.S. Department Of Energy**  
**Office of Fossil Energy**

# **Native American Initiative**



**August 2003**

**National Energy Technology Laboratory**





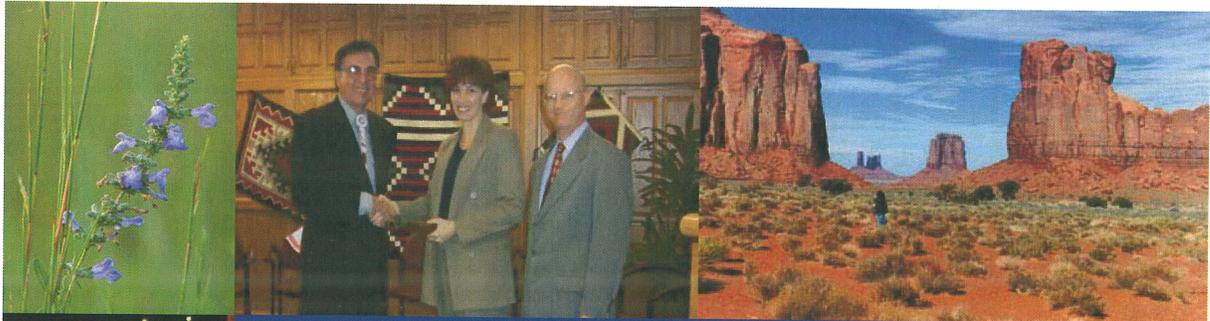
The U.S. Department of Energy's Tribal Energy Program is committed to helping our Native American Tribes develop clean, affordable and reliable energy options. Diversity is an important element to our success and our commitment. It is therefore important that everyday we seek new ways to expand opportunities. These projects will encourage tribal self-sufficiency, increase employment and promote economic development

We must include tribal participation in the decision-making process where our action may impact their environment and cultural interests. The rich cultural traditions and proud ancestry of American Indians and Alaska Natives have made vital contributions to the strength and diversity of our society. But more than just recognizing the valuable contributions of Native Americans, we are celebrating the idea that American's strength can be found in people from every walk of life and every set of experiences.

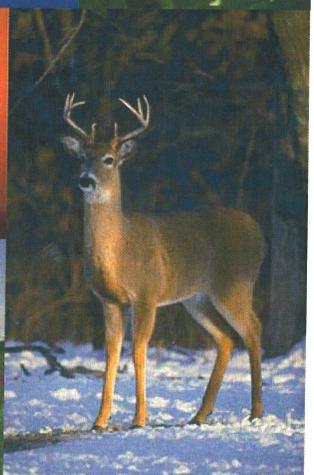
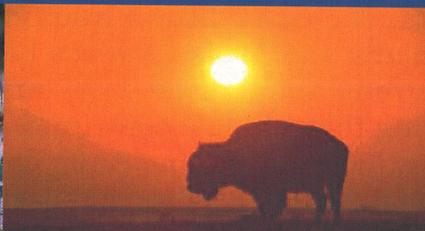
A handwritten signature in cursive script that reads "Spencer Abraham".

Secretary of Energy

# Mission Statement



The U.S. Department of Energy assists Native American Tribes to better manage their oil reserves by gaining access to new petroleum technologies.



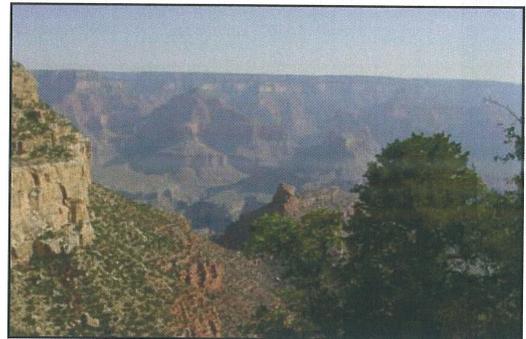
# Table of Contents

Introduction.....	2
Government-to-Government.....	3
 Educational Outreach.....	4
Oil Program.....	5
Map .....	6
Success Stories.....	8
Current Projects.....	10
Contacts .....	15

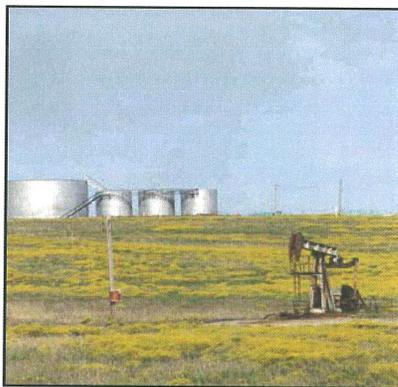


# Introduction

Native American reservations contain large reserves of oil and gas. On tribal lands there are an estimated 890 million barrels of oil and natural-gas liquids, and 5.6 trillion cubic feet gas\*. This translates into huge potential revenues for the tribes even when conservative production estimates are used.



