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Native American Training Program in Petroleum Technology

By
Judith H. Kokesh
Winifred M. Ho

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U.S. Department of Energy
Assistant Secretary for Fossil Energy

National Petroleum Technology Office
P.O. Box 3628
Tulsa, OK 74101

Prepared by:
BDM-Oklahoma, Inc.
P.O. Box 2565
Bartlesville, OK 73005

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EXECUTIVE SUMMARY

A comprehensive training program is outlined for members of Native American Tribes whose lands have oil and gas resources. These tribes include the Osage, Creek, Pueblo, Cherokee, St. Regis Mohawk, Northern Arapaho, and Ute Mountain Ute. The training program includes short courses and internships tailored to three audiences: (1) adult tribal members who manage tribal mineral holdings, set policy, or work in the oil and gas industry; (2) Native American graduate and undergraduate college students; (3) high school and middle school teachers who are Native American or who teach predominantly Native American students. Partnerships will be established with the tribes, the Bureau of Indian Affairs (BIA), tribal organizations, other government agencies, and the private sector to implement the program.

The proposed program will meet the goals of the U.S. Department of Energy's (DOE) *Domestic Oil and Gas Initiative* to help Native American tribes become more self-sufficient in developing and managing their resources by using technologies that enhance hydrocarbon production and meet environmental regulations. These technology transfer efforts are expected to have a positive impact on both tribal economic development and the U.S. domestic oil and gas production.

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NATIVE AMERICAN TRAINING PROGRAM IN PETROLEUM TECHNOLOGY

1.0 BACKGROUND

The United States is at its lowest domestic oil production level in 24 years, with more than half of the oil used in the United States imported from overseas. Domestic petroleum consumption, however, is forecast to increase from 17.0 million B/D in 1990 to 21.3 million B/D in 2010. If current production trends continue, oil imports will climb to an estimated total of 60% adding $1.6 trillion to the U.S. trade deficit by 2010 (DOE's National Oil Program Brochure).

Among the stakeholders in the domestic petroleum industry are the Native American tribes. Revenue from oil and gas development provides significant income to tribes and individual Indians, but that revenue has declined over the past several years because of lower prices and depleting reserves, often resulting in economic hardship to the tribes (Anderson 1994).

Revenues to the Native American tribes also have been affected negatively by the added costs of complying with an increasing number of environmental regulations. Federal environmental regulations severely affect hydrocarbon exploration, drilling, and production operations. Operators have increased responsibility for air emissions and waste disposal. In order to stay in compliance, they must be aware of a multitude of complicated federal and state environmental regulations, waste classification, approved waste disposal methods, and air emissions standards. In the future, it is projected that the industry will fall under more stringent environmental regulations, leading to increased costs for operators (Johnson and Carrroll 1995). Any program that addresses oil and gas exploration and production on Native American lands also must address environmental issues.

Assessments of undiscovered recoverable conventional resources of oil beneath Indian and Native lands in the continental U.S. range from 0.1 to 3.3 billion bbl. Furthermore, in the 48 contiguous states, it is estimated that more than 90% of the onshore undiscovered oil and gas under Indian and Native ownership is economically recoverable (Anderson 1994).

The proposed training program will meet the goals of DOE's *Domestic Oil and Gas Initiative* to help Native American tribes become more self-sufficient in developing and managing these resources through training in cost-effective, improved technologies for hydrocarbon production that will meet environmental regulations. These technology transfer efforts are expected to have a positive impact on both tribal economic development and the U.S. domestic oil and gas production.

This report outlines a comprehensive training program for members of Native American tribes whose lands have oil and gas resources. The program has two components: short courses and internships. Programs are proposed for: (1) adult tribal representatives who are responsible for managing tribal mineral holdings, setting policy, or who work in the oil and gas industry; (2) graduate and undergraduate college students who are tribal members and are studying in the appropriate fields; and (3) high school and middle school teachers science teachers. Partnerships will be established with the tribes, the BIA, tribal organizations, other government agencies, and the private sector to implement the program.

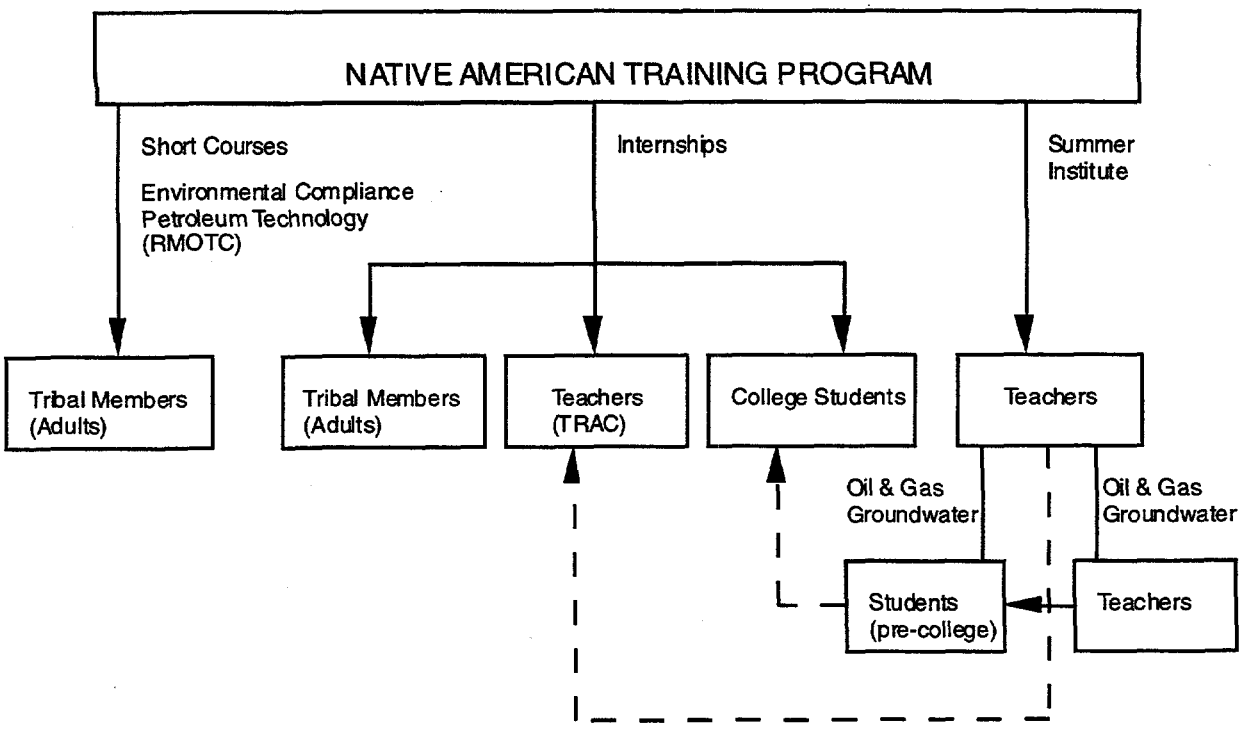

Figure 1 Schematic Representing the Project

The objectives of this report are:

- To evaluate the pilot courses for adults conducted in the fall of 1994 and to make recommendations for a comprehensive training program and an intern program
- To outline a summer intern program for undergraduate and graduate students
- To propose a training program for pre-college teachers that includes a short course and a summer research experience

2.0 ADULT TRAINING PROGRAM

2.1 Background

The Adult Training Program is part of a wider DOE effort to transfer technology and expertise developed at NIPER and other DOE Fossil Energy programs to Native Americans involved in oil and gas leasing, exploration, or production. The program is customer-driven to provide training to tribes to assist them in developing their oil and gas resources in an efficient, economical and environmentally sound manner. The most important part of the program will consist of short courses designed to meet the needs of the participants. An intern program for adults may be a small part of the total program and is addressed at the end of this section.

2.2 Short Courses

A pilot training program for Native American tribal members in environmental and oil field technology was established in late 1994. The project was a collaboration of DOE's Bartlesville Project Office; the Rocky Mountain Oil Field Testing Center (RMOTC) at Naval Petroleum Reserve No. 3 in Casper, Wyoming; BDM-Oklahoma, and the tribes. Two courses were held: Basic Production Training and Stripper Field Operations was held at the NPR Number 3 in Casper, Wyoming in November 1994 and Introduction to Environmental Compliance was held at NIPER in December 1994. Instructors for both classes were RMOTC staff.

The first of the classes, Production Training and Stripper Field Operations was attended by 10 tribal members representing the Apache, Arapaho, and Osage tribes. Topics included:

- Geology of oil exploration
- Land issues
- Drilling
- Well completion
- Lift methods
- Well stimulation

A course outline is included in Appendix A.

BDM-Oklahoma staff provided support and technical assistance to instructors from RMOTC during the second class, Introduction to Environmental Compliance, held at NIPER. Topics included:

- Waste management
- Hazardous materials

- Well-site considerations
- Water and air sampling
- Groundwater monitoring.

A course outline is included in Appendix B. The training included three days of classroom instruction and a field trip to examine oil production in Osage County. Representatives from the Osage Tribal Council, members of the Osage Tribe who work for the Environmental Protection Agency (EPA), and a member of the Apache Jicarilla Tribe attended the training.

RMOTC staff conducted on-site evaluations of the two courses. A survey was distributed to class members following the teaching of each unit. A copy of the evaluation tool and the compiled results for the Introduction to Environmental Compliance course are included in Appendix C. Most participants were satisfied with the course and the content. The survey also asked for comments from participants. Relevant comments included:

- "I enjoyed the taking of the samples and the use of the equipment."
- "It would have been nice to discuss other methods of 'hiding' locations of wells."
- "I felt there was too much detail covered in this subject for a 'basic' course (groundwater monitoring)."
- "More time could have been spent on equipment."
- "Much of the regs did not apply to our reservation. Maybe should refer to BIA."

No follow-up contact with participants is planned at this time. However, to assess the long-term impact of the training, a follow-up survey or interview with participants is recommended.

2.2.1 Recommended Changes to the Pilot Training Program

The following recommendations are based on BDM-Oklahoma staff's experience with a variety of training and technology transfer activities, observations from the course on environmental compliance and participant comments from the pilot class held at The National Institute for Petroleum and Energy Research (NIPER), and knowledge of what is considered "best practice" for adult training.

2.2.2.1 Expand Course Content

A survey was developed and sent to tribes who had responded to an initial inquiry by RMOTC during the fall of 1994. A list of the tribes contacted and the survey are included in Appendix D. Tribes were asked to indicate course content needs, levels, preferred time of year, and location. A follow-up by telephone to the tribes who did not respond by mail was conducted. Results of the survey are compiled in Table 1.

Table 1 Survey of Native American Tribal Training Needs
Tabulated Results

Tribe	Course	Level	No. Participants	Preferred time	Location
Cherokee Nation Tahlequah, OK	Environmental Compliance	elementary intermediate advanced	10-15	winter	will travel
All Indian Pueblo Council Albuquerque, NM	Environmental Compliance	intermediate advanced		summer winter spring	will travel
	Air Pollution Technologies Air Quality Program Management Pollution Prevention 40 hr. OSHA Training Emergency Response to Hazardous Spills Underground Storage Tanks Groundwater Studies Surface Water	intermediate advanced	15-25	summer winter spring	on site or travel
St. Regis Mohawk Hogansburg, NY	Environmental Compliance	intermediate advanced		fall winter	will travel
	Environmental Sampling Spill Mitigation	advanced			on site
Ute Mountain Ute Towaoc, CO	Oil and Gas Environmental Training— Oil Spills, Chemical Spills, Water Disposal Wells and Inspection Wells	elementary intermediate		summer fall spring	will travel
Muskogee (Creek) Nation Muskogee, OK	Environmental Compliance	intermediate		fall spring	will travel
	Basic Production Training and Stripper Field Operation	elementary			will travel

Six tribes (Cherokee, Pueblo, St. Regis Mohawk, Ute Mountain Ute, Muskogee Creek, and Northern Arapaho) responded to the survey in time to be included in this report. Responses also are expected from the Southern Ute, Three Affiliated Tribes, Tonkawa, and Rosebud Sioux, who have been contacted by telephone. The Hopi and Navajo also have been contacted by telephone, but have not responded. BDM-Oklahoma will continue to survey tribes at conferences, meetings and other opportunities.

A recommended expanded training schedule based on the results of the survey is compiled in Table 2.

Table 2 Proposed Schedule
Short Courses for Native American Tribal Members

Date	Course	Tribe	Location
Fall 1995	Basic Production and Stripper Well Operation	Creek	RMOTC
Winter 1996	Air Pollution Technology Air Quality Management	Pueblo	Albuquerque
Winter 1996	Environmental Compliance	Creek Cherokee St. Regis Mohawk Northern Arapaho (other Oklahoma tribes)	NIPER
Spring 1996	Oil and Gas Environmental Training	Ute Mountain Ute Pueblo	RMOTC
Fall 1996	Basic Production and Stripper Well Operation		RMOTC
Winter 1997	Environmental Sampling	St. Regis Mohawk	Hogansburg, NY
Spring 1997	To be scheduled		
Summer 1997	Groundwater and Surface Water	Pueblo	Albuquerque

- Fall 1995—*Basic Production and Stripper Well Operation.* Members of the Creek (Muskogee) Nation are interested in this training and will travel. With enough advance notice and aggressive publicity, it is assumed that members of other tribes will fill the course.

