Ernst & Ernst

Planning Manual for Energy Resource Development on Indian Lands

Volume III - Manpower and Training

Prepared for the

U.S. Department of Energy

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PLANNING MANUAL FOR ENERGY RESOURCE DEVELOPMENT ON INDIAN LANDS

(FORMERLY "COMPREHENSIVE ANALYSIS OF ISSUES REGARDING ENERGY RESOURCE DEVELOPMENT ON INDIAN RESERVATIONS")

VOLUME III--MANPOWER AND TRAINING

PREPARED FOR THE
U.S. DEPARTMENT OF ENERGY

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WASHINGTON, D.C.

PREFACE[1/]

This is one of five volumes constituting the "Planning Manual for Energy Resource Development on Indian Lands." (The title of the final draft report, dated October 1977, was "Comprehensive Analysis of Issues Regarding Energy Resource Development on Indian Reservations.") The other four volumes produced under this contract are:

"Volume I -- Benefit-Cost Analysis"

"Volume II -- Management and Contractual Arrangements"

"Volume IV -- The Environment"

"Volume V -- Energy Information and Clearinghouse Design"

In addition to these five separate reports, there is an Executive Summary covering the key points from each of the individual task reports. The Executive Summary is intended for wide distribution and has been written in non-technical language.

1/ The reader should be aware that the Energy Research & Development Administration (ERDA), Federal Energy Administration (FEA), Federal Power Commission (FPC), and some divisions of the Department of the Interior (DOI) were reorganized into a consolidated U.S. Department of Energy (DOE) effective October 1, 1977. The DOE is in the process of being reassigned accordingly. As a result, some of the sources and/or telephone numbers listed in this manual may have been changed. If information of a specific nature is desired, and this manual does not provide sufficient detail to obtain it, the reader should call the DOE general information number: (202) 252-5000.

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I. INTRODUCTION AND SUMMARY

In addition to providing revenues to tribal governments, energy resource development is a means of generating jobs for tribal members. Mineral development leases have traditionally stipulated that preference in hiring should be given to "qualified tribal members"; however, in most instances, tribal members have been qualified only for jobs requiring minimal skills.

This volume addresses ways to bridge the gap between existing tribal skill levels and the skill levels required for higher paying jobs in energy resource development projects. It addresses opportunities for technical, skilled, and semi-skilled employment as well as professional positions, because it is important to have tribal participation at all levels of an operation.

One important benefit to tribal members trained for careers in the energy field is the flexibility (in terms of life-style) that it offers them as individuals. For example, a tribal member trained as a mine dragline operator would find opportunities for employment in a high-paying position both on and off the reservation. At the present time, there are a limited number of occupations offering individual Indians this choice.

Section II, "Energy-Related Employment Opportunities," covers three areas: (1) the identification of energy resource occupations; (2) the description of these occupations; and (3) the identification of skill requirements by type of occupation.

The first area is addressed by identifying occupations associated with development of a particular energy resource (e.g., coal, uranium) as well as occupations (e.g., engineering technicians, welders) common to the development of all energy resources. For reference purposes, we have included a grid that cross-classifies energy occupations by six types of energy resources.

Before a tribal training program can be planned, it is necessary to have an understanding of what various energy occupations involve. The second subsection discusses the importance of tribes and companies agreeing on training for specific jobs as opposed to using general employment preference clauses in contracts.

The third subsection highlights the relationship of skills to occupations in terms of the formal training and education required to gain the skills. It also discusses the value of tribal skills inventory as a starting point in assessing the tribe's training needs.

Section III, "Description of Training Programs," covers three areas: (1) the concept of a training program model, (2) a description of various training methods, and (3) an assessment of the cost of training utilizing different programs. The first subsection discusses the elements of a training program, the occupational categories that should be covered, and factors to be considered in creating a focus for the training program.

The subsection describing training methods discusses standard approaches, such as colleges and apprenticeships, as well as special programs offered by trade associations and consultants.

The final subsection catalogs the costs of different programs of study available in the Southwest and Northern Great Plains regions. Costs are provided for:

- Four-year colleges or universities--Exhibit III-2
- Two-year colleges--Exhibit III-3
- Vocational schools--Exhibit III-4
- Native American programs and services--Exhibit III-5
- Training companies and services--Exhibit III-6
- Industry associations and organizations--Exhibit III-7
- Government courses--Exhibit III-8.

Section IV, the last section, concentrates on the development of a training program for target occupations, skills, and populations. This section also covers three areas: (1) an overview of the development of a skills training program; (2) the identification of target occupations, skills, and populations; and (3) energy careers for younger tribal members.

The first subsection presents, in flow chart form, the decisions and actions required of a tribe in developing a training program. Because this flow chart provides a good overview of the decisions and resources involved in the program development process, it has been included in this summary.

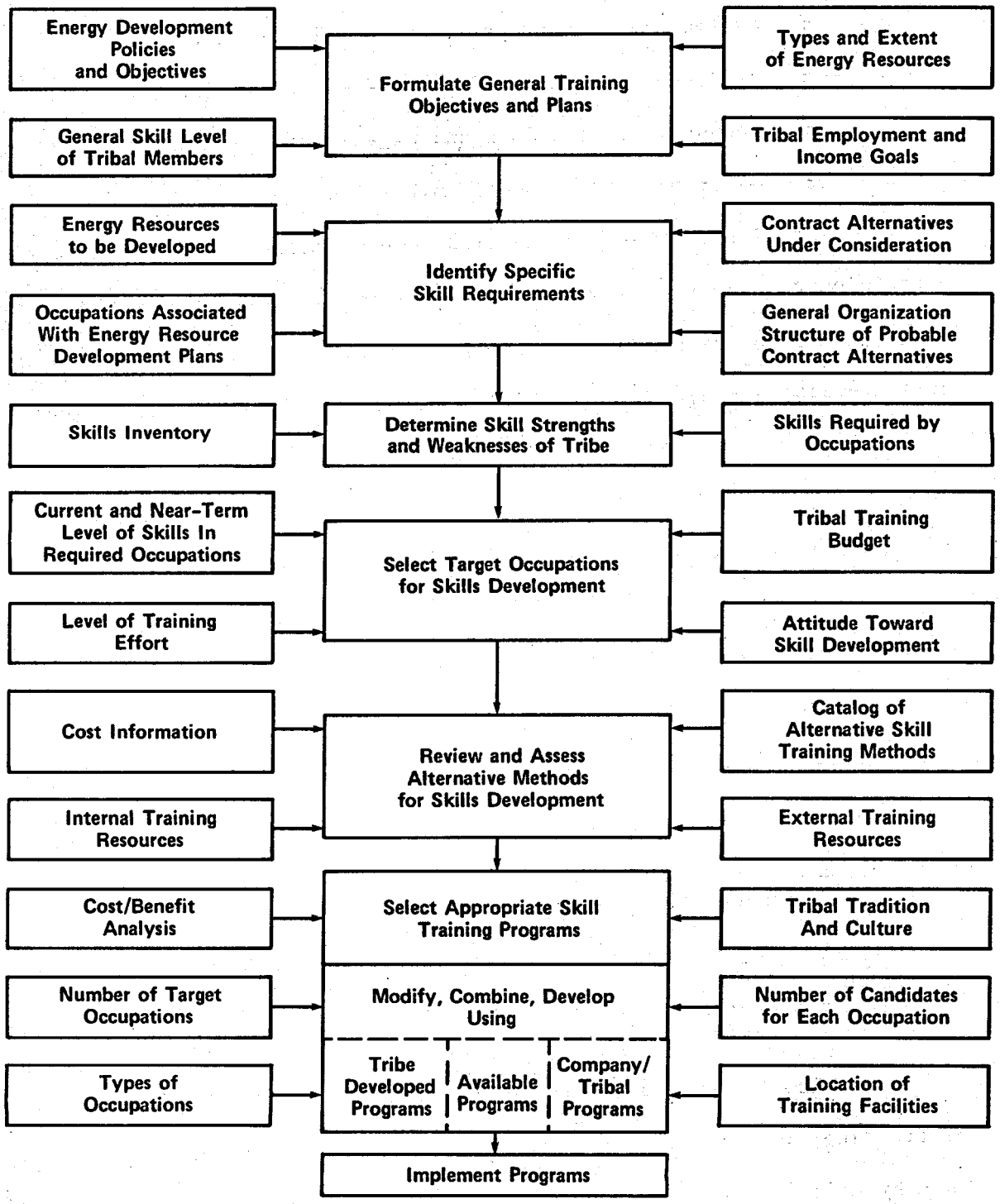
The second subsection addresses factors that the tribe should consider in determining target occupations for which tribal members will be trained. These considerations include:

- The number and variety of employment opportunities provided by each development alternative
- The tribe's policy toward skill development
- Overall tribal economic, income, and employment goals.

Also included in this subsection is a matrix showing the level of training or education required for all energy occupations. This can be used by tribal manpower planners to identify both short-term target

EXHIBIT I-1

FLOW CHART -- DECISIONS AND ACTIONS RELATED TO DEVELOPMENT OF SKILLS TRAINING PROGRAMS



occupations (those requiring shorter periods of training or on-the-job training) and long-term target occupations (professional or technical positions).

Finally, the third subsection discusses how younger tribal members who are still in school can be encouraged to pursue careers in the energy field. This section is particularly relevant to those occupations (such as engineering, geology, and business) where advanced training is required. Preparation for careers in these areas requires planning and counseling of students while they are still in school.

The two appendices are intended for use primarily by tribal manpower/education personnel. They are structured as resource handbooks for use in planning training programs for tribal members.

Appendix A provides an inventory of education and training programs in the energy field. It covers schools and colleges in the West offering training programs, special programs, industry and trade association courses, and sources of financial assistance for training of tribal members. We have provided red tab dividers for each section in this appendix to make it convenient to use.

Appendix B lists brief job descriptions for positions in each resource area (i.e., coal, oil, and gas) in order to provide an overview of the employment opportunities available. Position descriptions for each resource are separated by tan tab dividers for easy reference.

II. ENERGY-RELATED EMPLOYMENT OPPORTUNITIES

Before an energy tribe can develop a skills training program, a familiarity with certain information is needed. For example:

- What occupations are associated with development of the tribe's energy resources?
- What are the characteristics of these occupations?
- What skills are needed in these occupations?

This section discusses each of these elements.

ENERGY RESOURCE OCCUPATIONS

There is a group of occupations common to each of the six energy resources discussed here. These occupations include accountant, drafter, maintenance foreman, lawyer, purchasing agent, electrician, laborer, and bookkeeper. Further, each type of energy resource has occupations, fewer in number, that are found in development operations unique to that resource. For example, rig builder and roustabout are oil and gas occupations while an augerman and a tipple operator would only be found in a coal mine.

Exhibit II-1 contains a grid of occupations cross-classified by six types of energy resources. The exhibit is divided into nonmanual and manual occupations. The purpose of cross-classifying occupations to the one or more energy resources in which the occupation is found is to provide a quick and reliable method for completing two steps: (1) identifying those occupations associated with development of a particular energy resource, and (2) identifying occupations that are common to development of most or all energy resources.

EXHIBIT II-1
OCCUPATIONS BY TYPE OF
ENERGY DEVELOPMENT

NONMANUAL

	Oil and Gas	Coal	Uranium	Oil Shale	Geothermal	Solar Space and Heating
Accountant	X	X	X	X	X	X
Analytical lab technician			X			
Bank boss		X				
Bookkeeper	X	X	X	X	X	X
Business machine operator	X	X	X	X	X	X
Cargo inspector	X					
Car inspector	X					
Chemical engineer	X			X		
Chemist	X		X	X		
Chemist's helper	X		X	X		
Civil engineer				X		
Clerk, general office	X	X	X	X	X	X
Coal inspector		X				
Computer analyst	X	X	X	X	X	X
Computer programmer	X	X	X	X	X	X
Construction and maintenance inspector	X					
Dispatcher						X
Dispatcher, Chief I	X					
Dispatcher, Chief II	X					
Dispatcher, oil	X					
Doctor	X	X	X	X	X	X
Drafter	X	X	X	X	X	X
Electrical engineer		X		X	X	
Engineering aide	X	X	X	X	X	X
Engineering technician	X	X	X	X	X	
Environmental engineer		X	X	X		
Fireman	X	X	X	X	X	X
Fire marshal	X	X	X	X	X	X
Foreman	X	X	X	X	X	X
Foreman, dehydrogenation	X					
Foreman, dock	X					
Foreman, loading-rock	X					
Foreman, maintenance	X	X	X	X	X	X
Foreman, meter and regulator-shop	X					
Foreman, mine		X				
Foreman, natural-gas plant	X					
Foreman, purification	X					
Foreman, salvage	X					
Foreman, specialty plant	X					
Foreman, tower	X					
Foreman, treating and pumping	X					
General pit foreman		X				

EXHIBIT II-1 (Cont.)