Grand canyon South Rim



Oil Pump, Osage County

For example:

\* \$6.5 billion in economic activity, plus nearly \$1 billion in royalties would be generated if only 35% of the estimated reserves of oil and natural-gas liquids were produced and sold at \$21 per barrel.

\* Almost \$10 billion in sales and \$1.5 billion in royalties would be realized if 70% of the estimated gas reserves were produced.

The Department of Energy's (DOE) Native American Initiative is designed to enable Tribes to develop and manage this significant energy resource. DOE partners with tribes, industry and other government agencies to increase oil recovery on tribal lands while effectively protecting the environment. The effort is expected to return economic dividends to the tribes at the same time it helps strengthen our country's energy security.



Native American leaders at NETL office in Tulsa

# Government-to-Government Relationships

The U. S. Department of Energy (DOE) is committed to maintaining unique government-to-government relationships with Tribal Nations.

DOE's National Energy Technology Laboratory has funded oil & gas research projects on non-allotted Native American and Alaskan Native Corporation lands while honoring DOE's American Indian and Alaska Native Tribal Government Policy. This policy ensures that Tribal environmental and cultural beliefs are upheld and protected when a course of action is considered to extract the natural resources on their land. The policy may be found in a pdf format at the bottom of the following webpage: [www.em.doe.gov/public/tribal/policy2.html](http://www.em.doe.gov/public/tribal/policy2.html)

To further protect the Tribes, there exists a trust responsibility that shows the Federal government still has the responsibility to honor agreements and treaties.



Rhonda and Tribal Official



Osage Nation Deals with DOE

## "Trust Responsibility

includes, but is not limited to: promotion and protection of tribal treaty rights, federally recognized reserved rights, and other federally recognized interests of the beneficiary American Indian and Alaska Native nations; determining, documenting, notifying, and interacting with tribal governments with regard to the impact of Departmental programs, policies, and regulations to protect American Indian and Alaska Native traditional and cultural lifeways, natural resources, treaty and other federally recognized and reserved rights."

# Educational Outreach

Our educational programs to improve the awareness of current and future energy issues.

## GOALS



*Increase public understanding of energy issues*



*Provide hands-on training in the petroleum industry*



*Provide technology to enable both economic development and environmental protection*

We currently sponsors three programs that help the Native American students and Tribal leaders to become aware of the energy issues in the United States.

## PROGRAMS

### Adopt-A-School



*The DOE has adopted Byrant Elementary School, which has the largest number of enrolled Native American students in Tulsa. The students participate in DOE sponsored field trips, career fairs, tutoring and career tours of local institutions that feature careers in science and technology.*

### Mickey Leland Energy



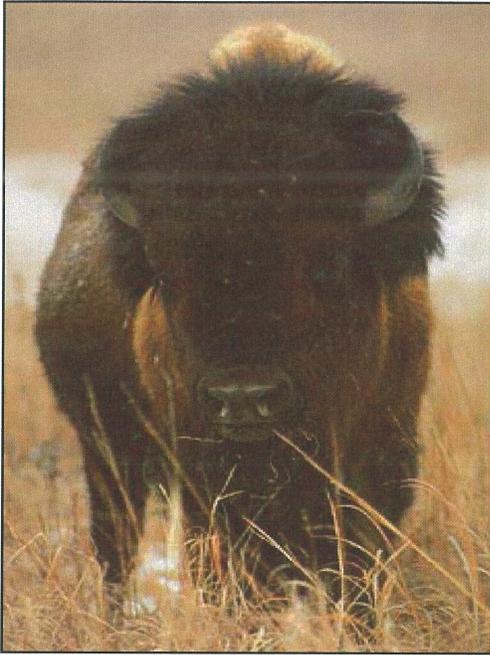
*The Mickey Leland Energy Fellowship provides college and graduate student interns summer jobs at Fossil Energy sites throughout the country. At NETL the 10-week internship gives the student hands-on experience in the oil/gas industry.*

### Workshops



*Native American workshops offer Tribal leaders and members of Tribal Energy and Mineral Departments the opportunity to learn about advanced petroleum technologies. Advanced technologies can resolve the environmental, supply, and reliability constraints of producing and using fossil fuels.*

# Oil Program



Buffalo at Tall Grass Prairie Reserve

There are many unexplored areas and underdeveloped oil reserves on Native American and Alaskan Native Corporation properties. The objective of the program is to increase resource and economic development while protecting the environment.