- Winter 1996—*Air Pollution Technology and Air Quality Management.* BDM-Oklahoma staff spoke with the managers in the environmental office of the All Indian Pueblo Council in Albuquerque. The council is responsible for providing coordination for 19 Pueblo Tribes. The Pueblos are very interested in environmental training and will recruit participants and provide classroom space.

- Winter 1996—*Environmental Compliance.* The Creek and Cherokee Nations (in Oklahoma), the St. Regis Mohawk in New York and the Northern Arapaho in Wyoming indicated an interest in a basic environmental compliance class. Other Oklahoma tribes also will be invited to this class.

- Spring 1996—*Oil and Gas Environmental Training*. This course at RMOTC will be directed at the Ute Mountain Ute and the Pueblo. Both tribes indicated an interest in training in response to hazardous spills. It is expected that the Southern Ute and the Three Affiliated Tribes also will be interested.

- Fall 1996—*Basic Production and Stripper Well Operation*. This course is not directed at a particular tribe, but if scheduled with ample lead time, it will probably attract participants.

- Winter 1997—*Environmental Sampling*. The St. Regis Mohawk indicated a need for this training and will recruit participants if the course is held in New York.

- Summer 1997—*Groundwater and Surface Water*. The Pueblos are facing a shortage of usable water and indicated a pressing need for this training. (Depending on the preference of the Pueblo Tribe, this course and the course scheduled for Winter 1996 could be switched.)

2.2.1.2 Expand Resources

Training will be conducted by RMOTC staff, who developed the two pilot courses, with technical assistance from BDM-Oklahoma. RMOTC was designed at the Naval Petroleum Reserve Number 3 to offer an opportunity for advanced technology, evaluation and training in new oil field and environmental technologies. Training and testing facilities are available to independent oil producers, environmental agencies, universities, and other government agencies.

RMOTC staff have the capability to develop courses in addition to those offered in the pilot program. They have the resources and the expertise to expand any of the topics included in the survey course, Introduction to Environmental Compliance, into a more comprehensive course. For example, RMOTC can meet the training needs of the Pueblo tribes and provide intermediate to advanced courses in air monitoring and sampling, hazardous waste management, and other environmental topics.

If RMOTC cannot provide training, BDM-Oklahoma has capability to design, coordinate and conduct the Native American Training Program. BDM-Oklahoma staff includes geologists, geophysicists, exploration and drilling specialists, and environmental policy experts. The technical staff have expertise in reservoir characterization and assessment, environmental research, enhanced oil recovery, and risk assessment. New technologies, which can be transferred to tribes, are developed and tested at NIPER. BDM-Oklahoma researchers have developed techniques to explore untested formations within older producing fields using advanced geophysical tools, geochemical survey techniques, and computerized data management. Drilling and completion technology research will develop improved and more cost-effective engineering methods. Research on vertical, slant, horizontal, and slimhole wells is in progress. BDM-Oklahoma's highly experienced research staff have developed microbial, chemical, thermal, and gas-injection technologies to improve oil recovery. These technologies have been applied by industrial clients and independent producers in cost-shared field demonstration projects. State-of-the-art risk-based decision management tools are being developed to improve the economics of domestic oil and gas exploration and production.

An additional resource available to BDM-Oklahoma for training is the operational field laboratory located on the Osage Nation land in Osage County, Oklahoma. The site will be used for developing and improving oil recovery processes, drilling, reservoir characterization and environmental research. The laboratory site will provide the means for field pilot testing of promising exploration technologies, methods, and equipment, and will serve as a demonstration site for training.

BDM-Oklahoma has considerable experience in designing and implementing training for adults as shown by a successful teacher development program and other activities conducted within the technology transfer group. BDM-Oklahoma's contractor relationship with the University of Tulsa provides additional resources in petroleum technology and continuing education that can be used. In addition, resources at the University of Oklahoma, and Oklahoma State University and the industrial capabilities of Phillips Petroleum Company, Amoco Production Company and Conoco could be used.

BDM-Oklahoma also will use tribal contacts and organizations to inform tribes about other training available through the technology transfer program. For example, free seminars, workshops and other training opportunities will be offered through the PTTC regional resource centers starting in the summer of 1995.

2.2.1.3 Foster Pedagogy

The objective of an adult training program is to ensure, as much as possible, that participants acquire the desired levels of skill and implement the skills in the workplace. Research on adult learning suggests that in order to be effective, training must address a variety of preferred learning styles of the participants, make learning relevant and practical, and foster confidence (Arin-Krupp 1989). Furthermore, adult learning theory suggests that practice of the skill under simulated conditions and peer coaching are necessary to provide optimum chance for the new skills to be transferred to the workplace (Joyce and Showers 1988). It is recommended that the Native American Adult Training Program include some strategies that will help ensure these objectives:

- Address individual learning styles by varying the presentation method from the "stand and deliver" lecture format. Include some hands-on activities. Background reading material handed out in advance also can be helpful.

- Include a practical laboratory or field experience for participants. Participants will practice with the equipment and perform measurements that they will do in the field.

- Include opportunities for participants to work in teams or groups, particularly during the laboratory or field experience. This fosters confidence and diminishes anxiety over learning new concepts.

- Include problems that will allow participants to transfer the newly-acquired skills and information to real-world situations.

- Train individuals together who will work together. This will allow peer-coaching and on-the-job support. It is expected that transfer of the new skills and learning will be more likely to occur.

2.2.1.4 Continue Cost-Sharing

Pilot course costs were shared by the tribes, who paid travel costs and a course fee for participants at NIPER. It is recommended that a per-participant course fee be set that will allow some of the training costs to continue to be shared by the tribes. This fee should be kept moderate (around $100), because tribes indicate they have limited funding to support training. Based on the costs of the pilot program, the costs of instructors and materials for a four-day course will probably be about $10,000.

2.3 Adult Intern Program

An internship program for adults who have completed initial training offered by DOE would provide practical, hands-on training for participants. In addition, it would benefit DOE by forging important links with tribes that will enhance communication, foster future collaborative programs, and promote additional transfer of technology.