	Oil and Gas	Coal	Uranium	Oil Shale	Geothermal	Solar Space and Heating
Geological engineer			X	X		
Geological engineering aide			X	X		
Geophysicist	X					
Industrial engineer		X				
Instrument technician				X		
Inventory clerk	X	X	X	X	X	X
Keypunch operator	X	X	X	X	X	X
Laboratory technician	X			X		
Labor relations specialist	X	X	X	X	X	X
Lawyer	X	X	X	X	X	X
Lease buyer	X					
Maintenance superintendent	X	X	X	X	X	X
Manager	X	X	X	X	X	X
Manager, bulk plant	X					
Manager, contracts	X					
Manager, industrial organization	X					
Mechanical engineer	X	X	X	X	X	
Mechanical inspector	X					
Metallurgical engineer			X			
Mining engineer		X	X	X		
Mining engineering aide		X	X	X		
Mine superintendent		X				
Nurse	X	X	X	X	X	X
Nurse-paramedic		X		X		
Personnel specialist	X	X	X	X	X	X
Petroleum geologist	X					
Pit foreman		X				
Process-control clerical supervisor	X					
Production superintendent	X					
Prospecting computer	X					
Purchaser		X				
Purchasing agent	X	X	X	X	X	X
Reclamation engineer				X		
Safety engineer		X	X	X		
Safety inspector		X				X
Secretary	X	X	X	X	X	X
Supervisor	X	X	X	X	X	X
Surveyor		X		X		
Systems analyst		X				
Title clerk	X					
Training specialist	X	X	X	X	X	X
Typist	X	X	X	X	X	X
Warehouseman	X	X	X	X	X	X
Waste treatment engineer	X					
X-Ray emission spectograph technician			X			

EXHIBIT II-1 (Cont.)

MANUAL

	Oil and Gas	Coal	Uranium	Oil Shale	Geothermal	Solar Space and Heating
Acidizer	X					
Aerial-tram operator		X				
Augerman		X				
Bettman			X	X		
Bit-sharpener operator		X				
Blaster		X				
Blender	X					
Blender's helper	X					
Boilermaker	X		X	X	X	
Boom-conveyor man		X				
Bottomman			X	X		
Bratticeman		X		X		
Breaker repairman		X				
Car cleaner		X				
Carpenter				X	X	
Catalyst operator	X					
Catalyst operator's helper	X					
Cementer	X					
Check viewer		X				
Chemical Operator II	X					
Chemical Operator III	X					
Churn-drill operator		X				
Clay roaster	X					
Coal haulage truck driver		X				
Coal washer		X				
Company laborer		X				
Continuous miner operator		X		X		
Control man	X	X				
Core splitter		X				
Craftsmen helper	X	X	X	X	X	
Crane & derrick operator	X			X		
Dehydration plant operator	X					
Dozer operator		X	X	X		
Dragline oiler		X				
Dragline operator		X				
Drill operator		X				
Driller's helper		X				
Dump operator		X				
Electrical repairman	X	X	X	X	X	X
Electrician	X	X	X	X	X	X
Engine operator	X					
Field mechanical-meter tester	X					
Fork-lift operator		X	X	X		
Front-end loader operator		X	X	X		

EXHIBIT II-1 (Cont.)

	Oil and Gas	Coal	Uranium	Oil Shale	Geothermal	Solar Space and Heating
Gager	X					
Gager, chief	X					
Gas compressor operator	X					
Gas plant operator	X					
Gas-governor repairman	X					
Gas-governor repairman's helper	X					
Gasoline treatment plant operator	X					
Gauger	X					
Glazier						X
Grease maker	X					
Grease maker head	X					
Heavy equipment operator		X		X		
Heavy media operator		X				
Helper	X	X	X	X	X	X
Hoist operator	X		X	X		
Industrial-truck operator	X					
Instrument repairer	X	X	X	X	X	X
Insulation worker	X			X		
Iron worker				X	X	
Jig runner		X				
Laborer	X	X	X	X	X	X
Lead recovery man	X					
Line walker	X					
Loading-shovel oiler		X				
Machinist	X	X		X		
Mason				X		
Mechanic		X	X	X	X	
Miner		X	X			
Mobile crane operator		X	X	X		
Molder, wax	X					
Motor grader operator		X	X	X		
Motorman			X	X		
Observer	X					
Observer, gravity prospecting	X					
Operator			X	X	X	
Painter	X			X		
Panelboard operator		X				
Parrafin-plant operator	X					
Parrafin-plant sweater man	X					
Performance operator	X					
Pilot plant operator	X					
Pipefitter	X			X	X	
Pitman		X				
Planimeter operator	X					
Plumber						X

EXHIBIT II-1 (Cont.)

	Oil and Gas	Coal	Uranium	Oil Shale	Geothermal	Solar Space and Heating
Powderman				X		
Power-shovel operator		X				
Preparation plant operator			X	X		
Pulleyman		X				
Pumper	X		X	X		
Pumpman	X					
Pumpman's helper	X					
Rail car cleaner		X	X	X		
Rail car loader		X	X	X		
Rail car sampler		X	X	X		
Refinery operator	X					
Refrigeration mechanic						X
Rig builder	X					
Rig builder's helper	X					
Road grader operator		X				
Roofbetter operator			X	X		
Rotary driller	X					
Rotary driller's helper	X					
Roustabout	X					
Salvageman	X					
Salvageman's helper	X					
Sampler	X					
Scraper operator		X				
Sewage treatment plant operator		X	X	X		X
Sheetmetal worker	X					
Shooter	X					
Shothole drillers	X					
Shovel oiler		X				
Shuttle car operator		X	X	X		
Sprinkler		X				
Stillman	X					
Stillman's helper	X					
Still pump operator	X					
Stripping shovel operator		X				
Supply truckdriver		X				
Switcher	X					
Tank cleaner	X					
Tank-truck driver	X					
Test-engine operator	X					
Tester	X					
Tipple operator		X				
Tool pusher	X					
Trackman			X	X		

EXHIBIT II-1 (Cont.)

	Oil and Gas	Coal	Uranium	Oil Shale	Geothermal	Solar Space and Heating
Track-moving machine operator		X				
Tractor-suder operator		X				
Treater	X					
Treater's helper	X					
Truck driver	X	X		X		
Tube cleaner	X					
Underground miner			X	X		
Utility man	X	X				
Water treatment plant operator	X		X	X		
Water truck driver		X				
Welder	X	X	X	X	X	
Well pullers	X					
Wharfinger head	X					

The first step enables a tribe to assess the range of job opportunities associated with development of its resources. This assessment would indicate the number and variety of occupations and associated skills an operation requires. Determination of skill deficits and surpluses can be made by comparing the required skills with the tribe's skill inventory. Decisions related to the kinds and numbers of target occupations the tribe might include in employment sections of its mineral development contract can then be made in more specific terms.

The second step, identifying occupations common to a number of resources, provides useful information for developing training programs that could be sponsored by several tribes. One advantage that could result from this approach is that the tribes should be able to develop or purchase comprehensive programs at a lower cost per participant than if each tribe were to develop programs independently. Another is that joint development should enable the tribes to establish a more extensive series of skill training programs than if done individually. Also, the quality of teaching and follow-up (program evaluation, upgrading, and enhancement) should increase with the frequency of a program's use.

DESCRIPTION OF EACH OCCUPATION

The second important element in developing a skills training program is the definition of duties and tasks of each occupation. Appendix B contains a brief description of each energy-related occupation listed in the occupation-energy resource grid. These definitions, a sample of which is included in Exhibit II-2, are intended to provide a very general idea of what each occupation entails. Also, they can be used in drafting the employment and training provisions attached to leases and other contracts. By agreeing on specific jobs for which tribal members will be trained, the company is more likely to adhere to a training and employment program for tribal members.

An understanding of these occupations is needed before a training program can be designed. Tribes may use definitions of occupations to aid in selecting target occupations. Target occupations are those on which the tribe intends to focus its efforts to improve skills, employment opportunities, and stability, as well as aggregate and per capita income.

EXHIBIT II-2

SAMPLE JOB DESCRIPTIONS--
COAL MINING[1/]

A. NONMANUAL

1. Technical

a. Engineers

1. Electrical--responsible for supervising the operation and maintenance of electical and electronic equipment.

2. Environmental--responsible for calculating and monitoring air and water pollution generated by the project, determining pollution control requirements, and developing pollution control methods.

3. Industrial--performs a variety of engineering functions in planning and overseeing the utilization of production facilities and personnel.

b. Draftsmen--responsible for preparing work plans and detailed drawings of mine structural features and machinery.

c. Mine Supervisors-responsible for supervising and coordinating activities of workers employed in a coal mine.

2. Other Technical

a. Bank Boss--supervises and coordinates activities of workers operating machinery, such as front-end loaders, bulldozers, and conveyors, used in loading bank coal into trucks and railroad cars.

b. Coal Inspector--responsible for maintaining coal quality standards by visually inspecting coal samples to estimate percentage of impurities and grading coal accordingly.

1/ This listing is a sample of job descriptions in the coal area. The complete list is in Appendix B, p. B-10.

EXHIBIT II-2 (Cont.)

2. Other Technical (Cont.)

c. Computer programmer--responsible for developing production simulation models, scheduling employees and equipment, and scheduling maintenance operations for mine equipment and machinery.

B. MANUAL--CRAFTSMEN

1. Aerial-tram operator--tends aerial tramway (buckets attached to overhead cables and pulleys supported by towers) to convey refuse, coal, and other materials from plant or mine to spoil pile, conveyor, railroad car, or plant.

2. Augerman--sets up and operates rotary auger drilling machine to mine coal from surface seams.

3. Bit-sharpener operator--tends bit-sharpening machine to shape and sharpen detachable bits of mining equipment.

SKILL REQUIREMENTS BY TYPE OF OCCUPATION[1/]

The third element is the determination of basic skills commonly associated with each occupation. The most practical means of accomplishing this is to relate the skill requirements of the occupation to the formal training and education required to gain the skill and supporting knowledge and aptitude. For many occupations, there is a recognized or required training/educational process to acquire the necessary skills. Examples are: mining engineer or petroleum geologist--4- or 5-year college degree; electrician or machinist--high school or equivalent plus successful completion of formal apprenticeship programs; engineering aide or technician--two years of vocational training coupled with related on-the-job training. Other occupations have less rigid equivalency guidelines; for example, business machine operator, computer analyst, and secretary. It is important to note, however, that the ultimate determination of a person's qualifications for an occupation may be other than the level and type of schooling attained. Many trade or craft occupations require a vocational/trade school followed by structured on-the-job training or an apprenticeship program. Further, semi- or fully-skilled production occupations in such areas as coal mining or petroleum refining have skill development programs similar to those for a trade or craft occupation. Selected skilled clerical or administrative occupations also have a combination of formal schooling (business or vocational) and on-the-job training.

1/ This subsection highlights the relationship of skills to occupations within a training framework. Descriptions of the many skills required for every resource development are provided in Appendix B. Section IV describes the factors to consider in developing a training program to meet certain skill requirements.

In assessing its skills or lack of skills, a tribe should conduct a tribal skills inventory. This inventory would involve a survey of tribal members to show the skill status of the tribe for each occupational category--management, professional, supervisory, technical, skilled trades, and skilled clerical--that the tribe has targeted for penetration. A sample skills inventory form is included as Exhibit II-3. This form should be updated on a regular basis, at least once a year. Maintenance of the skills inventory should be the responsibility of the tribe's personnel or administrative staff. Use of this inventory form in adapting a training program to meet skills requirements is discussed in Section IV.

The next section describes the elements of alternative training programs designed to develop the skills needed in energy resource occupations.

EXHIBIT II-3

TRIBAL SKILLS INVENTORY FORM

Occupation Classification	Associated Skill Level	Number of Tribal Members in Category[1/] Male	Female	Total
Management	4-year degree or 2-year degree in field			
Professional-technical	4-year degree in field			
Professional-other	4-year degree or bachelor's degree plus advanced degree			
Administrative/specialist	2-year degree or 2-3 years of business school			
Supervisory	3-4 years of apprenticeship or 2-3 years of vocational or business school			
Technical	2-year degree, 2-3 years of vocational school or 0-1 year of vocational school			
Trades and crafts/skilled production	1-3 years of apprenticeship or 3-4 years of apprenticeship			
Clerical and secretarial	0-1 year of business school or high school diploma or secretarial training			
Semi-skilled or unskilled production	High school or on-the-job training			
	Total Tribal Labor Force	____	____	____

1/ A file on each person would be maintained in the tribe's employment office coded by occupation, skill area(s), etc.

III. DESCRIPTION OF TRAINING PROGRAMS

This section presents the concept of a training model and an overview of the different types of training programs available. Appendix A provides a complete inventory of education and training programs of interest to energy resource tribes. As noted in Section I, Appendix A has tabs to make it easy for a reader to refer to a training program of special interest. Also included in this section is a breakout of the costs for various training and/or educational programs.

CONCEPT OF A TRAINING PROGRAM MODEL

The characteristics of a training program depend on the focus selected. A program that focuses on energy development skills should have the following characteristics:

(1) Includes these program elements:

- (a) Elementary and secondary education (college-prep)
- (b) Higher education (college-level)
- (c) Vocational training (secondary and post-secondary)
- (d) Apprenticeship
- (e) Manpower training programs (e.g., Comprehensive Employment Training Act--CETA)

(f) Adult Basic Education, including General Equivalency Diploma (GED)

(g) Company-sponsored or tribally developed training

(h) Management training for tribal employees (e.g., civil service courses, company-sponsored workshops).