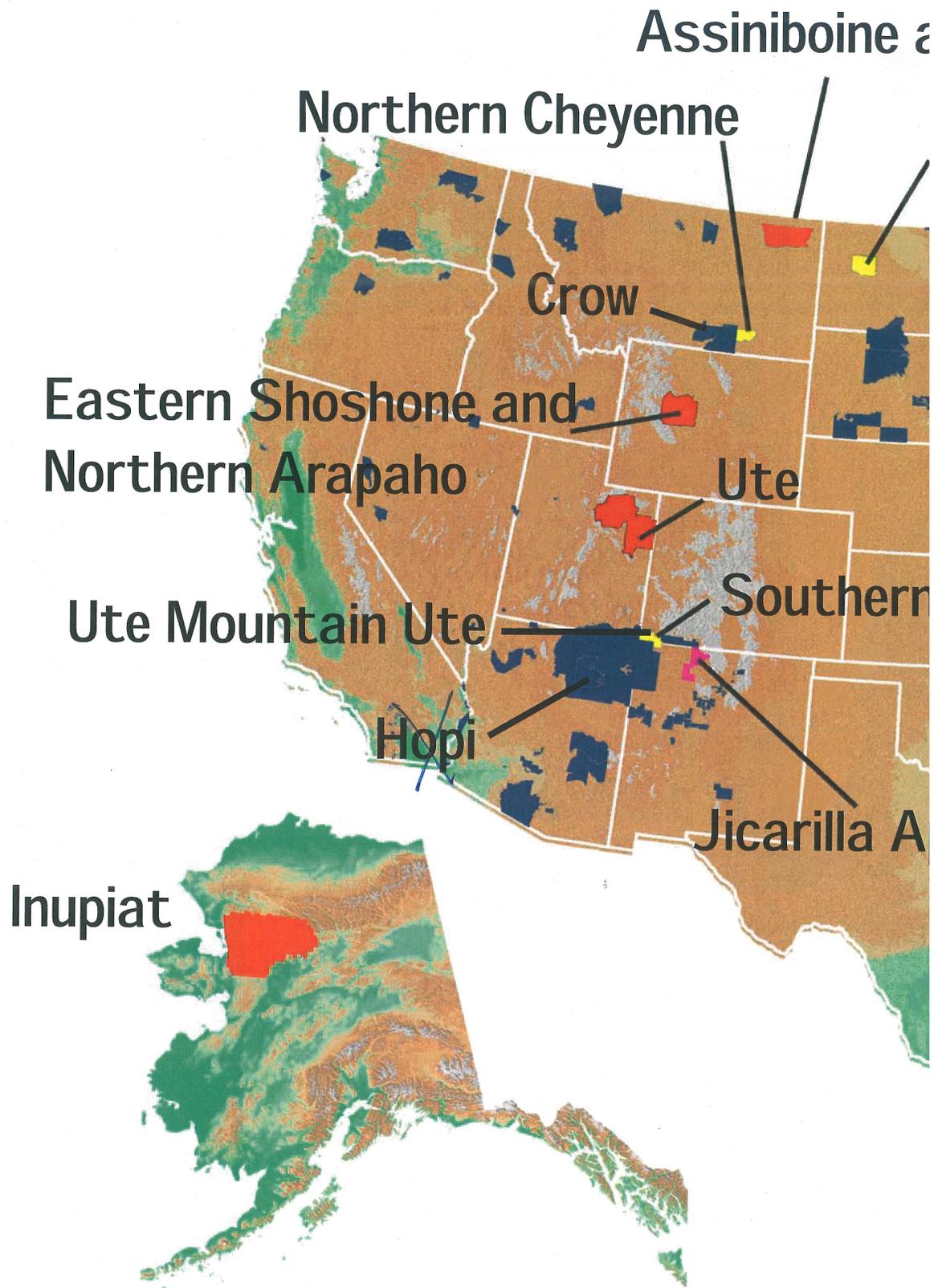
Projects must be performed on non-allotted tribally-owned lands or reservation. The intent of the program is to benefit the entire tribe, and not individual land holders. All data developed during the performance of the project is made available to the Native American Tribe or Alaskan Native Corporation and to the

general public.

The goal of our program is to apply innovative oil research to improve the development of a known oil field, to promote exploration of undiscovered oil reserves, to reduce the cost of effective environmental oil and gas field compliance, or to study the environmental impact or economic feasibility of oil processing facilities. The Native American program awards projects through a competitive solicitation process. The program is designed so that all can apply, but requires active participation with a Native American tribe or Alaskan Corporation.