An adult internship program would be targeted to those tribal members who are working for tribes as engineers or technicians in oil and gas production or environmental programs. Interns would work on projects that would have direct technology transfer benefit to tribal oil and gas or environmental programs. Applicants should have participated in one or more of the training programs in the Native American Training Initiative. Internships could be offered for six-month or 1-year periods. A pilot internship program is proposed for January 1996.

Funding for the adult internship program might be through a partnership or cost-sharing with the tribe, BIA and DOE. The tribe or BIA could be asked to pay the intern's salary, while the DOE could assume travel costs, a stipend for housing, and the resources needed to conduct research or complete a project at the site.

3.0 NATIVE AMERICAN STUDENT INTERN PROGRAM

3.1 Background

Internships have existed for a long time as a link between school and work. Students may work as interns after completing high school or college or may serve as interns in business or industry during the summer. The intern program for Native Americans in petroleum technology will begin with college students in the summer of 1995.

For the past several years, DOE has supported a summer student program at NIPER. More recently, the focus of this program has been to train college students—undergraduates and graduate students in petroleum technology. This program benefits:

- The academic community, by providing practical training in energy R&D that is not available in most university programs
- The petroleum industry, by helping to provide future employees with directly applicable skills
- DOE, by providing technology transfer from programs sponsored at NIPER to universities
- Researchers at NIPER, who gain valuable assistance from young scientists and engineers

3.2 Pilot Program

The program already in place at NIPER will serve as a pilot program for the Native American intern program by incorporating Native American students. Four to six students are being recruited through contacts with the Osage, Hopi, and Navajo tribes to spend 10 - 12 weeks at NIPER in the summer of 1995. The students will work under the direction of technical staff in Exploration and Drilling. Students will assist researchers involved with implementing exploration, drilling and risk management programs for DOE. Involvement with these programs in the NIPER laboratories will provide the interns an introduction to the petroleum industry and insight into how research is accomplished. The experience also will (1) encourage students to make career decisions in the petroleum industry, (2) develop work-place habits such as punctuality, responsibility, and the understanding of teamwork, and (3) provide them future interaction with the energy industry.

3.3 Internship Program Models

Other internship programs that address the needs of minority and underrepresented students can serve as models for an expanded Native American student intern program at NIPER. There also are several existing programs run by other agencies with which BDM-Oklahoma will cooperate.

Other intern programs include the following:

- The Metairie Site Office coordinates an Intern Program in Fossil Energy for students at historically black colleges and universities (HBCUs).

- The Council of Energy Resource Tribes (CERT) operates a summer intern program for students. Host companies are asked to pay a fee ($16,000) to CERT for each intern. Interns are provided a salary of $4,000, housing and travel, and preprogram orientation at CERT.

- The American Indian Science and Engineering Society (AISES) has funding from the DOE and the Department of Commerce to coordinate an intern program for college students. Stipends run from about $400 per week for undergraduate students to about $500 per week for graduate students. In addition, AISES will operate as a broker by providing on the Internet information for students about other programs.

- Oklahoma State University received a grant from the National Science Foundation to fund the Oklahoma Alliance for Minority Participation in Science, Engineering and Mathematics. Seven state institutions will be included in the program, which has summer internships as a component.

- Associated Western Universities (AWU) has experience managing student intern programs and might help recruit Native American students.

3.4 Recommendations

BDM-Oklahoma has the capability and the experience to coordinate an intern program in Petroleum Technology and Environmental Research for Native American students.

The Intern Program for students at HBCUs funded by DOE and coordinated by the Metairie Site Office, is recommended as a model for the Native American program. In the HBCU program, students are recruited from HBCUs that offer technical programs that complement the Fossil Energy program. Student resumes are sent to Fossil Energy sites, which review them for placement. Students are paid a monthly stipend and a travel and housing allowance.

Although there are a limited number of colleges that admit only Native American students, students will be better recruited by contacts with tribes, tribal organizations, BIA, and colleges and universities with large Native American populations. There are also several Native American organizations that coordinate intern programs that are funded from other sources. BDM-Oklahoma will cooperate with these organizations (and others) to offer placement for students.

- BDM-Oklahoma will develop recruitment materials, including a brochure that addresses the opportunities for Native American students at NIPER and other Fossil Energy sites.

- BDM-Oklahoma will develop criteria for student selection.

- The selection process will be coordinated through BDM-Oklahoma, who will forward student resumes to other sites for consideration.

- BDM-Oklahoma staff will work with other Fossil Energy facilities, such as the SPR sites, to develop their capacity to mentor students. This might include offering orientation or training for staff.

- The student stipends will be handled by AWU.

- The program will offer students a one or two-year renewal, where the internship includes at least one summer at a field site such as NPR Number 3 in Casper. This can foster a mentoring environment that can be critical in turning out successful scientists and engineers, particularly from traditionally underrepresented groups.

3.5 Funding Sources

BDM-Oklahoma, with the assistance of the University of Tulsa researched funding sources for student intern programs in petroleum energy. Based on the results of the report, it is recommended that the intern program be funded through a partnership with DOE, tribal organizations such as CERT and AISES, and the private sector. BDM-Oklahoma will work to leverage the DOE dollars to support additional students. Detail of the report is included in Appendix E.

- It is recommended that DOE provide funding for six summer internships in 1996 at a cost of about $5,000 per student (includes a stipend of $250 - $300/week, housing and travel allowance).

- Additional students can be placed at Fossil Energy sites by collaborating with CERT and AISES.

- Since several private foundations give support to the American Indian College Fund for scholarships, some students at a selected number of colleges may come with paid internships.

- BDM-Oklahoma will approach the Phillips Petroleum Foundation, Amoco Foundation, Exxon Education Foundation, and Conoco for cost-shared funding with the DOE to support additional students.

4.0 TEACHER TRAINING INITIATIVE

4.1 Background

A program to train teachers is addressed in this report as part of a comprehensive training program, because teacher training is the most effective way to influence the next generation of adults. By informing teachers and providing them teaching resources about oil and gas and groundwater, DOE has an opportunity to inform the public and correct public misconceptions about the petroleum industry and environmental issues.

DOE and BDM-Oklahoma have teacher development programs in place that need to be expanded and/or adapted to meet the needs of Native American teachers and students. The first program is a partnership with the Denver Earth Science Project at the Colorado School of Mines that offers training in earth science curriculum modules. The second program is an eight-week research appointment at a DOE laboratory or facility.