(2) Emphasizes training programs for positions that are energy-related. Categories of occupations to be considered are:

(a) Management (e.g., contracts manager, mining superintendent)

(b) Professional - technical (e.g., geologist, chemical engineer, petroleum engineer)

(c) Professional - other (e.g., accountant, lawyer, employee relations specialist, systems analyst)

(d) Administrative - specialist (e.g., training specialist)

(e) Supervisory (e.g., foreman, office supervisor)

(f) Technical (e.g., laboratory technician, engineering aide, drafter, instrument technician)

(g) Tradesman - skilled operator (e.g., chemical operator, drill operator, electrician, gager, operating engineer, mechanic)

(h) Administrative/Staff (e.g., bookkeeper, inventory clerk, keypunch operator, secretary, computer operator)

(i) Production and service (e.g., car cleaner, miner, pitman, helper)

(3) Is applicable to occupations related to energy development and to tribal natural resource and economic development. The model should be responsive to training needs for occupations in both energy development operations (e.g., coal mine) and a tribal minerals office.

(4) Takes into account the tribe's present and planned energy resource and economic development programs in terms of resource(s) involved, planned level of development, and availability of management, technical, trade, and other skills.

(5) Reflects the tribe's employment and human development goals and the tribe's policies related to its economic self-sufficiency.

To summarize, a training model consists of programs designed to prepare tribal members for employment in the areas of energy enterprise development (e.g., an oil and gas operation or coal mine), a tribal minerals office, and/or a tribally owned and operated energy enterprise. In each case, programs must be developed on a resource-by-resource basis.

DESCRIPTION OF TRAINING METHODS

Many types of training methods are available to tribes developing a training program. Some focus on classroom training in an institutional framework while others emphasize on-the-job training. A summary of training programs in relation to occupations and sponsoring organizations is provided in Exhibit III-1. In addition, Appendix A contains detailed information on alternative programs available.

EXHIBIT III-1

DESCRIPTION OF VARIOUS
TRAINING PROGRAMS

DESCRIPTION OF PROGRAM	EXAMPLES OF OCCUPATION	ORGANIZATION PROVIDING TRAINING
Four-year program resulting in a bachelor's degree	Accountant Purchasing Agent Chemical Engineer Geologist Mining Engineer Geophysicist Petroleum Engineer Systems Analyst	Four-year college or university
Two-year, college-level program resulting in a diploma or certificate of arts, business, technology, or equivalent	Cargo Inspector Computer Analyst Engineering Aide Manager Mine Superintendent Purchaser (Buyer) X-Ray Emission Spectograph Technician	Two-year community or junior college
Recognized apprenticeship program of three to four years' duration resulting in achievement of a journeyman's status in a recognized skill or craft occupation. Consists of considerable workplace experience with necessary classroom or similar training.	Blender Carpenter Chemical Operator Crane & Derrick Operator Electrician Gager Molder Pumper Sheetmetal Worker Welder	Union Trade Council Employer Council Employer Organization

EXHIBIT III-1 (Cont.)

DESCRIPTION OF PROGRAM	EXAMPLES OF OCCUPATION	ORGANIZATION PROVIDING TRAINING
Recognized apprenticeship program of one to two years' duration resulting in a certification of achievement in a recognized skilled, semi-skilled, or craft occupation. Consists of considerable on-the-job experience with classroom or similar training.	Plasterer Craftsman's Helper Front-end Loader Operator Instrument Repairer Mechanic Sewage Treatment Operator Plant Operator Treater's Helper	Union Trade Council Employer Council Employer Organization
Vocational, technical or business program of two to three years' duration resulting in formal recognition, such as a certificate or diploma. Consists of considerable classroom training with some on-the-job experience.	Bookkeeper Nurse-paramedic	Vocational, technical, or business school
Vocational, technical or business program of six to twelve months' duration resulting in formal recognition, such as a certificate	Business Machine Operator Engineering Technician Laboratory Technician Secretary	Vocational, technical, or business school

EXHIBIT III-1 (Cont.)

DESCRIPTION OF PROGRAM	EXAMPLES OF OCCUPATION	ORGANIZATION PROVIDING TRAINING
(cont.) or diploma. Consists of considerable classroom training with limited work place experience.		
General or special courses that run from several days to several months and are designed to augment or broaden already acquired professional, technical, or management skills.		American Management Association Professional Societies Colleges and Universities Trade Associations
Programs or services specially designed to develop or improve skills among Native Americans. Often satisfy unique cultural, social, or environmental characteristics, and provide some form of financial support.	Accountant Bookkeeper Electrician Mechanic Manager Nurse-Paramedic Supervisor Welder	Arrow-Inc. All Indian Pueblo Council Indian Technical Training Center All Indian Development Association
Courses developed and offered by training companies and service programs provide both skill development and skill improvement opportunities.	Machinist Supervisor Lease Operator Technician Pumpman Welder	Dupont Howell Corporation Hughes Tech. Comm. Co. Petroleum Ext. Service Technical Publ. Co. Training Sys.

EXHIBIT III-1 (Cont.)

DESCRIPTION OF PROGRAM	EXAMPLES OF OCCUPATION	ORGANIZATION PROVIDING TRAINING
Ongoing programs offered by industrial organizations and trade associations	Accountant Chemical Engineer Computer Programmer Nurse Mechanical Engineer Biological Engineer Purchasing Agent	Bituminous Coal Operators Association National Society of Professional Engineers
Programs offered by the government	Drafter Bookkeeper Business Machine Operator General Office Clerk Secretary Supervisor Typist Inventory Clerk	Department of Commerce BIA Civil Service Commission

Standard Training Methods

Standard training methods are:

- Four-year college program
- Two-year college program
- Three- to four-year apprenticeship
- One- to two-year apprenticeship
- Six- to twelve-month business, technical, or vocational school
- Formal on-the-job training directly linked to one of the above programs.

A description of these methods is included in the preceding exhibit (III-1). A tribe may use a number of standard training methods to develop the necessary energy resource skills among its members. The selection of the method a tribe would find most effective and efficient in developing a particular skill depends primarily on the:

- Type of occupation skill(s) involved
- Number of tribal members who require skills development in this occupation
- Availability of prepared skills training programs
- Cost of alternative programs
- Accessibility of training for tribal members
- Attitude of tribal members toward different training methods
- Policy of the tribe with regard to development of programs with other tribes.

Because of the number of variables involved in selecting the most appropriate skills training mode, it is not feasible to describe specific alternatives. It is practical, however, to show that certain training

program alternatives would be most effective with specific groups of occupations. For example, several skills development methods have been proven to be most effective with supervisory/middle management positions. Other training methods or programs have been most effective with trade and craft occupations. Professional technical occupations call for still another set of skills training methods. Thus, each tribe has a set of various skills development methods that should be considered as it establishes its overall training program. The program choices generally used for the several categories of occupations--nonmanual and manual and sub-groups of each--are described in Appendix A. The training methods used most frequently are identified in Section IV, Exhibit IV-2. This exhibit lists energy resource occupations and education and training equivalents associated with each occupation.

Generally, other training methods as well as the standard approaches are used. Some of these other methods are considered as substitutes for standard methods. That is, a basic skill need may be satisfied by implementing one of several alternative training methods. For example, a tribe that is targeting on the development of skills associated with the occupation of operating engineer has a number of various training methods from which to choose and evaluate. One method is to enroll members in three- to four-year apprenticeship programs. Another method would be on-the-job training. This type of training has three objectives. The first is to direct and instruct a new employee on company procedures, practices, and rules that are essential to good performance but are generally unique to the organization (not readily transferable). The second is to provide the new and relatively inexperienced employee the opportunity to reach an acceptable performance/ production level under controlled conditions (additional skills learned are

transferable). Finally, it is necessary to train people in an occupation for which the demand consistently exceeds the supply and where the skills are largely mechanical and can best be acquired in a production setting (skills learned are generally transferable within the same industry). The selection of a program involves consideration of both the availability of programs and their relative cost.[1/] Once a tribe's training objectives have been set and its employment goals determined, target occupations can be selected. It is from the group of target occupations and the skills inventory that tribal skill needs or deficiencies can be identified. Those skill areas judged to be most essential to the tribe's economic development program, primarily energy resource management, should have a high priority on the tribe's list of "skills to be developed." The cost of a training program is a key aspect in this decision process.

Various training methods can be considered when the tribe is evaluating one skills development program against another. The result of this evaluation is the selection of one program (and the rejection of its competitor). In selecting from different training methods, a tribe should also determine the type of training on which it will focus -- short cycle with moderate initial cost, moderate cycle with more cost, or long cycle requiring considerable investment. Some tribes may elect to establish a program that balances all three skills development objectives. The list of program costs (presented subsequently) would help tribal leadership decide which is the most cost-effective program for its particular situation.

1/ A discussion of training program costs is provided at the end of this section.

Additional Training Methods

In addition to standard training methods, a variety of other training methods are available. These range from special programs offered by colleges, universities, and private organizations to those sponsored by companies on a consultant basis. The combination of standard training methods and those described below should provide a tribe with a broad range of alternatives from which to develop a workable and cost-effective tribal training program.

Programs Offered by Colleges, Universities, and Private Organizations. These programs are generally designed to run from several days to several months and are designed to broaden already acquired professional, technical, or managerial skills.

Energy tribes have the option of using a multi-tribal organization to coordinate the development or purchase of skills training programs that relate to occupations of interest to a majority of tribes. The organization could act as the representative of its members in discussions with energy companies, training companies, industry associations, and colleges and universities concerning the design or modification, conduct, and follow-up of special training programs. It could also assist members in obtaining financial and technical assistance in the development and administration of their programs. Such organizations could also provide members with information about the experiences of other tribes with alternative training methods.

Programs Offered by Industry or Professional Associations. These programs generally are classified as intermediate (six to nine months) to long (one to two years) courses that provide training to develop and enhance intermediate or advanced skills. They are often developed to meet specific skill or organizational needs. They are conducted by both industry and professional personnel and are given on or near their own facilities. The programs are described in greater detail in Appendix A.

Programs Provided by Government Agencies. Government-sponsored programs are generally short (several weeks) to intermediate-length (six to nine months) courses that provide employees with training to develop and/or enhance basic or general skills. The programs are often developed to meet specific skills or organizational needs. They are conducted by government personnel and are given on or near a governmental facility.

Programs Developed by or for Energy Resource Companies. Many energy-related companies provide training programs to develop various skills. The following three programs were developed by Shell Oil Company:

- Drilling & Production - This program was developed to train people of various skill levels in drilling and production and requires no specific education level. The steps involved in developing the program were to spell out the basic principles of drilling and production, outline the steps required, develop the training media, and devise a plan of implementation. Shell's training program is based on a curriculum that consists of slide/tape programs (varying by skill level) and selected programmed learning material.

- Operations - This program covers operations development and is a one-year program. The program is oriented toward training new operations employees and is designed to include operator courses, on-the-job training, self-development training, and specialized training.

- Management - Training in the management field is divided into seven levels starting with the most basic skills and progressing to the senior management material. In developing this program, the organizers analyzed the basic needs and levels of a good management system. After these levels were determined, they developed specific courses for training in each of these areas. Managers at different levels enter the program at varying stages and complete the program designed specifically for them.

These particular programs would be potentially available only to tribes having resources being developed by Shell. However, they can be considered typical of the types of programs that any major mineral development company uses to train its personnel. Therefore, tribes negotiating with major companies should inquire about the availability of such programs for training tribal members to be employed by the company.

COSTS OF TRAINING PROGRAMS

The overall cost of training would depend on the number of trainees, types of programs selected, and follow-up training through continuous education. The intent here is to catalog the costs of different curricula and variations in the costs of different programs offering the same curriculum. Since a benefit-cost or cost-effectiveness analysis of different program combinations designed to achieve a stated training objective was not undertaken, it is

not possible to recommend specific training programs. This is a decision each tribe must make through further refinement of its employment objectives and opportunities, skill levels of its work force members, and specific programs and combinations of programs open to it.

Exhibits III-2 through III-8 present costs for various programs for 1977. When cost information for 1977 was not available, 1975 figures were multiplied by a 20 - 25% inflation factor that represents the increase in the cost of education during the two-year period. Each type of program and its respective exhibit follow: 1/

- Four-year colleges or universities--Exhibit III-2
- Two-year colleges--Exhibit III-3
- Vocational schools--Exhibit III-4
- Native American programs and services--Exhibit III-5
- Training companies and services--Exhibit III-6
- Industry associations and organizations--Exhibit III-7
- Government courses--Exhibit III-8

1/ Note that Appendix A contains additional information on training programs provided by various organizations and institutions.

EXHIBIT III-2

COSTS PER YEAR FOR FOUR-YEAR
COLLEGES OR UNIVERSITIES

State/School	Tuition In-State	Tuition Out-of-State	Room and Board	Additional Fees
ARIZONA				
Arizona State University	$ 450	$1,640	$1,200	$462
Arizona, University of	450	1,640	1,285	160
Grand Canyon College	1,588*	--	1,261	125
Northern Arizona University	400	1,400	1,050	--
Southwestern College	1,050*	--	960	112
CALIFORNIA				
California State College (Stanislaus)	190	1,630	1,358	98
California State Polytechnic University	190	1,440	1,497	180
California State University (Sacramento)	186	1,486	1,330	100
California University (Berkeley)	638	2,543	1,500	--
COLORADO				
Adams State College	518	1,953	1,125	187
Colorado College	3,100*	--	1,400	62
Colorado School of Mines	580	2,310	1,135	86
Colorado State University	609	1,913	1,230	145
Colorado, University of	576	1,894	1,308	171
Colorado Women's College	2,870*	--	1,700	62
Denver, University of	2,700*	--	1,200	--
Fort Lewis College	1,704	2,753	1,040	142
Loretto Heights College	2,950*	--	1,650	125
Mesa College	516	1,656	1,057	152
Metropolitan State College	337*	--	1,353	97
Northern Colorado, University of	575	1,727	1,420	127
Regis College	2,920*	--	1,540	100
Southern Colorado State College	561	1,707	--	--
Western State College of Colorado	510	1,473	1,242	217

- Indicates no information.
* Indicates overall tuition; not in-state or out-of-state.