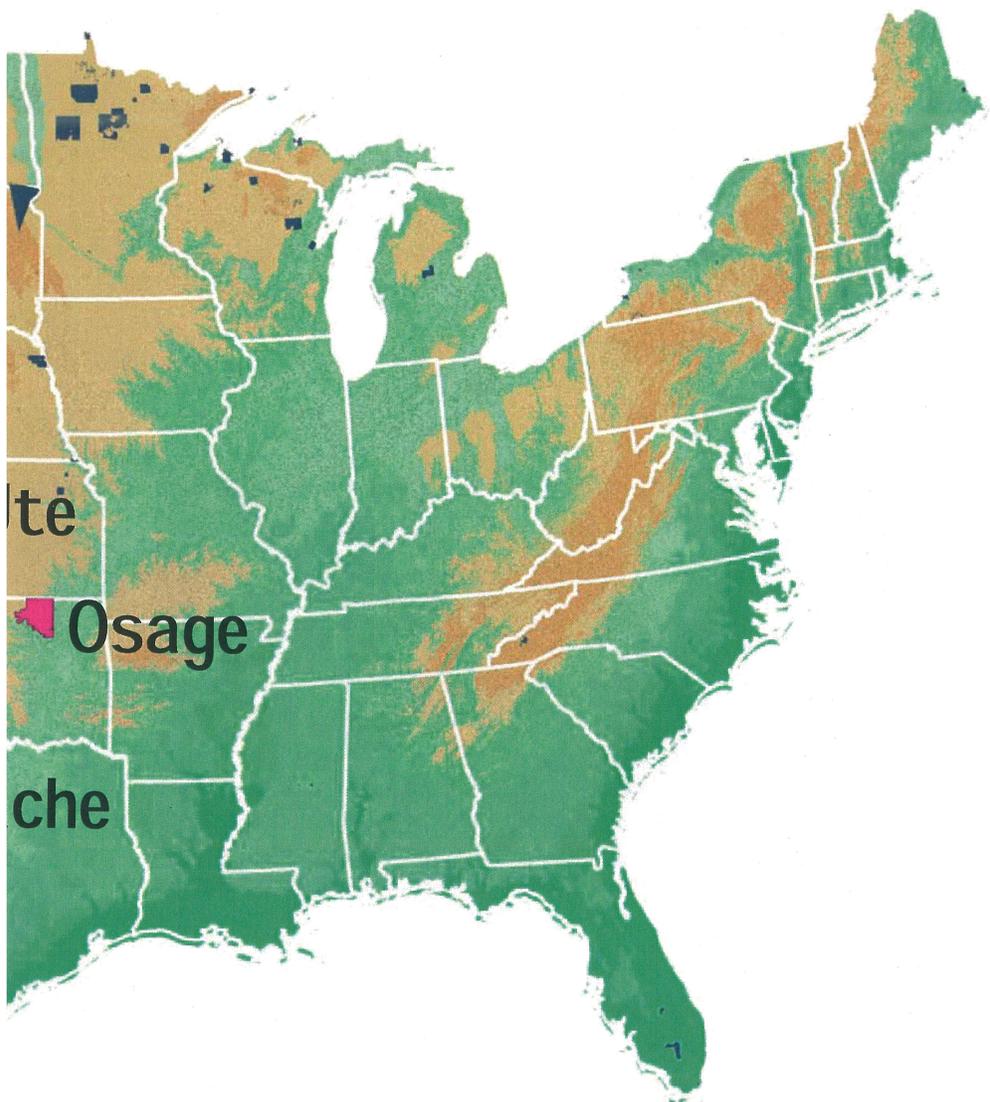


Tall Grass Prairie Reserve

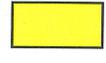


# Grand Sioux

## Three Affiliated Tribes

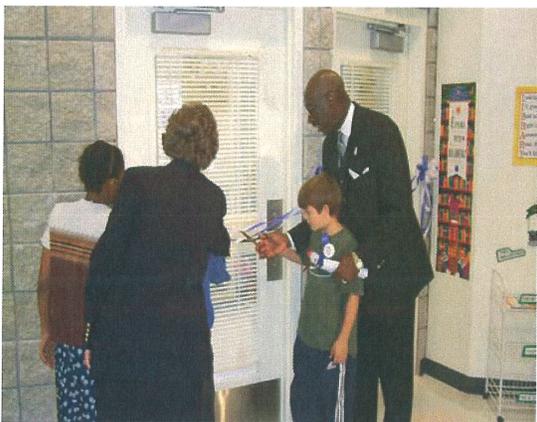


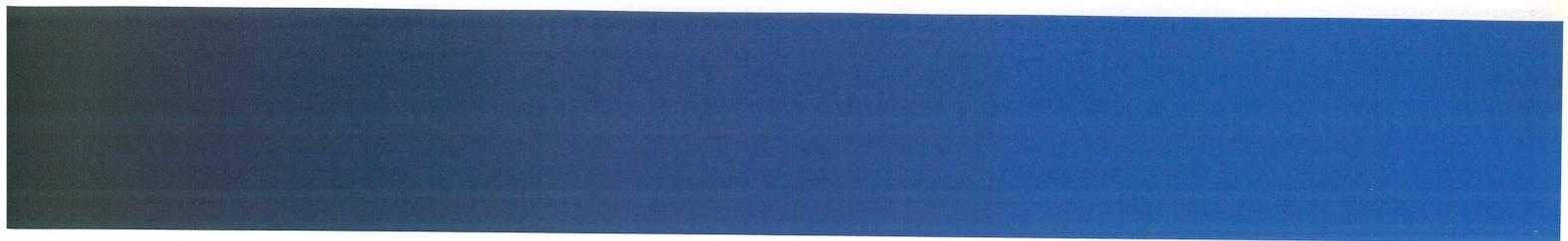
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-  Native American Reservations
-  Reservations/Native Corporations with Active Projects
-  Reservations/Native Corporations with Current Projects
-  Reservations/Native Corporations with Both Active and Current Projects

# Success Stories

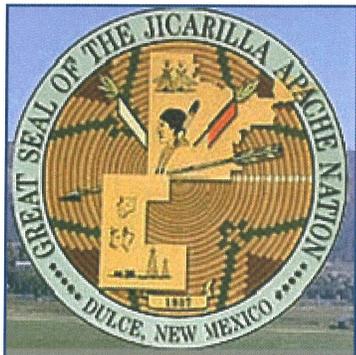
Success stories are not available at this time. See next edition for stories of completed projects on Native American Reservations.