4.2 Teacher Training in Earth Science Modules

4.2.1 Background

The goal of the teacher training program is to provide middle and high school earth science teachers the information, tools, and experience to teach knowledgeably about the production and utilization of oil and gas. BDM-Oklahoma has accomplished this by offering training in a curriculum module that was developed by teachers and Amoco scientists, who recognized a need for earth science curriculum that dealt with critical issues facing society. The project currently is coordinated by the Denver Earth Science Project at the Colorado School of Mines. The training is offered through a grant from DOE to the Colorado School of Mines.

BDM-Oklahoma currently is training teachers at two levels: the national level and in the state of Oklahoma. At the national level, the Earth Science Leadership Institute trains teachers to be trainers in two earth science curriculum modules: Oil and Gas Exploration and Groundwater Studies. The three-week institute is supported by the National Council for Science, Education and Technology and administered through the DOE Office of Science Education Programs. The institute during the summer of 1995 is the second year of a three-year funding cycle. To date, 45 teachers from 23 states have been trained. In 1995 approximately 24 teachers from an additional eight states will participate in the training.

At the state level, 40 Oklahoma teachers from 20 school districts have been trained in the Oil and Gas Exploration module during two four-day workshops. In May 1995 an additional 30 teachers from Tulsa Public Schools will participate in the training.

4.2.2 Recommendations for a Native American Teacher Training Program

Two teachers from Red Rock Day School, a Native American School, have been invited to participate in the Earth Science Leadership Institute. They will be trained to be teacher trainers and will teach the curriculum during the 1995 - 1996 school year. In the summer of 1996, BDM-Oklahoma hopes to

provide them the support to conduct for 25 - 30 Native American teachers afour-day teacher workshop at a BIA school on the Oil and Gas Exploration and/ or the Groundwater modules.

In-kind support for the project will be requested from BIA. This will include facilities to hold the training and assistance in recruiting teachers. In addition, BIA will be requested to pay a stipend for each teacher out of existing teacher development monies. Based on 1995 costs for training, the remaining costs (i.e., instructors and teacher materials) is estimated to be about $18, 000.

4.3 Teacher Internships

4.3.1 Background

NIPER has had a summer teacher intern program for local teachers for the past three years. The project is a cooperative effort with Phillips Petroleum Company. A request for applications is sent jointly to area teachers who are then selected by BDM-Oklahoma and Phillips research staff. One local teacher intern has worked at NIPER during each of these summers. The project is funded through the BPO Education Outreach program.

BDM-Oklahoma staff has worked with the DOE Office of Science Education Programs to participate in the national Teacher Research Associates Program (TRAC) during the summer of 1995. BDM-Oklahoma participated in the "TRAC Draft" and has selected teachers for the summer of 1995. Three TRAC teachers and one local teacher intern will conduct research at NIPER during the summer of 1995.

The TRAC Program is funded by the DOE Office of Science Education Programs and administered by AWU. It offers high school and middle school teachers eight-week research appointments at DOE laboratories and facilities in the summer. The purpose of the program is to provide science, mathematics, and technology education teachers with professional scientific and engineering experience through summer research at one of 27 DOE labs or facilities. The program enhances teacher leadership skills, increases teachers' awareness and understanding of current science and technology, and promotes the transfer of this knowledge to the classroom. Teachers are paid a stipend of $550 per week and a small housing and travel allowance.

AWU works to attract and place minority teachers as well as teachers of minority students. Native American teachers, however, seem to be underrepresented in the population of teachers who have applied for TRAC appointments and who have been selected.

4.3.2 Recommendations for Native American Teacher Intern Program

BDM-Oklahoma proposes to work through contacts with tribes, tribal schools, and Native American organizations to focus on recruitment of Native American teachers into the TRAC program at NIPER during the summer of 1996. Teachers will work under the direction of BDM-Oklahoma research staff in the areas of petroleum exploration and production to develop an understanding of the oil and gas industry that they can transfer to the classroom.

The program will be funded through the existing TRAC monies provided by the Office of Science Education Programs to the Associated Western Universities.

Table 3 Native American Training Program

Proposed Annual Budget Summary (1996)

Category	Costs
Program Management	
Labor	$132,000
Travel	$8,000
Supplies	$10,000
Adult Training	
Short Courses: 4/ yr @ $10,000/ course	$40,000
Adult Intern: (one in 1996) housing and travel	$2,000
Student Intern	
Eight students in 1996	$40,000
Teacher Training	
Oil and Gas Exploration course	$18,000
Teacher Interns (TRAC program funded by DOE through AWU)	($4,400)
Total estimated costs	**$250,000**