EXHIBIT III-2 (Cont.)

State/School	Tuition In-State	Tuition Out-of-State	Room and Board	Additional Fees
GEORGIA				
Georgia Institute of Technology	$ 677	$1,844	$1,221	--
ILLINOIS				
Illinois University	666	1,656	None	60
MONTANA				
Carroll College	1,674*	--	1,150	180
Eastern Montana College	474	1,446	1,021	--
Great Falls, College of	1,850*	--	1,060	40
Montana College of Mineral Science and Technology	412	1,383	1,261	260
Montana State University	501	972	1,065	--
Montana, University of	542	1,514	1,372	662
Northern Montana College	445	913	1,074	75
Rocky Mountain College	1,750*	--	1,100	110
NEVADA				
University of Nevada	656	1,856	1,300	655
NEW MEXICO				
Albuquerque, University of	1,560*	--	1,240	20
Artesia College	1,562	--	1,312	162
Eastern New Mexico University	512	1,221	1,080	200
New Mexico Highlands University	348	1,057	960	--
New Mexico Institute of Mining and Technology	220	1,050	1,500	263
New Mexico State University	180	480	None	160
New Mexico, University of	520	1,516	1,080	40
Santa Fe, College of	1,664*	--	1,536	130
Western New Mexico University	343	1,051	1,120	75

- Indicates no information.
* Indicates overall tuition; not in-state or out-of-state.

EXHIBIT III-2 (Cont.)

State/School	Tuition In-State	Tuition Out-of-State	Room and Board	Additional Fees
NORTH DAKOTA				
Dickinson State College	$1,368*	--	$ 891	$100
Jamestown College	2,090*	--	1,250	65
Mary College	1,410*	--	1,050	58
Mayville State College	473	1,010	930	45
Minot State College	468	1,029	900	--
North Dakota State University	504	1,233	1,092	101
North Dakota, University of	641	1,369	1,025	50
Valley City State College	160	339	966	75
OHIO				
Miami University	787*	--	1,743	262
OKLAHOMA				
Oklahoma, University of	470	1,310	1,050	20
SOUTH DAKOTA				
Augustana College	2,575*	--	1,085	137
Black Hills State College	684	1,252	951	187
Dakota State College	687	1,397	1,060	125
Dakota Wesleyan University	1,800*	--	1,080	162
Huron College	1,915*	--	1,173	141
Mount Marty College	1,975*	--	1,060	937
Northern State College	652	1,276	938	187
Sioux Falls College	2,080*	--	1,144	687
South Dakota School of Mines and Technology	711	1,510	878	73
South Dakota State University	693	1,445	945	161
South Dakota, University of	682	1,434	1,070	274
Yankton College	2,250*	--	1,250	62

- Indicates no information.
* Indicates overall tuition; not in-state or out-of-state.

EXHIBIT III-2 (Cont.)

State/School	Tuition In-State	Tuition Out-of-State	Room and Board	Additional Fees
TEXAS				
Southern Methodist University	$2,510*	--	$1,350	$312
St. Mary's University	2,000*	--	900	500
Texas A&M	536	1,361	1,285	80
Texas Tech University	120	1,200	1,220	175
UTAH				
Brigham Young University	750*	--	1,085	50
Southern Utah State College	429	879	1,050	161
Utah State University	497	1,253	1,080	73
Utah, University of	525	1,380	1,430	30
Weber State College	471	959	930	202
Westminster College	1,650*	--	1,086	--
WASHINGTON				
Central Washington State College	507	1,359	1,350	180
Eastern Washington State College	507	1,359	1,300	117
Fort Wright College	2,062*	--	1,406	62
Gonzaga University	2,380*	--	1,360	143
Pacific Lutheran University	2,688*	--	1,300	--
Puget Sound, University of	2,849*	--	1,400	45
St. Martins College	2,150*	--	1,385	37
Seattle Pacific College	2,367*	--	1,323	--
Seattle University	2,340*	--	1,290	70
Walla Walla College	2,730*	--	1,220	93
Washington State University	564	1,581	1,412	--
Washington, University of	564	1,581	1,440	50
Western Washington State College	507	1,359	None	--
Whitman College	2,910*	--	1,200	--
Whitworth College	2,860*	--	1,350	206

- Indicates no information.
* Indicates overall tuition; not in-state or out-of-state.

EXHIBIT III-2 (Cont.)

State/School	Tuition In-State	Tuition Out-of-State	Room and Board	Additional Fees
WYOMING				
Wyoming, University of	$ 434	$1,400	$1,364	$175

- Indicates no information.
* Indicates overall tuition; not in-state or out-of-state.

EXHIBIT III-3

COSTS PER YEAR FOR
TWO-YEAR COLLEGES

State/School	Tuition Area Resident	Tuition In-State	Tuition Out-of-State	Room and Board	Additional Fees
ARIZONA					
Arizona Western College	$170	$1,370	$1,420	$1,280	$187
Central Arizona College	--	144	1,350	990	62
Cochise College	--	200	1,400	1,180	90
Eastern Arizona College	45	375	615	1,262	96
Glendale Community College	45	300	760	None	112
Mesa Community College	--	45	715	None	56
Navajo Community College	--	1,310*	--	1,380	75
Phoenix College	45	475	715	None	--
Scottsdale Community College	90	680	1,520	None	56
Yavapai College	--	150	1,100	1,190	75
COLORADO					
Arapahoe Community College	--	243	1,069	None	67
Colorado Mountain College	276	744	1,860	1,380	40
Colorado Northwestern Community College	100	390	850	990	175
Denver Community College	--	300	1,500	--	36
El Paso Community College	--	243	1,002	None	--
Lamar Community College	--	340	1,157	1,106	127
Northeastern Jr. College	255	465	1,095	1,105	87
Trinidad State Jr. College	--	283	1,056	1,104	46
MONTANA					
Flathead Community College	255	300	600	None	--
Miles Community College	269	389	689	None	103
NEW MEXICO					
New Mexico Jr. College	140	260	380	None	50

- Indicates no information.
* Indicates overall tuition; not in-state or out-of-state.

EXHIBIT III-3 (Cont.)

State/School	Tuition Area Resident	Tuition In-State	Tuition Out-of-State	Room and Board	Additional Fees
NORTH DAKOTA					
Fort Berthhold Community College	--	$ 600*	--	None	--
Lake Region Jr. College	--	582	843	956	137
SOUTH DAKOTA					
Presentation College	--	1,400*	--	1,050	150
TEXAS					
Western Texas College	--	187	500	1,062	162
UTAH					
Dixie College	--	300	875	937	--
Eastern Utah, College of	--	300	875	875	--
Snow College	--	264	660	None	41
Stevens Henager College	--	1,031	--	--	73
WASHINGTON					
Bellevue Community College	--	249	681	--	26
Big Bend Community College	--	249	681	1,340	--
Centralia College	--	250	681	--	180
Clark College	--	249	681	None	--
Columbia Basin Community College	--	249	681	--	6
Edmonds Community College	--	249	681	--	--
Everett Community College	--	249	683	None	--
Fort Sheilacoom Community College	--	273	705	None	--
Grays Harbor College	--	249	681	--	12
Green River Community College	--	249	681	None	--

- Indicates no information.
* Indicates overall tuition; not in-state or out-of-state.

EXHIBIT III-3 (Cont.)

State/School	Tuition Area Resident	Tuition In-State	Tuition Out-of-State	Room and Board	Additional Fees
WASHINGTON (Cont.)					
Highline Community College	--	$ 249	$ 681	--	$ 25
Lower Columbia College	--	252	684	--	--
North Seattle Community College	--	228	660	None	--
Olympic College	--	249	681	None	--
Peninsula College	--	228	660	1,256	--
Seattle Central Community College	--	228	660	None	--
Shoreline Community College	--	249	681	None	--
Skagit Valley College	--	249	681	None	--
Spokane Falls Community College	--	270	744	None	--
Tacoma Community College	--	250	681	None	--
Walla Walla Community College	--	249	681	1,200	--
Wenatchee Valley College	--	250	681	1,200	--
Yakima Valley College	--	255	687	1,200	--
WYOMING					
Casper College	--	288	900	1,098	--
Central Wyoming College	--	265	420	1,100	12
Northwest Community College	--	270	710	1,070	96
Sheridan College	--	300	2,100	1,050	80

\- Indicates no information.
* Indicates overall tuition; not in-state or out-of-state.

EXHIBIT III-4

COST PER YEAR FOR
VOCATIONAL SCHOOLS

	Sample Areas of Instruction	In-State	Out-of-State	Room and Board	Fees
ARIZONA					
Academy of Drafting 1202 North Scottsdale Road Tempe, Arizona 85281	Drafting	$2,210*		None	$206 - supplies
Blair College of Medical & Dental Assistants 1005 West Southern Avenue Mesa, Arizona 85202	Medical Assisting	$1,995		None	
Phoenix School of Welding 603 South First Avenue Phoenix, Arizona 85003	Welding	$2,450		None	
COLORADO					
Automation & Training Universal Corporation 425 Lincoln Street Denver, Colorado 80203	Drafting Key Punch Operator Computer Programmer Business Machine Operator	$2,640 $ 350 $2,795			
Barnes Business College, Inc. 150 Sheridan Denver, Colorado 80226	Secretary Accounting Clerk Key Punch Operator	$2,000 $1,200 $ 420			
Blair Business College, Inc. 10 North Farragut Avenue Colorado Springs, Colorado 80909	Clerk-Typist Secretary Accounting Bookkeeping	$1,350 $2,700 $2,700 $2,025			
Certified Welding School, Inc. 2565 South Broadway Denver, Colorado 80210	Welding	$1,710			
Colorado Springs College of Business, Inc. 824 South Union Boulevard Colorado Springs, Colorado 80910	Secretary Clerk-Typist Accounting Key Punch	$2,592 $1,728 $2,592 $ 525			
Denver Institute of Technology, Inc. 7350 North Broadway Denver, Colorado 80221	Drafting Technician	$2,700			
Engineering Drafting School, Inc. 9635 West Colfax Denver, Colorado 80215	Drafting	$2,970			
Midwest Business College, Inc. 3210 Wedgewood Drive Pueblo, Colorado 81003	Secretary Clerk-Typist Accounting Key Punch	$2,700 $1,800 $2,700 $ 240			

EXHIBIT III-4 (Cont.)

	Sample Areas of Instruction	In-State	Out-of-State	Room and Board	Fees
COLORADO--CONTINUED					
Parks College, Inc. 7450 North Broadway Denver, Colorado 80201	Accounting Secretary Medical Assistant	$2,600 $2,200 $2,800			
Rocky Mountain Business College, Inc. 1445 Pearl Street Boulder, Colorado 80302	Accounting Secretary Clerk-Typist	$2,160 $2,448 $1,440			
Seible School of Drafting 1596 South Acoma Denver, Colorado 80223	Drafting	$1,050			
United States Driving School, Inc. 6530 Federal Denver, Colorado 80221	Inter-State Heavy Duty Truck Driving	$2,380			
MONTANA					
Billings Vocational-Technical Center 3615 Montana Avenue Billings, Montana 59102	Clerical Welding Drafting Management	$ 150	$640		
Butte Vocational-Technical Center 404 South Wyoming Street Butte, Montana 59701	Accounting Welding Civil Engineering Aide	$ 150	$640		
Great Falls Vocational-Technical Center 2100 16th Avenue S. Great Falls, Montana 59405	Clerical Bookkeeper Data Processing	$ 150	$640		
Helena Vocational-Technical Center 1115 Roberts Street Helena, Montana 59601	Data Processing Key Punch Welding Clerical	$ 150	$640		
Missoula Technical Center 909 South Avenue West Missoula, Montana 59801	Clerical Management Key Punch	$ 150	$640		
NEW MEXICO					
Albuquerque Technical Vocational Institute 525 Buena Vista S.E. Albuquerque, New Mexico 87106	Accounting Drafting Welding	0	$400 for 4 months	None	$10 - registration
Dona Ana County/Occupational Education Branch University & Espina Avenue P.O. Box 30A Las Cruces, New Mexico 88003	Nursing Welding Secretarial	$ 220	$514	$380	$10 - registration

NEW MEXICO--CONTINUED	Sample Areas of Instruction	In-State	Out-of-State	Room and Board	Fees
Eastern New Mexico University-Clovis Branch Vocational Division 615 Axtell Street Clovis, New Mexico 88101	Masonry Office Occupations Practical Nursing	$ 195	$360	$800	
Eastern New Mexico University Technical Vocational Division Roswell Campus Box 6761 Roswell, New Mexico 88201	Nursing Assistant Secretarial Truck Driving Welding	$ 246*		$100/quarter + board	
Luna Vocational Technical Institute Las Vegas, New Mexico 87701	Drafting Welding	0 for residents of Guadalupe, Mora or San Miguel dist.	$360	$1,050	
New Mexico Junior College Technical Vocational Division Lovington Highway Hobbes, New Mexico 88240	Drafting Mid-Management Nursing Secretarial	$ 120	$240		+ counter fees
New Mexico Technical-Vocational School El Rito Campus El Rito, New Mexico 87530	Typing Drafting Masonry	$ 45*		$624	
New Mexico Technical-Vocational School Espanola Campus P.O. Box 250 Espanola, New Mexico 87532	Accounting Secretarial Nursing Assistant Welding	$ 45*		None	
NMSU - San Juan Branch Technical Vocational Division 4601 College Boulevard Farmington, New Mexico 87401	Nursing Assistant Welding	$ 735 $ 500		None	
Southwest Indian Polytechnic Institute P.O. Box 10146 Albuquerque, New Mexico 87114	Civil Engineering Aid Drafting Secretarial & Related	0		None	
NORTH DAKOTA					
Bismarck Vocational Technical School Bismarck, North Dakota 58501	Data Processing Welding	$ 468	$792	$970	$715
Lake Region Jr. College Devils Lake, North Dakota 58301	Drafting Civil Engineering Aid	$ 470	$550	$310/semester	$25 lab./semester
ND State School of Science Wahpeton, North Dakota 58075	Drafting Environmental Science Technology Mech. & Civil Engineering Welding				High school only
UND Williston Williston, North Dakota 58801	Building & Construction Secretarial	$ 389/sem.	$495/sem.	room (540/tri-year ($378/year	

EXHIBIT III-4 (Cont.)