# JICARILLA APACHE TRIBE

Petroleum Refinery Process Design, Jicarilla Apache Reservation, New Mexico



Seal of the Jicarilla Apache Nation

**Project ID Number:**

DE-FC-26-02NT15454

**Project Start Date:**

9-30-2002

**Project End Date:**

10-29-2004

**Project Investigator:**

Jesse Evans  
Jicarilla Apache Energy Co.  
P.O. Box 507  
Dulce, NM 87528

Phone: (505) 759-3224

Email:

jevans232000@yahoo.com

**Project Manager:**

Kathy Stirling

**Objectives:**

- Evaluate the feasibility of constructing an oil processing facility (refinery) on the Jicarilla Apache Reservation.
- Create a CD-ROM detailing project findings for distribution to the public.

**Partners:** Jicarilla Apache Nation, Jicarilla Apache Energy Company (JAECO), John D. Jones Engineering Inc.

**Project Description:** There are approximately 65 petroleum companies operating about 2,500 wells on the Jicarilla Apache Reservation. Because of limited production and transportation options, the Nation is dependent on large regional refineries to process their crude oil. These refineries often set a low price for regionally produced crude oil, because they have access to pipelines that can bring crude from distant sources. Indian tribes are dependent on these facilities to supply their local fuel needs. While the Tribes may not be getting the best value for the crude oil they sell, they have to pay full value for the refined products they purchase.

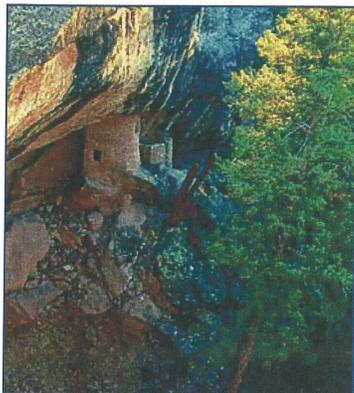
The Jicarilla Apache Nation will collaborate with JAECO and John D. Jones Engineering Inc, to conduct a feasibility study to design and construct an oil processing facility on the Jicarilla Apache Reservation in northern New Mexico. During the project, the participants will:

- Characterize the feedstocks for the refinery
- Establish the major equipment to be installed
- Determine the quantity and quality of products to be produced
- Complete the capital and operating cost data for the project
- Evaluate the feasibility of the project and quantify the value to the Jicarilla Apache Nation

Oil and gas production has been a significant source of revenue to the Nation since 1955. Development of oil and gas reserves has become a critical factor in the tribe's continued economic growth. The Jicarilla Apache Reservation is geographically situated in the northeast quarter of the resource-rich San Jan Basin. The southern portion of the Reservation has been extensively developed and is considered a mature petroleum area. The relatively unexplored northern part of the Reservation lies on the same geologic and structural trend. Current developments and a new Minerals Development Agreement covering acreage in the northern portion of Reservation mark the beginning of a new wave of more extensive reserve development. The planned oil processing facility will provide the necessary infrastructure for expanded development of petroleum reserves on the Jicarilla Apache Reservation.

# UTE MOUNTAIN UTE TRIBE

Multicomponent Seismic Analysis and Calibration, Paradox Basin, Colorado



Ruins of Ute ancestors, the Anasazi, that lived in the Four Corners area (Colorado, New Mexico, Utah, and Arizona) about 1300 A.D.

**Project ID Number:**

DE-FG26-02NT15451

**Project Start Date:**

9-23-2002

**Project End Date:**

9-22-2004

**Project Investigator:**

Paul LaPointe  
Golder Associates, Inc.  
18300 NE Union Hill Rd.  
Redmond, WA 98052  
Phone: (425) 883-0777  
Email:  
plapointe@golder.com

**Project Manager:**

Virginia Weyland

**Objectives:**

- Increase oil recovery contained within algal mounds on the Ute Mountain Ute, Southern Ute and Navajo tribal lands.
- Develop an understanding of 3D3C seismic data related to the variations in permeability and porosity of algal mounds, as well as lateral facies variations, for use in both reservoir development and exploration.
- Evaluate seismic data for undiscovered algal mound fields on Tribal Lands.
- Evaluate the potential for applying CO<sub>2</sub> floods, steamfloods, or other secondary/tertiary recovery processes to increase oil production.
- Promote use of the technologies developed in the project through direct assistance to the Tribe.