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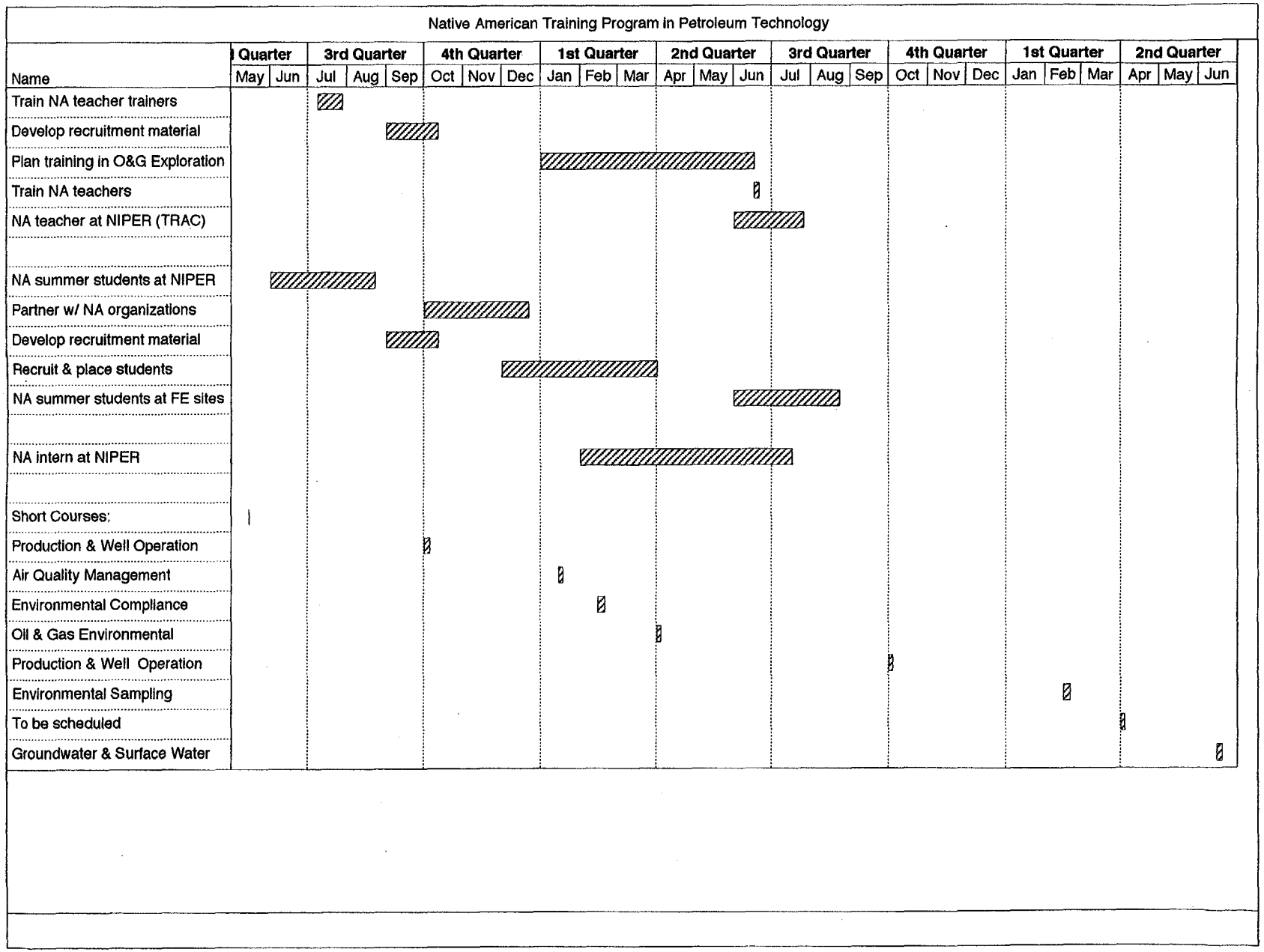
Native American Training Program in Petroleum Technology
Name
Quarter
3rd Quarter
4th Quarter
1st Quarter
2nd Quarter
3rd Quarter
4th Quarter
1st Quarter
2nd Quarter
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Train NA teacher trainers
Develop recruitment material
Plan training in O&G Exploration
Train NA teachers
NA teacher at NIPER (TRAC)
NA summer students at NIPER
Partner w/ NA organizations
Develop recruitment material
Recruit & place students
NA summer students at FE sites
NA intern at NIPER
Short Courses:
Production & Well Operation
Air Quality Management
Environmental Compliance
Oil & Gas Environmental
Production & Well Operation
Environmental Sampling
To be scheduled
Groundwater & Surface Water

APPENDICES

APPENDIX A
BASIC PRODUCTION TRAINING AND STRIPPER FIELD OPERATIONS

Course Outline

Geology:
- Where does oil come from?
- Structures, fractures and Faults
- How do we find oil and gas?
- Reservoirs, Types and Pressures

Land:
- Township and Range
- Meridan Codes
- Well Spacing
- Communitization
- Ownership

Drilling:
- Drilling Rig
- Casing
- Slant Drilling
- Horizontal Drilling
- Cementing

Completion:
- Openhole Completion
- Perforation
- Pulling Unit
- Tubulars
- Rods
- Packers

Lift:
- Flowing Wells
- Artificial Lift
- Pumping Units
- Gas Lift
- Submersible Pumps
- Downhole Pumps

Well Stimulation:
- Frac Treatment
- Hot Oil Treatment
- Hot Water Treatment
- Chemical Treatment
- Acid Treatment

Gas and Oil Treatment Equipment:
- Production Separators
- Free Water Knockouts
- Test Separators
- Gathering Systems
- Cathodic Protection

Measurement:
- L.A.C.T. Units
- API Gravity, Temperature Correction
- Obtaining Oil Samples from Tanks
- Basic Sediment and Water Sample Measurement
- Gauging Tanks for Sales
- Color Cut

Gas Processing:
- Gas Processing
- Gas Meters
- Gas Compressors
- Dehydration Units
- Leak Detection

Well Analysis:
- Dynamometers
- Fluid Levels
- Pressure Gauges
- Pump-off Controllers
- Pressure Surveys

Enhanced Recovery:
- Waterflood
- Steamflood
- Gasflood
- CO_2 Flood
- Microbial
- Chemical Flood

Safety:
- OSHA
- Reporting Requirements

Stipper Field Operation:
- Economics
- Automation
- Computers

APPENDIX B
INTRODUCTION TO ENVIRONMENTAL COMPLIANCE

Course Outline

CLASS I: INTRODUCTION TO AIR SAMPLING

Discussion of sampling requirements for airborne pollutants common in oil and gas production operations. A brief discussion of the regulations serves as a background to what types of sampling and what types of pollutants are most likely. Some hands-on sampling will be available. Basic criteria for determining a sampling plan.

CLASS II: INTRODUCTION TO GROUNDWATER MONITORING

An overview of groundwater monitor well sampling including: a brief discussion of groundwater gydrology, reasoning behind groundwater sampling, sample handling, monitor well components, sampling procedure and equipment.

CLASS III: INTRODUCTION TO WATER SAMPLING

An overview of sampling activities in association with surface water, National Pollutant Discharge Elimination System (NPDES) discharges, and with small drinking water systems. The basics of sampling, including chain-of-custody, container selection and safety supplies, will be covered along with guidelines for preparation of a surface water sampling plan. Some hands-on sampling will be available to familiarize participants with proper sampling techniques.

CLASS IV: INTRODUCTION TO WASTE MANAGEMENT

Introduction to waste minimization techniques, the values of recycling, and source substitution for pollution prevention in the petroleum production industry. The class will use the *API Environmental Guidance Document - Onshore Solid Waste Management in Exploration and Production Operations* to become familiar with regulations affecting the disposal of wastes generated during oil and gas drilling and production operations. Performing a waste inventory for a given facility and selecting the preferable methods for each identified waste stream will be included.

CLASS V: INTRODUCTION TO LANDFARM/LANDFILL CONSTRUCTION

An introduction to sanitary landfill design and construction. The basic elements of landfill requirements, site location, and the environmental concerns associated with each.

CLASS VI: INTRODUCTION TO HAZARDOUS WASTE HANDLING

Introduction to the safe handling and identification of hazardous waste. Class will build upon the regulatory framework presented in the Introduction to Waste Management class, but will focus on hazardous chemicals and wastes. The class will become familiar with the hazards associated with common oilfield materials, how to detect the presence of a hazardous environment, and with the personal protective equipment needed in those circumstances. This course is not intended as training to qualify persons to work in a hazardous environment or at an EPA hazardous waste site.