	Sample Areas of Instruction	In-State	Out-of-State	Room and Board	Fees
SOUTH DAKOTA					
Mitchell Area Vocational-Technical School Mitchell, South Dakota 57301	Accounting Drafting Laboratory Assistant Practical Nursing Secretarial Welding	$ 60	$60	None	
Pierre School of Practical Nursing Pierre, South Dakota 57501	Practical Nursing	$ 60	$60	None	
Black Hills Area Vocational-Technical School Rapid City, South Dakota 57701	Electronics Nursing Aid Practical Nursing Welding	$ 60	$60	None	
Southeast Area Vocational-Technical School Sioux Falls, South Dakota 57105	Data Processing Drafting Nurses Aid	$ 60	$60	None	
Northwestern Vocational-Technical School Sturgis, S.D. 57785	Secretarial Skills Bookkeepers Electronics Business Machine Operators	$ 60	$60	None	
Lake Area Vocational-Technical School Watertown, S.D. 57201	Laboratory Assistant Drafting Practical Nursing	$ 60	$60	None	
UTAH					
Sevier Valley Technical 515 W 1st North Richfield, Utah 84701	Drafting Welding	$ 75*/Quarter		None	Books
Utah Technical College 4600 So. Redwood Rd. Salt Lake City, Utah 84107	Welding Electronic Technology Drafting Masonry Mechanics	$ 128	$328	None	$385/Yr.
Uintah Basin Area Vocational Center P.O. Box 367 Roosevelt, Utah 84066	Drafting Welding	$ 13.50*/Quarter $ 20.00*/Quarter		None	None

EXHIBIT III-4 (Cont.)

UTAH --Continued	Sample Areas of Instruction	In-State	Out-of-State	Room and Board	Fees
Davis Area Vocational Center 411 Lancer Lane Layton, Utah 84041	Masonry Electronics	$ 30/Month		None	None
Bridgerland Area Vocational Center U.M.C. Building 72 USU Logan, Utah 84322	Welding Drafting Computer Programmer Business Machine Operator Secretarial	$ 30*/Quarter 18*/Quarter		$700-$800 $700-$800	$25 $50
Skills Center North 1100 Washington Blvd. Ogden, Utah 84404	Masonry Welding Drafting Sheetmetal	None		None	None
Skills Center South 431 So. 600 E. Salt Lake City, Utah 84102	Machinist Welding	$ 80*/Month		None	None
WASHINGTON					
Bellingham Vocational-Technical Institute 3028 Lindberg Avenue Bellingham, WA 98225	Welding Engineering Technology	$ 352 $ 352		None	None
Clover Park Vocational-Technical Institute 4500 Steilacoom Boulevard, S.W. Tacoma, WA 98499	Welding Engineering Technician	Over 21 $ 582 Under 21 $ 406 Over 21 $ 690 Under 21 $ 363		None	None
Lake Washington Vocational-Technical Institute 6511 112th Avenue, N.E. Kirkland, WA 98033	Welding Drafting Accounting Management	$ 354 $ 198 $ 153		None	None
L. H. Bates Vocational-Technical Institute 1101 South Yakima Tacoma, WA 98405	Key Punch Bookkeeper Accounting Engineering Aide Welding	Over 21 $ 90 Under 21 $ 40 Over 21 $ 489 Under 21 $ 309 Over 21 $ 464 Under 21 $ 284		None	None
Renton Vocational-Technical Institute 3000 Northeast 4th Street Renton, WA 98055	Secretary Drafting Welding Bookkeeper Business Machine Operator	$ 650 $ 185 $ 325		None	None

EXHIBIT III-5

NATIVE AMERICAN PROGRAMS AND SERVICES 1/

Name	Cost
Arrow Inc. Foundation 1000 Connecticut Avenue, N.W. Washington, D.C. 20036	0
American Indian Higher Education Consortium 1626 High Street Denver, Colorado 80218	0
The Indian Education Training Center 5510 Domingo Road Albuquerque, New Mexico 87108	0
All Indian Pueblo Council P.O. Box 6507 Albuquerque, New Mexico 87107	Trainees receive $2.30/class hour plus tuition and some living allowance is included
Indian Technical Assistance Center 1075 South Yukon P.O. Box 26268, Billmar Branch Lakewood, Colorado 80226	0
Navajo-Hopi Indian Training Program Argonne National Laboratory 9700 South Cass Avenue Argonne, Illinois 60439	Supported by ERDA funds
United Tribes Employment Training Center 3315 South Airport Road Bismarck, North Dakota 58501	Tribal Agency pays cost for students. Students receive $56.00 every 2 wks. for living allowance

EXHIBIT III-5 (Cont.)

Name	Cost
American Indian Management Institute 302 San Pablo, S.E. Albuquerque, New Mexico 87108	4 day courses - $80 registration 5 day courses - $100 registration
United Sioux Development Co. Pierre, South Dakota	0
All Indian Development Association 2401 12th Street, N.W. Albuquerque, New Mexico 87102	0

1/ See Appendix A, Section V, for more detailed information on these programs.

EXHIBIT III-6

COST OF COURSES AND MATERIALS OFFERED BY TRAINING COMPANIES AND SERVICES[1/]

I. DUPONT - Prices range from $10.00 - $30.00 per course for programmed learning materials

II. HOWELL - Course materials and training aids

(1) API Pilot Series - prices range from $4.85 to $55.60 with an average cost of $22.81 per course

(2) API Profit Series - prices range from $5.90 to $55.60 with an average cost of $26.75 per course

(3) GPA Plant Series - prices range from $4.65 to $26.35 with an average cost of $10.84 per course

(4) Manufacturing Series - prices range from $2.65 to $80.50 with an average cost of $38.40 per course

(5) Operator Slide/Tape Series - prices range from $65.00 to $625.00 with an average cost of $156.42 per course

III. HUGHES - Films, tapes and slides

(1) Slide/Tapes - prices range from $60.00 to $150.00 with an average cost of $120.76

(2) Filmstrip/Tape - prices range from $50.00 to $170.00 with an average cost of $78.23

IV. PETROLEUM EXTENSION SERVICE

(1) PUBLICATIONS - $3.00 - $6.00 per publication

(2) SLIDE TAPE PROGRAMS - $85.00 for each program including slides, audio-cassette tapes and illustrated script.

1/ A brief description of these training companies is contained in Appendix A, Section VII, page A-76.

(3) MOTION PICTURE FILMS - Prices generally vary between $150 - $400.

(4) SCHOOLS OF TECHNOLOGY - Short on-site courses

(a) Kilgore Schools - $140 - $400 fee

(b) Baytown Schools - $250 fee

(c) Houston School - $350 fee

(d) Odessa Schools - $150 - $350 fee

(e) Austin School - $400 fee

(5) HOME STUDY COURSES - materials

(a) Well servicing and workover - $36.00

(b) Rotary drilling - $78.00

V. TARGET - Five programs: Cost of materials:

(1) Pump Operation - $15.50

(2) Pump Maintenance - $10.50

(3) Value Operation - $10.50

(4) Furnace Operation - $10.50

(5) Distillation - $74.50

EXHIBIT III-7

COST OF COURSES OFFERED BY INDUSTRY ASSOCIATIONS AND ORGANIZATIONS[1/]

Name	Cost
Bituminous Coal Operators Association World Center Building Washington, D.C.	$26.50 per trainee per program
National Society of Professional Engineers 2029 K Street, N.W. Washington, D.C. 20006	$40 membership charge per year plus additional seminar and course fees

1/ See Appendix A, Section V, for more detailed information on these programs.

EXHIBIT III-8

COST OF PROGRAMS OFFERED BY THE GOVERNMENT[1/]

Name	Cost
Civil Service Commission 1900 E Street, N.W. Washington, D.C. 20415	Cost only to the groups' sponsoring government agency (such as BIA for the tribes)
Department of Commerce - User Training Branch Data User Services Division Bureau of the Census Washington, D.C. 20233	Workshops and Seminars
Indian Education Resources Center 123 4th Street, N.W. P.O. Box 1788 Albuquerque, New Mexico 87103	Funded by BIA

1/ See Appendix A, Section VI, for more detailed information on these programs.

IV. DEVELOPMENT OF A TRAINING PROGRAM FOR TARGET OCCUPATIONS, SKILLS, AND POPULATION

OVERVIEW

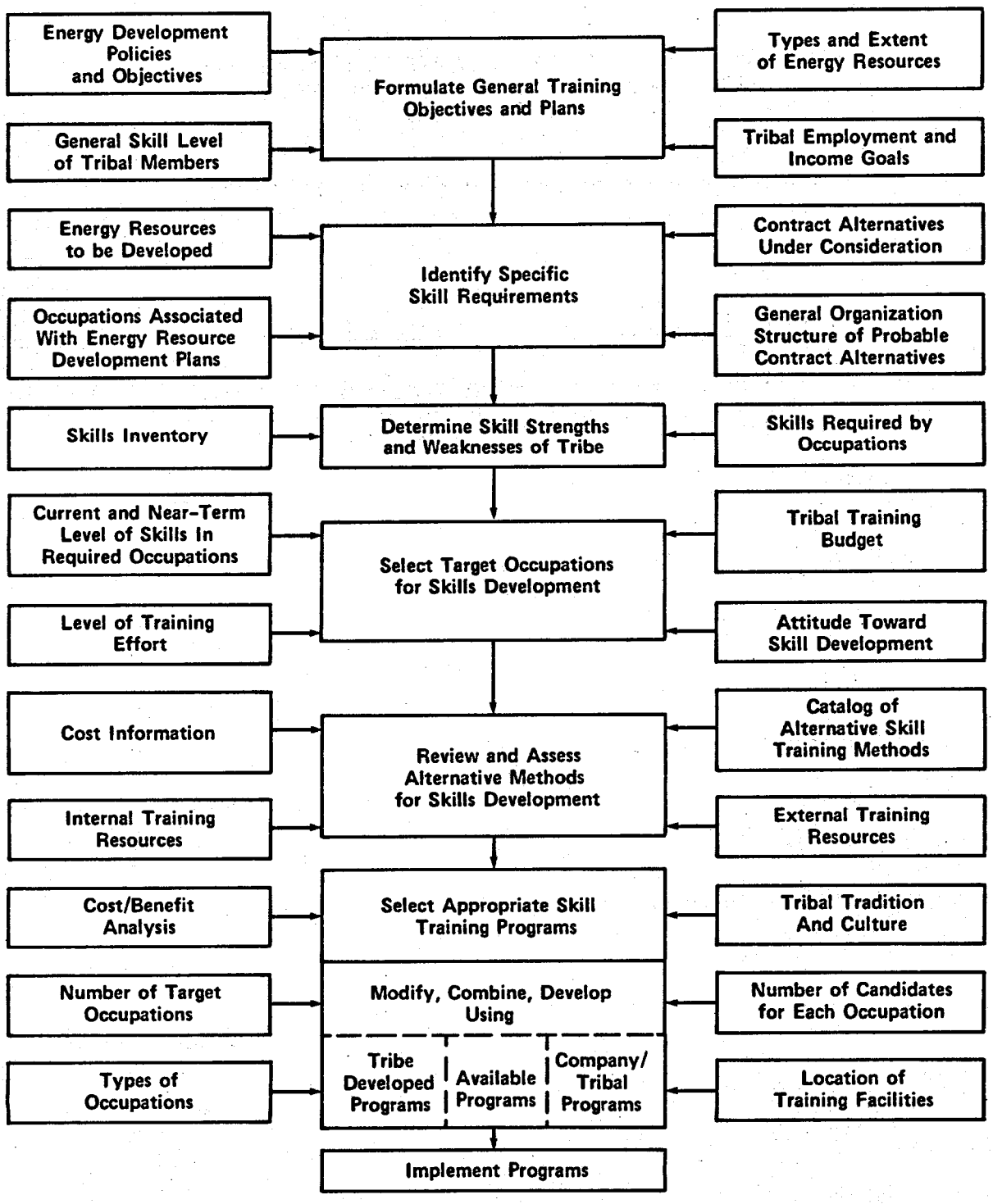
This section describes how a tribe might develop a skills training program to meet deficiencies or weaknesses in skills needed for various occupations. It also discusses the population to which training programs should be directed.