**Partner Team:** Golder Associates, Inc., Ute Mountain Ute Tribe, Red Willow Production Co., Legacy Energy Corp., and Solid State Geophysical, Inc.

**Project Description:** Golder Associates, Inc and their partners will conduct a detailed reservoir study using cutting edge three-dimensional, three-component (3D3C) seismic data to improve existing predictive models for exploration of petroleum reserves.

Recent advances in seismic acquisition and processing offer new ways to image smaller subsurface features with higher confidence and to characterize the internal structure of reservoirs. The 3D3C technology will be used to improve production by selecting optimum drilling paths in the numerous small carbonate algal mound reservoirs on Tribal lands. The resulting information will be used in selecting enhanced recovery processes that maximize environmental stewardship and oil recovery in a cost effective manner.

A detailed reservoir study will be conducted to calibrate the seismic data to reservoir parameters such as permeability, porosity, and lithofacies. This will be done by developing a petrological and geological characterization of the mounds from well data; acquiring and processing the 3D3C data; and comparing the two using advanced pattern recognition tools such as neural networks. Should the correlation prove successful, the resulting data will be evaluated for selection of alternative enhanced recovery processes, and their possible implementation.

The successful completion of this project will not only benefit the Ute Mountain Ute Tribe through increased oil revenues, but will also enhance the technical capabilities of the Red Willow Production Company, a wholly owned Southern Ute Tribe entity. Domestic oil producers in the Paradox Basin will also be able to apply this technology to increase recovery from fields where hundreds of millions of barrels of oil remain.

# OSAGE TRIBE

Enhanced Oil Recovery By Horizontal Waterflooding, Osage County, Oklahoma

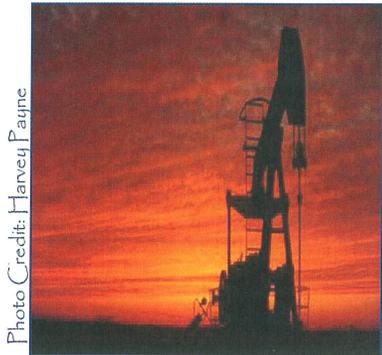


Photo Credit: Harvey Payne

Osage County, Oklahoma  
Production Well

**Project ID Number:**

DE-FG26-02NT15452

**Project Start Date:**

9-6-2002

**Project End Date:**

9-5-2004

**Project Investigator:**

Scott Robinwitz  
Grand Resources, Inc.  
2448 E. 81st St., Ste. 4040  
Tulsa, OK 74137  
Phone: (918) 492-4366  
Email:  
scott@grandoil.com

**Project Manager:**

Virginia Weyland

**Objectives:**

- Increase oil production by evaluating horizontal waterflooding technology in the Bartlesville Sandstone in Woolaroc Field, Osage County, OK.
- Conduct workshops, maintain a project website, and prepare publications to disseminate project findings.

**Partners:** Grand Resources, Inc., Osage Tribe, Dauben International Energy Consultants.

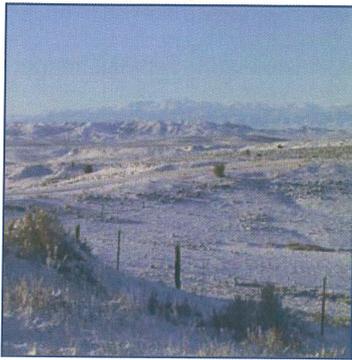
**Project Description:** Oilfields in the Osage Nation are in a mature stage of depletion, yet millions of barrels of potentially recoverable oil exist in the Bartlesville Sandstone, a low-permeability, shallow, naturally fractured reservoir. Conventional waterfloods using vertical wells in this formation are often unsuccessful because water cannot be injected at pressure below the reservoir parting pressure and at a rate high enough to improve oil recovery. A substantial amount of additional oil can be recovered by using a technology that will allow large volumes of water to be injected below the reservoir parting pressure. This project addresses the often unsuccessful method of vertical waterflooding in low permeability fractured reservoirs, and the potentially higher success rate for horizontal water injection at lower parting pressures.

The pilot area will be drilled in a portion of the Woolaroc field that has never been waterflooded and will consist of a center horizontal injection well and two offset and parallel horizontal producing wells. This pattern will permit the injection of large amounts of water below the fracture-parting pressure. Although the project has just recently begun, an extensive geologic study including mapping, regional core evaluations, existing log analysis, fracture orientation estimates, and preliminary evaluations regarding borehole stability and reservoir rock mechanics has been completed. The vertical portion of the proposed injector, Well #85-22, has been drilled and cored and is currently being evaluated for basic reservoir and rock mechanics properties. A multiple well interference test will be conducted in the pilot area to collect definitive data on fracture orientation. After fracture orientation is determined, a 1,000' lateral will be drilled from below the casing in Well #85-22.