CLASS VII: DEVELOPING A SPILL PREVENTION, CONTROL AND COUNTERMEASURES PLAN

An introduction to development of a SPCC Plan. The course will cover the basic concepts of an SPCC Plan and various aspects of spill prevention and containment for all major areas of an oil or gas production facility. The course will focus primarily on oil and produced water spills in regard to spill clean-up.

CLASS VIII: INTRODUCTION TO ENVIRONMENTAL WELL SITE CONSIDERATIONS

A brief discussion on the considerations that must be made in placing a well site on federal property including: the definition of National Environmental Policy Act (NEPA), which requires that sensitive environmental areas are considered prior to placement of potential well sites.

APPENDIX C
COMPILED EVALUATIONS—INTRODUCTION TO ENVIRONMENTAL COMPLIANCE

Introduction to Waste Management

	Poor	Less than Satisfactory	Satisfactory	Good	Excellent
Quality of classroom accommodations			3	1	3
Quality of training materials/ handouts			1	2	4
Was information presented adequate?			2	2	3
Was instructor well prepared?				2	5

Introduction to Hazardous Materials

	Poor	Less than Satisfactory	Satisfactory	Good	Excellent
Quality of classroom accommodations			3		3
Quality of training materials/ handouts			1	2	3
Was information presented adequate?			2		4
Was instructor well prepared?				2	4

Introduction to Air Monitoring

	Poor	Less than Satisfactory	Satisfactory	Good	Excellent
Quality of classroom accommodations			3		3
Quality of training materials/ handouts			1	2	3
Was information presented adequate?			2		4
Was instructor well prepared?				2	4

Environmental Well Site Considerations

	Poor	Less than Satisfactory	Satisfactory	Good	Excellent
Quality of classroom accommodations			3	2	4
Quality of training materials/ handouts			1	3	5
Was information presented adequate?			1	3	5
Was instructor well prepared?				2	7

Preparation of Spill Prevention Control and Countermeasures

	Poor	Less than Satisfactory	Satisfactory	Good	Excellent
Quality of classroom accommodations			3	2	4
Quality of training materials/ handouts			1	4	4
Was information presented adequate?			2	3	4
Was instructor well prepared?				3	6

Surface Water Sampling

	Poor	Less than Satisfactory	Satisfactory	Good	Excellent
Quality of classroom accommodations			3	1	4
Quality of training materials/ handouts			2	1	5
Was information presented adequate?			1	1	6
Was instructor well prepared?				2	6

Groundwater Monitoring

	Poor	Less than Satisfactory	Satisfactory	Good	Excellent
Quality of classroom accommodations			3	1	3
Quality of training materials/ handouts			1	2	4
Was information presented adequate?			2	1	4
Was instructor well prepared?			1	2	4

Introduction to Sanitary Landfill

	Poor	Less than Satisfactory	Satisfactory	Good	Excellent
Quality of classroom accommodations			2	1	3
Quality of training materials/ handouts			1	1	3
Was information presented adequate?				2	3
Was instructor well prepared?					5

APPENDIX D
NATIVE AMERICAN TRIBES AND TRIBAL ORGANIZATIONS CONTACTED

Anadarko Area Office	Anadarko, OK
Bureau of Indian Affairs	Golden, CO
Blackfeet Tribe	Browning, MT
Cherokee Nation	Tahlequah, OK
Creek Indian Tribe	Okmulgee, OK
Delaware Tribal Headquarters	Bartlesville, OK
Hopi Tribe	Kykotsmovi, AZ
Indiana American Indian Manpower	Indianapolis, IN
Indian Education & Training Center	Salt Lake City, UT
Jicarilla Apache	Dulce, NM
Native American Community Services	Buffalo, NY
Kickapoo Tribe	Horton, KS
Native American Intertribal Council of LA	Baton Rouge, LA
Navajo Nation	Window Rock, AZ
Osage Tribe	Pawhuska, OK
Peak Alaska Ventures	Anchorage, AK
All Indian Pueblo Council	Albuquerque, NM
Pueblo of Laguna	Laguna, NM
Pueblo Office of Environmental Protection	Albuquerque, NM
Rosebud Sioux Tribe	Rosebud, SD
Southern Ute Tribe	Ignacio, CO
St. Regis Mohawk	Hogansburg, NY
Tonkawa Tribe	Tonkawa, OK
Three Affiliated Tribes	Newtown, ND
Ute Mountain Ute Tribe	Towaoc, CO
Wind River Agency	Ft. Washakie, WY

Native American Training Survey

Name of Tribe: _____

Tribal Contact: _____ **Title** _____

Address: _____ **Phone:** _____ **Fax:** _____

Course Description Please indicate which course(s) would be of interest to you:	**Course Level**	**Estimated number of participants**	**Preferred time of year**	**Preferred location**
☐ **Environmental Compliance Training** An introduction to the government regulations and cost-effective ways to meet them. Includes air sampling, groundwater monitoring, water sampling, waste management, landfill construction and hazardous waste handling. Hands-on practice with monitoring equipment and a field trip is included.	☐ elementary ☐ intermediate ☐ advanced		☐ Summer (June-Aug) ☐ Fall (Sept-Nov) ☐ Winter (Dec-Feb) ☐ Spring (Mar-May)	☐ We will travel ☐ We prefer to have the training on site and will guarantee 25-30 participants
☐ **Basic Production Training and Stripper Field Operation** An overview of production operations in a stripper field. An introduction to exploration, drilling, field development, and production. Hands-on training is included.	☐ elementary ☐ intermediate ☐ advanced		☐ Summer (June-Aug) ☐ Fall (Sept-Nov) ☐ Winter (Dec-Feb) ☐ Spring (Mar-May)	☐ We will travel ☐ We prefer to have the training on site and will guarantee 25-30 participants
☐ **Other** Describe training that would be useful to your tribe.	☐ elementary ☐ intermediate ☐ advanced		☐ Summer (June-Aug) ☐ Fall (Sept-Nov) ☐ Winter (Dec-Feb) ☐ Spring (Mar-May)	☐ We will travel ☐ We prefer to have the training on site and will guarantee 25-30 participants