OVERVIEW OF THE TRAINING PROGRAM DEVELOPMENT PROCESS

A flow chart depicting the training program development process is presented in Exhibit IV-1. The center portion of the chart outlines the general steps to formulate and implement a training program geared to existing tribal human resources and expected job opportunities in the energy field. The information to be collected and analyzed as input for each step is identified on either side of that step on the flow chart.

EXHIBIT IV-1

FLOW CHART -- DECISIONS AND ACTIONS RELATED TO DEVELOPMENT OF SKILLS TRAINING PROGRAMS



For example, an assessment of overall tribal goals and objectives and existing skill levels is used to formulate general training objectives and plans. A more detailed assessment of the types of energy resources to be developed (e.g., oil and gas) and contractual arrangements under consideration (e.g., lease, operating agreement, service contract) is then made to identify specific skill requirements. Similarly, other types of information are used to determine the tribe's skill strengths and weaknesses, select specific target occupations, assess alternative methods for skill development, and, finally, select and implement a comprehensive skills training program.

IDENTIFICATION OF TARGET OCCUPATIONS AND SKILLS

Assume that a tribe has systematically assessed its potential energy resource development options. This review includes consideration of the tribe's resource development policy, its employment and income goals, its environmental protection aims, and its resource levels. As a result, the tribe decides to examine and evaluate alternative contractual arrangements for coal mining and transport. Several factors should be considered in evaluating each of the alternatives. One is the number and variety of employment opportunities each alternative provides the tribe. A second is the tribe's policy toward skill development. In tying these factors together, the tribe must consider which development alternative provides training and employment opportunities in line with its overall economic, income, and employment goals. Assume for this case that the tribe is committed to rapid upgrading of skills among its members and has initiated plans to develop resources for training from various sources, including contractors.

The next step is to review population and labor force data to identify a potential target population for a comprehensive training program. Those persons who are currently in the labor force or who are too old and/or sick to be considered for energy-related jobs would be excluded from the program. In the short run, the primary focus would be on matching people with good existing skills or who could be trained in the short term (up to three-five years) with energy-related jobs that are expected to become available. The less skilled employed and unemployed could then be trained as part of the tribe's overall manpower program to take over the jobs vacated by currently employed persons who are hired by the energy companies or the tribe itself (e.g., to staff the tribal minerals office).

As a result of the tribe's decision to assess the contract alternatives available in coal mining and transport, relevant information on this resource is collected and organized. Evaluation of the advantages and disadvantages of the several alternative arrangements suggests that an operating agreement with a mining company would be a viable arrangement. A part of the contract would include comprehensive employment and training provisions to support the tribe's employment and income goals.

While specific organization/occupation requirements are not known, the tribe can generally determine the range of occupations required to extract and transport coal. This information is essential to developing a practical employment clause that contributes to the tribe's long-range development plan. Most occupations inherent to a coal mining and transport operation will be needed in the proposed venture. A profile of the kinds of occupations and approximate number of employees for each is prepared, based on the tribe's and contractor's initial design of the operation's structure.

At this time, the tribe uses the various occupation/skill/energy resource materials to prepare for and conduct discussions with potential contractors. These discussions involve determination of specific elements of the employment and training provisions. The tribe is now ready to assess and select skill training programs from among the available alternatives.

Most of the energy tribes have skills training needs that are common to most or all member tribes. These shared skills training needs may be addressed in several ways. Each tribe could undertake the development of skill training programs on its own, a costly and timely effort. Alternatively, tribes can jointly develop core programs for use by all participating tribes. An example of the latter approach would be for a group of tribes having similar skill needs not met by available programs to negotiate a training contract with an outside organization to develop a program for use by all participating tribes. Another method for developing a core training program would be to use the services of energy tribe organizations. Program specifications could be developed by the participating tribes and communicated to the organizations representing them. The organizations could then either purchase and modify a program or coordinate development of the program by its staff and/or outside specialists.

To select target occupations, an examination is made of coal mining-related occupations. An occupation-energy resource grid (see Exhibit II-3) lists the necessary skills and occupations. These occupations are

also described in Appendix B, p. B-10. An occupation-level of training/education grid is then used to determine what is required for each occupation in terms of equivalent training/education. Exhibit IV-2 presents a grid that cross-classifies the energy occupations (divided into manual and non-manual occupations) with the generally accepted level of training/education. The level selected for each occupation is that judged necessary or required by law to perform the duties in an acceptable manner. For some of the occupations, only one level of formal training/education is checked. In several cases more than one level is checked; most of these involve formal training plus on-the-job training. These occupations are largely those in which the person is in an apprenticeship program or attends a vocational/trade school followed by structured on-the-job training. The occupation/training grid has specific application to the establishment of skill training programs. This grid, in combination with Exhibit II-3 and Appendix B, enables a tribe to identify the appropriate skill levels it must consider in structuring employment and training sections of its mineral development contracts and in determining the requirements of a training program. Major inputs into the determination of the most feasible contractual arrangement are the number, range, and diversity of occupations called for (e.g., under a service contract as compared with a lease); the employment and income goals of the tribe; and where the tribe currently is or what level it can quickly reach in terms of available skills.

EXHIBIT IV-2

ENERGY OCCUPATIONS BY LEVEL OF TRAINING/EDUCATION

	Level of Training/Education							
	Four-Year Degree	Two-Year Degree	3-4 Years Apprenticeship	1-2 Years Apprenticeship	2-3 Years Vocational or Business School	0-1 Year Vocational or Business School	High School Diploma	On-the-job Training
NONMANUAL OCCUPATIONS								
Accountant	X							
Analytical lab technician						X		
Bank boss			X					
Bookkeeper						X	X	
Business machine operator						X	X	
Cargo inspector		X		X				
Car inspector		X		X				
Chemical engineer	X							
Chemist	X							
Chemist's helper or aide		X						
Civil engineer	X							
Clerk general office							X	
Coal inspector		X		X				
Computer analyst	X							
Computer programmer		X			X			
Construction and maintenance inspector		X		X				
Dispatcher			X					X
Dispatcher, Chief I			X					X
Dispatcher, Chief II			X					X
Dispatcher, oil			X					X
Doctor	X[1/]							
Drafter					X	X		
Electrical engineer	X							
Engineering aide		X						
Engineering technician		X				X		X
Environmental engineer	X							
Fireman							X	
Fire marshal						X		
Foreman				X		X		
Foreman, dehydrogenation			X					
Foreman, dock				X				
Foreman, loading-dock				X				
Foreman, maintenance			X					
Foreman, meter and regulator-shop			X					
Foreman, mine			X					
Foreman, natural-gas plant			X					

1/ Plus required postgraduate medical or law school degree.

EXHIBIT IV-2 (Cont.)

	Level of Training/Education								
	Four-Year Degree	Two-Year Degree	3-4 Years Apprenticeship	1-2 Years Apprenticeship	2-3 Years Vocational or Business School	0-1 Year Vocational or Business School	High School Diploma	On-the-Job Training
Foreman, purification			X					
Foreman, salvage				X				
Foreman, specialty plant			X					
Foreman, tower			X					
Foreman, treating and pumping			X					
General pit foreman			X					
Geological engineer	X							
Geological engineering aide		X						
Geophysicist	X							
Industrial engineer	X							
Instrument technician			X			X		X
Inventory clerk							X	
Keypunch operator							X	X
Laboratory technician						X		X
Labor relations specialist	X							
Lawyer	X 1/							
Lease buyer						X		
Maintenance superintendent			X					X
Manager					X			
Manager, bulk plant					X			X
Manager, contracts					X			X
Manager, industrial organization			X		X			X
Mechanical engineer	X							
Mechanical inspector		X		X				
Metallurgical engineer	X							
Mining engineer	X							
Mining engineering aide		X						
Mine superintendent					X			X
Nurse	X							
Nurse-paramedic		X				X		
Personnel specialist		X						
Petroleum engineer	X							
Petroleum geologist	X							
Pit foreman				X				
Process-control clerical supervisor			X		X			X
Production superintendent			X					X
Prospecting computer		X		X				
Purchaser (Buyer)		X						X
Purchasing agent	X							
Reclamation engineer	X							

1/ Plus required postgraduate medical or law school degree.

EXHIBIT IV-2 (Cont.)

	Level of Training/Education								
	Four-Year Degree	Two-Year Degree	3-4 Years Apprenticeship	1-2 Years Apprenticeship	2-3 Years Vocational or Business School	0-1 Year Vocational or Business School	High School Diploma	On-the-Job Training
Safety engineer	X							
Safety inspector		X		X				X
Secretary						X	X	
Supervisor				X		X	X	
Surveyor						X		
Systems analyst	X							
Title clerk							X	X
Training specialist		X						
Typists							X	
Warehouseman								X
Waste treatment engineer	X							
X-Ray emission spectograph technician		X						

EXHIBIT IV-2 (Cont.)

	Level of Training/Education								
	Four-Year Degree	Two-Year Degree	3-4 Years Apprenticeship	1-2 Years Apprenticeship	2-3 Years Vocational or Business School	0-1 Year Vocational or Business School	High School Diploma	On-the-Job Training
MANUAL OCCUPATIONS								
Acidizer			X					
Aerial-tram operator			X					X
Augerman				X				X
Bettman				X				X
Bit-sharpener operator			X					X
Blaster				X				X
Blender			X					
Blender's helper				X				
Boilermaker			X				X	
Boom-conveyor man				X				X
Bottomman				X				X
Bratticeman				X				X
Breaker repairman				X				X
Car cleaner				X				X
Carpenter			X					
Catalyst operator			X					X
Catalyst operator's helper				X				
Cementer			X					
Check viewer			X					
Chemical operator II			X					
Chemical operator III			X					
Churn-drill operator			X					X
Clay roaster			X					
Coal haulage truck driver							X	
Coal washer				X				X
Company laborer								X
Continuous miner operator				X				X
Control man			X					
Core splitter				X				
Craftsmen helper				X				
Crane & derrick operator			X					X
Dehydration plant operator			X					X
Dozer operator			X					X
Dragline oiler				X				X
Dragline operator			X					X
Drill operator			X					X
Driller's helper				X				X

EXHIBIT IV-2 (Cont.)

	Level of Training/Education							
	Four-Year Degree	Two-Year Degree	3-4 Years Apprenticeship	1-2 Years Apprenticeship	2-3 Years Vocational or Business School	0-1 Year Vocational or Business School	High School Diploma	On-the-Job Training
Dump operator			X					X
Electrical repairman			X					
Electrician			X					
Engine operator			X					X
Field mechanical-meter tester			X					
Fork-lift operator				X				X
Front-end loader operator				X				X
Gager			X					
Gager, chief			X					
Gas compressor operator			X					
Gas plant operator			X					
Gas-governor repairman			X					
Gas-governor repairman, helper				X				
Gasoline treatment plant operator			X					
Gauger			X					
Glazier			X					X
Grease maker			X					
Grease maker head			X					
Heavy equipment operator			X					X
Heavy media operator			X					X
Helper				X				
Hoist operator			X					X
Industrial truck operator			X					X
Instrument repairer				X			X	
Insulation worker								X
Iron worker			X					
Jig runner				X				X
Laborer								X
Lead recovery man			X					
Line walker								X
Loading-shovel oiler				X				X
Machinist			X					
Mason			X					
Mechanic				X				
Miner								X
Mobile crane operator			X					X
Molder, wax			X					
Motor grader operator			X					X
Motorman				X				X

EXHIBIT IV-2 (Cont.)

	Level of Training/Education								
	Four-Year Degree	Two-Year Degree	3-4 Years Apprenticeship	1-2 Years Apprenticeship	2-3 Years Vocational or Business School	0-1 Year Vocational or Business School	High School Diploma	On-the-Job Training
Observer								X
Observer, gravity prospecting								X
Operator			X					X
Painter			X					
Panelboard operator			X					X
Parrafin-plant operator			X					
Parrafin-plant sweaterman			X					
Performance operator			X					
Pilot plant operator			X					
Pipefitter			X					X
Pitman				X				X
Planimeter operator								X
Plumber			X					X
Powderman				X				X
Power-shovel operator			X					X
Preparation plant operator			X					X
Pulleyman				X				X
Pumper			X					
Pumpman			X					
Pumpman's helper				X				
Rail car cleaner								X
Rail car loader								X
Rail car sampler								X
Refinery operator			X					
Refrigeration mechanic							X	X
Rig builder								X
Rig builder's helper				X				X
Road grader operator			X					X
Roofbolter operator			X					X
Rotary driller								X
Roustabout								X
Salvageman			X					
Salvageman's helper				X				
Sampler			X					
Scraper operator			X					X
Sewage treatment plant operator			X					
Sheetmetal worker			X					
Shooter								X
Shothole drillers				X				X

EXHIBIT IV-2 (Cont.)