Simulation studies indicate much higher recovery rates in the Bartlesville Sandstone with horizontal waterflooding than with conventional waterflooding. For example, a horizontal waterflood on 23-acre spacing would generate \$2.9 million cumulative revenue over 6 years of operation, compared to a conventional waterflood that generates \$1.4 million cumulative revenue over 30 years of operation. Also, start-up costs are recovered much more quickly with the horizontal waterflood. Horizontal waterflood startup costs of \$500,000 are recovered within 1 year of operation whereas it takes 5 years to recover \$200,000 conventional waterflood startup costs.

# NORTHERN CHEYENNE TRIBE

Assessment Of Coalbed Methane Resource And Produced Water Disposal Options,



Winter view of coalbed methane producing area in the Northern Cheyenne Reservation in Montana.

## Objectives:

- \*Determine the best coalbed methane development scenarios and water handling options to maximize economic return to the Tribe while minimizing adverse environmental impacts.
- \*Transfer project results to the Tribe and other area operators through publications and workshops.

**Project Team:** Idaho National Engineering and Environmental Laboratory, Northern Cheyenne Tribe, and Montana Bureau of Mining and Geology.

**Project Description:** Natural gas production (methane) from coal represents a significant potential asset to the Northern Cheyenne Indian Tribe of Montana. The resource however, is largely unevaluated. The Tribe is interested in developing this resource if it can be done in an environmentally responsible manner.

The work conducted during this project will consist of a complete analysis of the coalbed methane (CBM) production potential for coal assets underlying the Northern Cheyenne Indian Reservation of Montana. The work will include a basic understanding of the CBM resource, and address and resolve environmental impact issues associated with CBM production. Because of the environmental concerns associated with coal water production, special emphasis will be placed on identifying environmentally correct and cost-effective methods for producing gas while managing potentially large volumes of water.

Multiple water handling options will be reviewed within the context of the forecasted gas and water rates associated with the development of tribally owned coal assets. Production forecasts will be acquired through reservoir simulation and will be based on assumed reservoir properties by analogy and an actual geologic description of the coal assets. Of the water disposal options to be assessed, water disposal by reinjection will be closely evaluated.

A subsurface database has been completed. Eight log cross-sections of oil exploration wells have been constructed and the formations included in the Fort Union, Lance, Fox Hills, and Bearpaw Shale were correlated. A structure contour map on the top of the Lebo Shale Member of the Fort Union Formation, the horizon just below all the coal beds of interest for CBM development, has been generated.

A representative model for the Flower-Goodale coal seam, the deepest coal seam in the area, has been created. Sensitivity testing of permeability, net pay thickness, and Langmuir-isotherm parameters to gas production has been simulated. This is the first step towards more realistic models for other Northern Cheyenne coal seams, including the Canyon, Wall, and Knobloch-Sawyer-Nance beds.

## Project ID Number:

FEW 4340-72

## Project Start Date:

3-2-2002

## Project End Date:

3-2-2004

## Project Investigator:

Shaochang Wo  
Idaho National Engineering  
and Environmental  
Laboratory  
P.O. Box 1625  
Idaho Falls, ID 83415  
Phone: (208) 526-3552  
Email:  
wos@inel.gov

## Project Manager:

Jesse Garcia

# THREE AFFILIATED TRIBES

Remote Sensing Analysis To Identify Oil Exploration Leads, Fort Berthold Indian Reservation, North Dakota



Tribal Shield of the Three Affiliated Tribes that consists of the Mandan, Hidatsa, and Arikara Tribes.

**Project ID Number:**

DE-FG26-02NT15453

**Project Start Date:**

8-27-2002

**Project End Date:**

2-26-2004

**Project Investigator:**

Scott Reeves  
Advanced Resources Int'l.  
9801 Westheimer, Ste. 805  
Houston, TX 77042  
Phone: (713) 780-0815  
Email:  
sreeves@adv-res-hou.com

**Project Manager:**

Virginia Weyland

**Objectives:**

- Evaluate the oil exploration potential under Lake Sakakawea using remote imagery.
- Calibrate/validate the approach with existing seismic and offset production data.
- Understand the resolution requirements for a successful remote sensing analysis.
- Identify critical success factors via analysis of offset production.
- Identify specific target areas and develop reserve and economic forecasts.
- Disseminate the project results to industry, including potential development partners and Tribes.
- Transfer results of the project through presentations, publications, and a CD-ROM containing final reports and full-scale maps.

**Project Team:** Advanced Resources International (ARI), the Three Affiliated Tribes, the Bureau of Indian Affairs, and Planetary Data.

**Project Description:** Previous studies indicate a high potential for undiscovered oil and gas reserves on the Fort Berthold Reservation. Of particular interest are the Madison Limestone and Bakken Shale plays, which contain an estimated 320 million barrels of recoverable oil. Also of interest is the area beneath the Lake Sakakawea. These 150,000 acres have never been explored and the absence of a credible, detailed technical assessment of the oil exploration potential remains a deterrent for oil companies to explore on the Reservation. Such a technical assessment is needed to better define the oil exploration opportunity and attract oil companies to proceed with exploration and development for the benefit of the Tribes. The area represents the largest contiguous acreage block under control of the Tribes, and since the land is tribally owned, their leasing and administration can be efficiently accomplished.