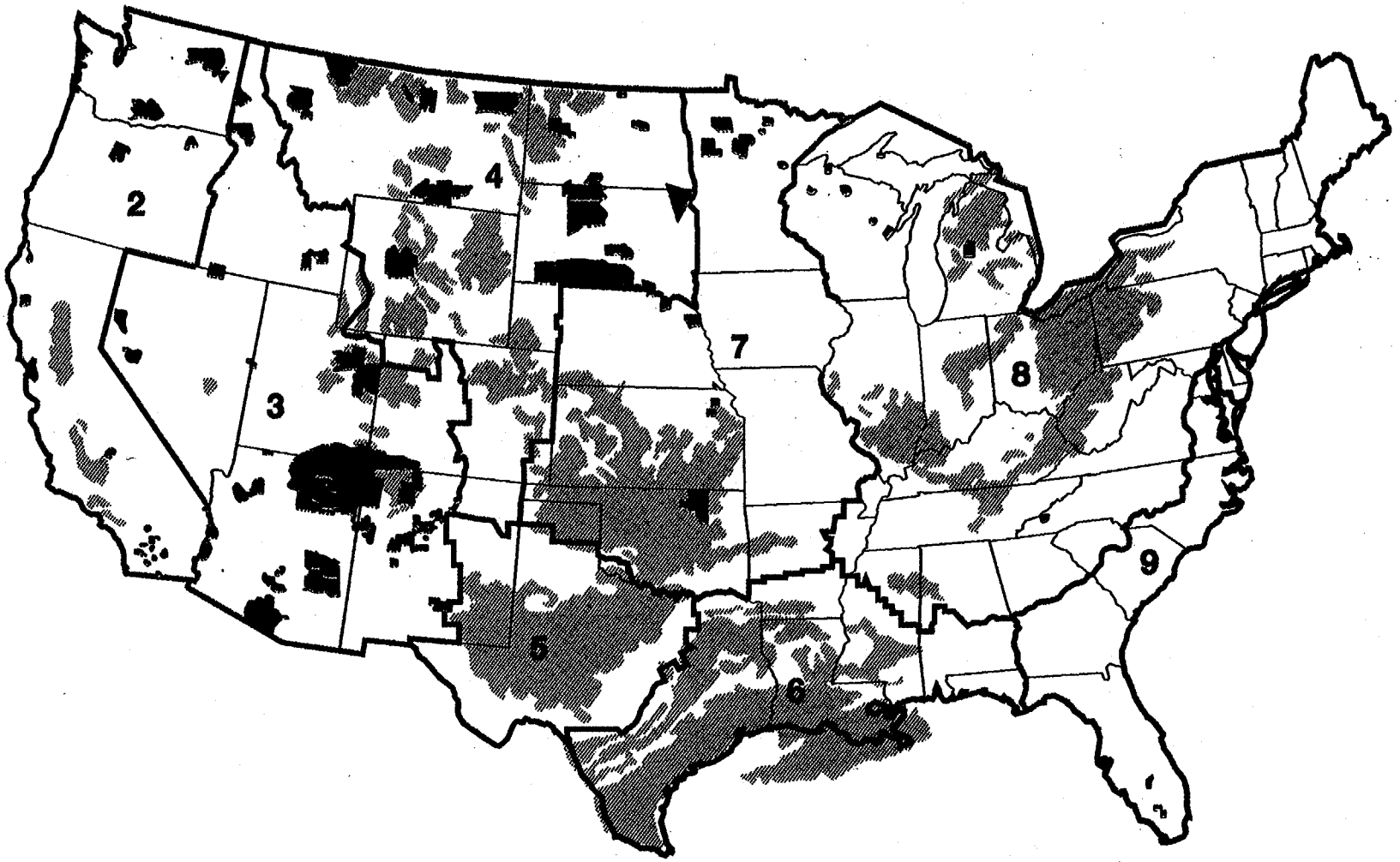

Figure 2 Map of the 48 contiguous States of the United States

APPENDIX E
EXCERPTS FROM UNIVERSITY OF TULSA REPORT

FUNDING SOURCES FOR NATIVE AMERICAN INTERNSHIPS

Private and Corporate Foundations

An on-line search via "Dialog" yielded 57 awards from 16 foundations that matched one or more of the descriptors in the criteria. All met the minority, education/ higher education descriptors; half or more also met Native American, engineering/ science. With almost no exceptions, funds were not given to individuals, only to institutions or non-profit organizations. Most restricted funding to the use of scholarship support of students pursuing undergraduate or graduate degrees. Some further restricted the funding to Ph.D. candidates (minority) preparing for careers in college and university teaching. Teacher training funds were almost exclusively for teachers in the elementary and secondary schools who teach science and math.

The Danforth Foundation gave a number of grants in support of minority Ph.D. candidates preparing for careers in college and university teaching (with emphasis on the sciences).

The Lilly Foundation gave a number of $150,000 awards to various universities for the purpose of "A Program to Improve Racial and Ethnic Diversity and Campus Climate" plus a number of other awards for a variety of purposes in support of minority groups. Lilly gave the American Indian Science and Engineering Society (AISES) of Boulder, CO a two-year grant of $240,820 to serve Native Americans with programs in mathematics, engineering and technology.

The Pew Charitable Trust also gave to AISES; a two-year grant of $150,000 for a pre-college program to increase the number of Native Americans who pursue higher education and careers in the sciences.

Many of the foundations gave to the American Indian College Fund for scholarships. Thirty-one foundations gave money for scholarships, endowment and other developmental needs of the Indian colleges. These funds are allocated to the 29 member Indian colleges from the American Indian College Fund. The individual colleges may have funds to support participants of summer institutes.

A number of foundations established by Oklahoma companies or the local subsidiaries of national companies with business interests in states with strong tribal connections were researched separately.

Lilly Endowment, Inc., Pew Charitable Trusts, General Electric, Rockefeller and Hearst Foundations have longer term interests in supporting scholarships to students in science, math, and engineering. They also support secondary and elementary teacher training.

Federal Funds

The Department of Interior's Bureau of Indian Affairs (BIA) and the Department of Education fund projects similar to the one proposed. The Office of Science Education Programs, U.S. DOE, also funds projects for underrepresented students and teachers in science, engineering and mathematics.

Recommendations

Phillips Petroleum Foundation, Amoco Foundation, Exxon Education Foundation, and Conoco are the most probable candidates to receive letters of inquiry/ proposals in support of a program to serve Native Americans in the oil and gas industry.

General Electric and Lilly seem the next most likely to be interested in student support and teacher training.

Conoco; Texaco; Texaco USA; Schlumberger; Dowel Schlumberger; Halliburton Co. Foundation; Amoco Corp. Foundation; Phillips Petroleum Foundation, Inc.; and Parker Drilling all have histories of interest in such projects. They also are likely to sponsor company internship programs.

Collaborative approaches also are recommended. Foundations almost never give funds to individuals, but to institutions or organizations who then spend the funds on appropriate services for the individual. AISES receives foundation funding for the purpose of providing training of the type proposed by this project. Other potential collaborators are CERT and the American Indian College Fund.