	Level of Training/Education							
	Four-Year Degree	Two-Year Degree	3-4 Years Apprenticeship	1-2 Years Apprenticeship	2-3 Years Vocational or Business School	0-1 Year Vocational or Business School	High School Diploma	On-the-Job Training
Shovel oiler								X
Shuttle car operator			X					X
Sprinkler								X
Stillman			X					
Stillman's helper				X				
Still pump operator			X					X
Stripping shovel operator			X					X
Supply truck driver							X	
Switcher								X
Tank cleaner				X				
Tank-truck driver							X	
Test-engine operator			X					X
Tester			X					
Tipple operator				X				X
Tool pusher								X
Trackman				X				X
Track moving machine operator			X					X
Tractor-seeder operator			X					X
Treater			X					
Treater's helper				X				
Truck driver							X	
Tube cleaner				X				
Underground miner								X
Utility man				X				X
Water treatment plant operator			X					
Water truck driver							X	
Welder			X					X
Well pullers			X					
Wharfinger head			X					

The tribe should then conduct a skills inventory to identify skill strengths in some occupations and weaknesses in others. One way to conduct a skills inventory is through the local State Employment Service Office. The first step would be to decide what types of occupations are needed. The Office could then begin a screening process of testing and counseling to pinpoint the skills of the tribal members. Once this is done, the various skills of the tribal members can be matched to the occupations necessary for the specific development project.[1/]

We will assume that tribal management concludes, after comparing information about its own skills with the skills required of coal strip mine occupations, that it has deficiencies in the following nonmanual occupations:

-Bank Boss
-Bookkeeper*
-Business Machine Operator
-Coal Inspector
-Computer Programmer*
-Drafter*
-Electrical Engineer*
-Engineering Technician
-Engineer*
-Environmental Engineer*
-Fire Marshal
-Fireman
-General Pit Foreman*
-Keypunch Operator*
-Labor Relations Specialist
-Mechanical Engineer*
-Mining Engineer*
-Nurse-Paramedic*
-Pit Foreman*
-Purchaser
-Safety Engineer
-Safety Inspector
-Secretary
-Supervisor
-Surveyor*
-Systems Analyst*
-Training Specialist*
-Warehouseman

* Skill target occupations.

Of the 30 nonmanual occupations for which the tribe has skill needs, 15 are selected as targets (indicated by an asterisk). The same analysis is made for manual occupations. Comparing existing manual skills (tribal

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1/ See Exhibit II-3 in Section II for a sample skills inventory form.

inventory) with required skills reveals deficiencies in 13 occupations. These include:

-Blaster
-Coal haulage truck driver
-Dozer (bulldozer) operator
-Dragline oiler
-Electrician
-Fork-lift operator
-Mechanic
-Mobile crane operator
-Motor grader operator
-Plumber
-Sewage treatment plant operator
-Tractor-seeder operator
-Welder

The 13 are established as target occupations for the tribe's manual skill development programs.

Three examples will illustrate how to use the foregoing information. The first example is a skills training program for advanced skills positions--engineering, professional, and management--that requires the equivalent of a four-year degree. The tribe wishes to develop these skills in six or seven members in the shortest possible time. After reviewing various training alternatives, it is decided that:

- Completion of a four-year program together with an internship would be used for the engineering positions.
- Completion of a series of management seminars and college summer courses in business by selected tribal members already having college degrees in non-business fields would be used for the management positions.

In-state and out-of-state college and university programs and seminars described in Appendix A (pp. A-3 through A-30) are studied for their possible application to these skill needs. Cost information for these programs, shown in the discussion of "Costs of Training Programs" (Section III), is also used. The decision is made to enroll members qualified for management training in state college intensive summer programs and out-of-state seminars on management. The mining engineer candidate will enter an out-of-

state school that has an outstanding mining program. The tribe will also include a provision in its contract with the company for each student to work in a "learning-type" position during non-school periods at an appropriate salary (college internship).

The second example is that of an apprenticeship program. Either a company-sponsored program or one that the tribe sponsors with other tribes and a union organization can provide adequate skill development. The decision is made to work out an arrangement (as part of the contract) with the company. The tribe wishes to focus its manual skill development efforts through apprenticeships in blaster, electrician, dozer operator, and mobile crane operator occupations. One apprenticeship program will be for blasters, with two to four tribal members being enrolled. Another will be for dozer operators, with four to five members enrolled. Apprenticeships will be arranged for the other occupations.

The third example is a program to develop management and communication skills among selected members. Participants would include those who have the basic technical skills but are deficient in skills related to managing and evaluating an organization and its personnel. The most feasible approach is judged to be the development of a special training program by training consultants.[1/] The group would be under contract to this tribe and others that have the same skill deficiency. The program would be similar to one described in "Additional Training Methods" (Section III)--tailored to satisfy special needs of tribal participants. The tribe

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1/ Potential training consultants might include the American Indian Management Institute (p. A-48), American Management Association (p. A-49), or the Civil Service Training Center (p. A-73).

will contribute to the content of the course. It will also pay a portion of the development costs as well as the fee charged for each participant to cover training costs.

In addition to programs that primarily develop basic skills, the tribe plans to use government, industry, professional association, and private programs. These programs will provide enhancement or expansion of basic skills.

ENERGY CAREERS FOR YOUNGER TRIBAL MEMBERS

Once a training program has been developed, the tribal government would serve as the primary channel for linking potential tribal employees with mineral development companies. This suggests that programs are needed within tribal government to encourage and support tribal members in pursuit of careers in energy-related fields. Discussions with tribal officials revealed that very few young Indian students have been inclined to pursue careers in technical fields. Unless this trend is reversed, tribal members will continue to be relegated to less-skilled and lower-paying positions in mineral development activities on their reservation. Programs to reverse this trend would focus primarily on students in high school and junior high school. Elements of such programs include:

- Identification of students who exhibit talent in science and mathematics (this would be based on specialized testing, rather than grades or standardized tests alone)
- Provision of tutoring and other enrichment programs in the science and mathematics areas

- Exposure of students to the range of career opportunities in energy resource development fields, including apprentice jobs, with a focus on how they relate to tribal energy resource development

- Acquainting tribal members, especially those still in school, with successes of other members in technical, business, and professional fields

- Provision of financial, tutorial and counseling assistance to Indian students interested in pursuing training in energy careers at vocational or community colleges, technical institutes, and universities

- Upgrading of grade and high school curricula in the mathematics, science, and technical fields

- Development of college recruitment programs to attract trained Indians to reservations involved in energy resource development.

Such companies as Atlantic Richfield, General Electric, Sun Oil Company, and Westinghouse have been actively involved in developing programs to increase the number of minority engineers. These programs focus on students at the junior high school level and follow them through high school. While these programs have been predominantly oriented to inner-city students, it seems likely that they could be adapted to Indian students as well. Formal organizations of energy tribes could potentially act as coordinating elements in contacting these companies and others operating on Indian reservations about developing a program to motivate Indian students toward careers in energy development. Such organizations could coordinate the development of special training programs geared to mineral development projects of member tribes.

APPENDIX A

INVENTORY OF EDUCATION AND TRAINING PROGRAMS OF SPECIFIC INTEREST TO ENERGY RESOURCE TRIBES

I. INTRODUCTION

This appendix provides a listing and brief description of both public and private sector education and training programs in the energy resource development field that will be of particular interest to CERT members. The programs are divided into seven groups:

- University and Technical College Programs
- Special University, College, and Vocational Opportunities for Native Americans
- Corporate Programs
- Association and Organization Programs
- Government Programs
- Special Training Companies
- Financial Aid

II. UNIVERSITY AND TECHNICAL COLLEGE PROGRAMS

A. UNIVERSITY PROGRAMS

This section contains a grid (Exhibit A-1) of all four-year programs that are applicable to energy resource development, matched with the corresponding schools. Exhibit A-2 provides complete addresses for all four-year and two-year schools mentioned.

EXHIBIT A-1
4-YEAR PROGRAMS BY UNIVERSITY

ARIZONA	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer2/
Arizona State Univ.	X		X	X			X				X			X			X		X	X	X			
Arizona, University of	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X		X	X	X			
Arizona Western College			X														X							
Central Arizona College																	X							
Cochise College																	X							
Eastern Arizona College																	X							
Glendale Community College			X														X							
Grand Canyon College	X		X																					
Mesa Community College																	X							
Navajo Community College																	X							
Northern Arizona Univ.	X		X							X							X		X					
Phoenix College			X														X		X					
Scottsdale Community College	X																							
Southwestern College																	X							
Yavapai College																	X							

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

CALIFORNIA	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer 1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer 2/
California State College (Stanislaus)	X		X									X								X				
California State Polytechnic University			X		X			X			X									X				X
California State Univ. (Sacramento)	X		X									X					X			X				
California University (Berkeley)			X		X				X		X		X			X				X				

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

COLORADO	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer2/
Adams State College	X		X																X	X				
Arapahoe Community College																	X							
Colorado College			X																X	X				
Colorado Mountain College			X																					
Colorado Northwestern Community College	X																		X					
Colorado School of Mines		X	X						X						X	X		X	X					
Colorado State Univ.			X	X			X							X						X	X			X
Colorado, University of	X		X	X	X	X	X						X	X			X			X	X			
Colorado Women's College			X														X							
Denver Community College	X		X														X							
Denver, University of	X		X	X			X						X	X							X			
El Paso Community College	X																X							
Fort Lewis College	X		X																X	X				
Lamar Community College	X																							
Loretto Heights College																	X							
Mesa College	X		X														X							
Metropolitan State College	X		X														X							
Northeastern Jr. College	X																X							
Northern Colorado, University of			X														X							

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

COLORADO	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer2/
Regis College	X		X																	X				
Southern Colorado State College	X		X														X		X	X				
Trinidad State Jr. College																	X							
Western State College of Colorado	X		X														X		X	X				

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

GEORGIA	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer2/
Georgia Institute of Technology		X	X	X			X				X			X								X		

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

ILLINOIS	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer2/
Illinois University (Chicago Circle Campus)	X		X		X												X						X	

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

MONTANA	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer2/
Carroll College	X		X														X			X				
Eastern Montana College			X																					
Flathead Valley Community College			X																	X				
Great Falls, College of			X																	X				
Miles City Community College																	X			X				
Montana College of Mineral Science and Technology			X					X	X					X	X			X						X
Montana State Univ.			X	X	X		X				X						X				X			
Montana, University of	X		X		X														X	X				
Northern Montana College																	X							
Rocky Mountain College			X																X	X				

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

NEVADA	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer2/
University of Nevada (Reno)	X		X						X							X	X			X				

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

NEW MEXICO	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer 1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer 2/
Albuquerque, University of	X		X														X			X				
Artesia College			X																					
Eastern New Mexico Univ.	X		X		X							X							X	X				
New Mexico Highlands University	X		X																	X				
New Mexico Institute of Mining and Technology			X		X			X		X					X	X		X						X
New Mexico Jr. College	X		X														X							
New Mexico State Univ.	X	X	X	X	X		X		X		X			X					X	X	X				
New Mexico, University of	X	X	X	X		X	X						X	X			X		X	X	X			
Santa Fe, College of	X		X																	X				
Western New Mexico Univ.	X		X																					

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

NORTH DAKOTA	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer2/
Dickinson State College			X														X							
Jamestown College			X														X			X				
Lake Region Jr. College			X																					
Mary College	X																			X				
Mayville State College			X																					
Minot State College			X														X			X				
North Dakota State Univ.			X	X	X		X				X			X			X		X	X	X			
North Dakota, University of	X		X	X		X	X					X	X	X			X		X	X	X			
Valley City State College			X																					

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

OHIO	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer2/
Miami University	X		X																				X	

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

OKLAHOMA	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer2/
University of Oklahoma (Norman)	X		X			X			X		X		X				X	X		X				

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

SOUTH DAKOTA	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer2/
Augustana College	X		X														X			X				
Black Hills State College	X		X																					
Dakota State College			X																					
Dakota Wesleyan Univ.			X																					
Huron College			X																	X				
Mount Marty College			X														X							
Northern State College			X																					
Presentation College																	X							
Sioux Falls College			X																					
South Dakota School of Mines and Technology			X	X			X							X	X				X		X			
South Dakota State University			X	X			X							X			X				X			
South Dakota University of	X		X		X								X				X			X				
Yankton College			X																	X				

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

TEXAS	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer 1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer 2/
Southern Methodist Univ.			X		X			X					X							X				X
St. Mary's University	X		X									X	X							X				
Texas A&M	X		X						X		X													
Texas Tech University	X		X								X		X							X				X
Western Texas College																X	X							

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

UTAH	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer2/
Brigham Young Univ.	X		X	X	X		X							X			X		X		X			
Dixie College	X		X																					
Eastern Utah College	X		X														X							
Snow College			X																X					
Southern Utah State College	X		X																X	X				
Stevens Henager College	X				X																			
Utah State University	X		X	X	X		X							X					X	X	X			
Utah, University of	X		X	X	X	X	X		X	X			X	X	X	X	X		X	X	X			
Weber State College	X		X														X		X	X				
Westminster College			X														X							

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

WASHINGTON	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer 1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer 2/
Bellevue Community College	X																X							
Big Bend Community College	X		X														X							
Centralia College			X														X							
Central Washington State College			X																X	X				
Clark College	X		X														X							
Columbia Basin Community College																	X							
Eastern Washington State College	X		X														X		X					
Edmonds Community College	X																							
Everett Community College	X																X							
Fort Steilacoom Community College	X																							
Fort Wright College																	X							
Gonzaga University	X		X	X			X						X	X							X			
Grays Harbor College																	X		X					
Green River Community College																	X		X					
Highline Community College																	X							
Lower Columbia College	X		X														X							

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

WASHINGTON	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer 1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer 2/
North Seattle Community College																	X							
Olympic College			X														X							
Pacific Lutheran Univ.			X														X			X				
Peninsula College	X												X				X							
Puget Sound, University of			X																X					
Saint Martin's College	X		X	X																	X			
Seattle Central Community College	X																X							
Seattle Pacific College			X														X			X				
Seattle University	X		X	X										X			X				X			
Shoreline Community College	X																X							
Skagit Valley College			X														X							
Spokane Falls Community College	X																X							
Tacoma Community College	X																X							
Walla Walla College			X														X			X				
Walla Walla Community College			X														X							
Washington State Univ.	X		X	X	X		X							X			X		X	X	X			
Washington, University of	X		X	X	X	X	X			X			X	X	X	X	X			X	X			
Wenatchee Valley College			X														X							

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

WASHINGTON	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer1/	Safety Engineer	Systems Analyst	Waste Treatment Engineer2/
Western Washington State College	X		X							X														
Whitman College			X																X	X				
Whitworth College			X																X					
Yakima Valley College			X														X							
																	X		X					

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-1 (Cont.)