Project partners will compile a comprehensive set of data using remote satellite imagery from NASA, existing seismic data, and digital well logs to identify specific areas for resource development, and locate drilling sites. The remote sensing data from different scales will be calibrated with the seismic data and existing production trends. A framework for interpreting the remote sensing data will be developed and used to identify lead areas under Lake Sakakawea. Reserves and economic forecasts for each lead area will be developed.

Preliminary economic analysis indicates that the increased production resulting from the project could potentially generate an additional \$26 million for the Tribes. If successful, the approach could be more widely applied to locate new Madison/Bakken targets in other parts of the Williston basin potentially recovering an additional 32 million barrels of oil.

For more information about the program, contact:

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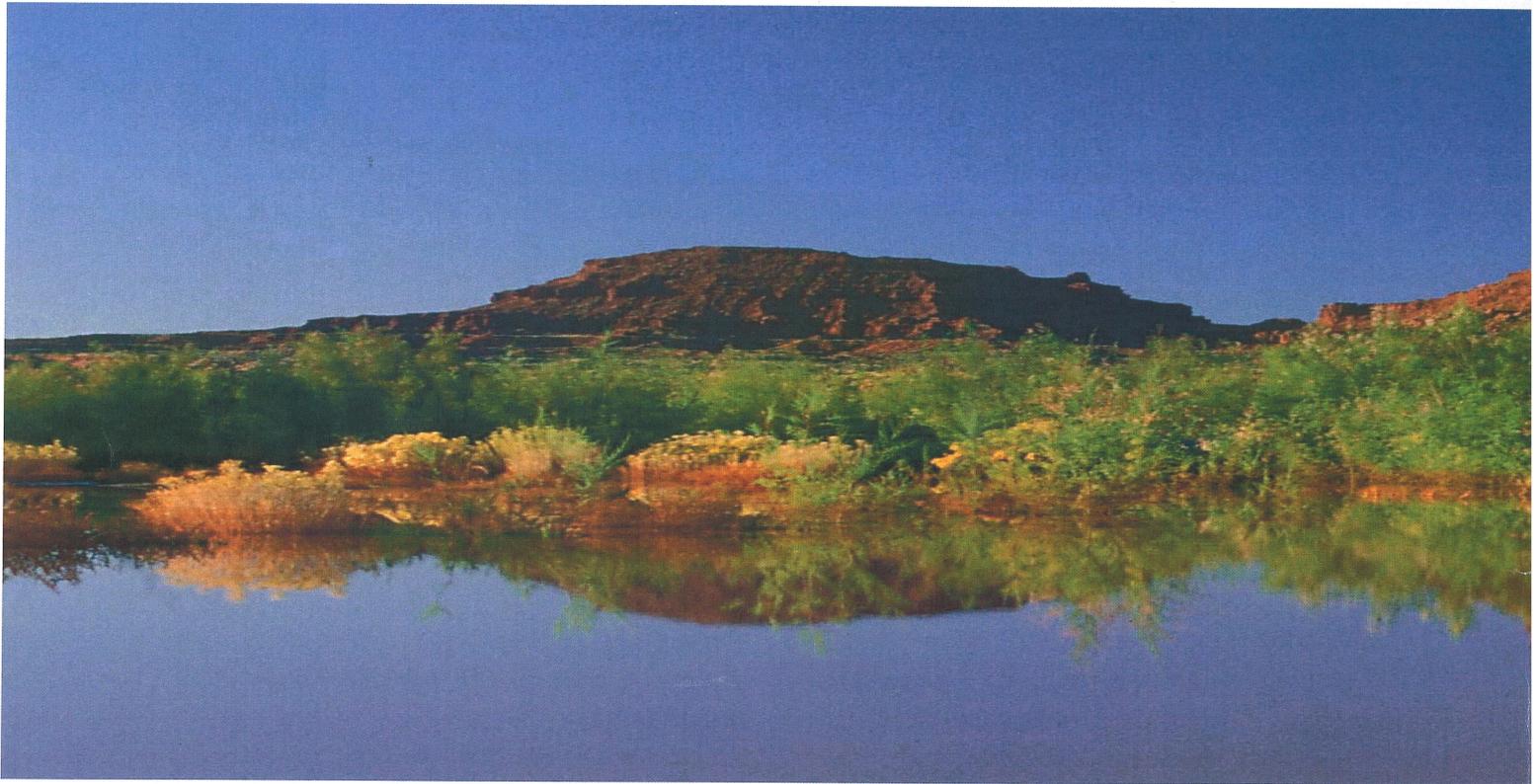
For Native American Initiative  
<http://www.npto.doe.gov/Native/index.html>

For National Energy Technology Laboratory Programs and Information  
<http://www.netl.doe.gov>

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