WYOMING	Accountant	Chemical Engineer	Chemist	Civil Engineer	Computer Analyst	Doctor	Electrical Engineer	Environmental Engineer	Geological Engineer	Geophysicist	Industrial Engineer	Labor Relations Specialist	Lawyer	Mechanical Engineer	Metallurgical Engineer	Mining Engineer	Nurse	Petroleum Engineer	Petroleum Geologist	Purchasing Agent	Reclamation Engineer[1]	Safety Engineer	Systems Analyst	Waste Treatment Engineer[2]
Casper College																								
Central Wyoming College	X		X														X		X	X				
Northwest Community College			X																					
Sheridan College																	X							
Wyoming, University of	X	X	X	X	X		X		X				X	X			X	X	X	X	X			

1/ Usually requires degree in Civil Engineering plus some courses in Mining Engineering.

2/ Requires Environmental degree.

EXHIBIT A-2

LIST OF COLLEGES AND ADDRESSES

Arizona

1. Arizona State University
   Tempe, Arizona 85281

2. Arizona, University of
   Tucson, Arizona 85721

3. Arizona Western College
   Yuma, Arizona 85364

4. Cochise College
   Douglas, Arizona 85607

5. Eastern Arizona College
   Thatcher, Arizona 85552

6. Glendale Community College
   6000 West Olive Avenue
   Glendale, Arizona 85301

7. Grand Canyon College
   3300 West Camelback Road
   Phoenix, Arizona 85017

8. Mesa Community College
   1833 West Southern Avenue
   Mesa, Arizona 85202

9. Navajo Community College
   Tsaila Rural Post Office
   Chinle, Arizona 86503

10. Northern Arizona University
    Flagstaff, Arizona 86001

11. Phoenix College
    1202 W. Thomas Road
    Phoenix, Arizona 85013

12. Scottsdale Community College
    P. O. Box Y
    Scottsdale, Arizona 85252

13. Southwestern College
    2625 East Cactus Road
    Phoenix, Arizona 85032

14. Yavapai College
    1100 East Sheldon Street
    Prescott, Arizona 86301

California

1. California State College-
   Stanislaus
   800 Monta Vista Avenue
   Turlock, California 95380

2. California State Polytechnic
   University - San Luis Obispo
   San Luis Obispo, California 93401

3. California State University
   6000 J Street
   Sacramento, California 95819

4. California University
   Berkeley, California 94720

Colorado

1. Adams State College
   Alamosa, Colorado 81102

2. Arapahoe Community College
   5900 South Santa Fe Drive
   Littleton, Colorado 80120

3. Colorado College
   100 North Cascade Avenue
   Colorado Springs, Colorado 80903

4. Colorado Mountain College
   Spring Valley
   Glenwood Springs, Colorado 81601

5. Colorado Northwestern
   Community College
   Rangely, Colorado 81648

6. Colorado School of Mines
   Golden, Colorado 80401

7. Colorado State University
   Fort Collins, Colorado 80521

8. Colorado, University of
   Regent Hall 205
   Boulder, Colorado 80302

9. Colorado Women's College
   Mountview Blvd. & Quebec Street
   Denver, Colorado 80220

Colorado (continued)

10. Denver Community College
1001 E. 62nd Avenue
Denver, Colorado 80216

11. Denver, University of
University Park
Denver, Colorado 80210

12. El Paso Community College
2200 Bott Avenue
Colorado Springs, Colorado 80904

13. Fort Lewis College
College Heights
Durango, Colorado 81301

14. Lamar Community College
2400 South Main Street
Lamar, Colorado 81052

15. Loretto Heights College
3001 South Federal Boulevard
Denver, Colorado 80236

16. Mesa College
1120 North Avenue
Grand Junction, Colorado 81648

17. Metropolitan State College
250 West 14th Avenue
Denver, Colorado 80240

18. Northeastern Junior College
100 College Drive
Sterling, Colorado 80751

19. Northern Colorado, University of
Greeley, Colorado 80639

20. Regis College
West 50th & Lowell Boulevard
Denver, Colorado 80221

21. Southern Colorado State College
900 West Orman Avenue
Pueblo, Colorado 81005

22. Trinidad State Junior College
600 Prospect Street
Trinidad, Colorado 81082

23. Western State College of Colorado
Gunnison, Colorado 81230

Georgia

1. Georgia Institute of Technology
Atlanta, Georgia 90332

Illinois

1. Illinois University-Chicago Circle
P. O. Box 4348
Chicago, Illinois 60680

Montana

1. Carroll College
Helena, Montana 59601

2. Eastern Montana College
1500 North 30th Street
Billings, Montana 59101

3. Flathead Valley Community College
Kalispell, Montana 59901

4. Great Falls, College of
1301 20th Street South
Great Falls, Montana 59405

5. Miles Community College
Miles City, Montana 59301

6. Montana College of Mineral
Science & Technology
Butte, Montana 59701

7. Montana State University
Bozeman, Montana 59715

8. Montana, University of
Missoula, Montana 59801

9. Northern Montana College
Harve, Montana 59501

10. Rocky Mountain College
1511 Poly Drive
Billings, Montana 59102

Nevada

1. Nevada, University of, Reno
Ninth & Virginia Streets
Reno, Nevada 89507

New Mexico

1. Albuquerque, University of,
   St. Joseph's Place, N.W.
   Albuquerque, New Mexico 87140

2. Artesia, College of
   Artesia, New Mexico 88210

3. Eastern New Mexico University
   Portales, New Mexico 88130

4. New Mexico Highlands University
   Las Vegas, New Mexico 87701

5. New Mexico Institute of Mining & Technology
   Campus Station
   Socorro, New Mexico 87801

6. New Mexico Jr. College
   Lovington Highway
   Hobbs, New Mexico 88240

7. New Mexico State University
   2900 West Church Street
   Carlsbad, New Mexico 88220

8. New Mexico, University of
   Albuquerque, New Mexico 87131

9. Santa Fe, College of
   St. Michaels Drive
   Santa Fe, New Mexico 87501

10. Western New Mexico University
    College Avenue at C Street
    Silver City, New Mexico 88061

North Dakota

1. Dickinson State College
   Dickinson, North Dakota 58601

2. Jamestown College
   Jamestown, North Dakota 58401

3. Lake Region Jr. College
   Devils Lake, North Dakota 58301

4. Mary College
   Bismarck, North Dakota 58501

5. Mayville State College
   Mayville, North Dakota

6. Minot State College
   Ninth Avenue Northwest
   Minot, North Dakota 58701

7. North Dakota State University of Agriculture & Applied Science
   State University Station
   Fargo, North Dakota 58102

8. North Dakota, University of
   Grand Forks, North Dakota 58201

9. Valley City State College
   Valley City, North Dakota 58072

Ohio

1. Miami University
   East High Street
   Oxford, Ohio 45056

2. Southern Ohio College
   100 S. 8th Street
   Cincinnati, Ohio 45202

Oklahoma

1. Oklahoma, University of
   Norman, Oklahoma 73069

South Dakota

1. Augustana College
   29th & Summit Avenue
   Sioux Falls, South Dakota 57102

2. Black Hills State College
   1200 University Avenue
   Spearfish, South Dakota 57783

3. Dakota State College
   Madison, South Dakota 57042

4. Dakota Wesleyan University
   Mitchell, South Dakota 57301

South Dakota (continued)

5. Huron College
   8th Street & Ohio Avenue, S.W.
   Huron, South Dakota 57350

6. Mount Marty College
   1100 West Fifth
   Yankton, South Dakota 57078

7. Northern State College
   Aberdeen, South Dakota 57401

8. Presentation College
   1500 North Main
   Aberdeen, South Dakota 57401

9. Sioux Falls College
   1501 South Prairie Avenue
   Sioux Falls, South Dakota 57101

10. South Dakota School of Mines
    & Technology
    500 East St. Joseph
    Rapid City, South Dakota 57701

11. South Dakota State University
    Brookings, South Dakota 57006

12. South Dakota, University of
    Vermillion, South Dakota 57069

13. Yankton College
    12th & Douglas Avenue
    Yankton, South Dakota 57078

Texas

1. St. Mary's University
   2700 Cincinnati Avenue
   San Antonio, Texas 78284

2. Southern Methodist University
   University Park
   Dallas, Texas 75275

3. Texas A & M
   College Station, Texas 77843

4. Texas Tech University
   Lubbock, Texas 79409

5. Western Texas College
   College Avenue
   Snydex, Texas 79549

Utah

1. Brigham Young University
   Provo, Utah 84602

2. Dixie College
   St. George, Utah 84770

3. Eastern Utah College
   Price, Utah 84501

4. Snow College
   150 East College Avenue
   Ephraim, Utah 84627

5. Southern Utah State
   351 West Center
   Cedar City, Utah 84720

6. Stevens Henager College
   2644 Washington Boulevard
   Ogden, Utah 84401

7. Utah State University
   University Hill
   Logan, Utah 84332

8. University of Utah
   Salt Lake City, Utah 84112

9. Weber State College
   3750 Harrison Boulevard
   Ogden, Utah 84403

10. Westminster College
    1840 South 13th East
    Salt Lake City, Utah 84105

Washington

1. Bellevue Community College
   3000 145th Place, S.E.
   Bellevue, Washington 98007

2. Big Bend Community College
   Highway 17 & Nelson Road
   Moses Lake, Washington 98837

3. Centralia College
   P. O. Box 639
   Centralia, Washington 98531

4. Central Washington State College
   Ellensburg, Washington 98926

Washington (continued)

5. Clark College
1800 E. McLaughlin Boulevard
Vancouver, Washington 98663

6. Columbia Basin Community College
2600 North Chase Avenue
Tri-Cities, Washington 99302

7. Eastern Washington State College
Cheney, Washington 99004

8. Edmonds Community College
20000 68th Avenue West
Lynnwood, Washington 98036

9. Everett Community College
801 Wetmore Avenue
Everett, Washington 98201

10. Fort Steilacoom Community College
6010 Mount Tacoma Drive, S.W.
Tacoma, Washington 98499

11. Fort Wright College
Spokane, Washington 99204

12. Gonzaga University
Spokane, Washington 99202

13. Grays Harbor College
Aberdeen, Washington 98520

14. Green River Community College
12401 S.E. 320th Street
Auburn, Washington 98002

15. Highline Community College
Midway, Washington 98031

16. Lower Columbia College
1600 Maple
Longview, Washington 98632

17. North Seattle Community College
9600 College Way
Seattle, Washington 98103

18. Olympic College
16th & Chester
Bremerton, Washington 98310

19. Pacific Lutheran University
Tacoma, Washington 98447

20. Peninsula College
1502 E. Lauridsen Boulevard
Port Angeles, Washington 98362

21. University of Puget Sound
15th & North Warner
Tacoma, Washington 98416

22. St. Martins College
Olympia, Washington 98501

23. Seattle Central Community College
1718 Broadway
Seattle, Washington 98122

24. Seattle Pacific College
Seattle, Washington 98119

25. Seattle University
Seattle, Washington 98122

26. Shoreline Community College
16101 Greenwood Avenue North
Seattle, Washington 98133

27. Skagit Valley College
2405 College Way
Mt. Vernon, Washington 98273

28. Spokane Falls Community College
W. 3410 Ft. George Wright Drive
Spokane, Washington 99204

29. Tacoma Community College
5900 South 12th Street
Tacoma, Washington 98465

30. Walla Walla College
College Place, Washington 99324

31. Walla Walla Community College
500 Tausick Way
Walla Walla, Washington 99362

32. Washington State University
Pullman, Washington 99163

33. University of Washington
Seattle, Washington 98105

34. Wenatchee Valley College
1300 5th Street
Wenatchee, Washington 98801

35. Western Washington State College
Bellingham, Washington 98225

36. Whitman College
345 Boyer
Walla Walla, Washington 99362

37. Whitworth College
Spokane, Washington 99251

38. Yakima Valley College
16th & Nob Hill Boulevard
Yakima, Washington 98902

Wyoming

1. Casper College
125 College Drive
Casper, Wyoming 82601

2. Central Wyoming College
Riverton, Wyoming 82501

3. Northwest Community College
Sixth & Cheyenne
Powell, Wyoming 82435

4. Sheridan College
Sheridan, Wyoming 82801

5. University of Wyoming
Laramie, Wyoming 82070

Since most universities have the same basic financial aid opportunities, only special programs are listed in Section VIII of this Appendix. An overall summary of basic university financial programs follows:

1) University--Each university generally has basic scholarships, teaching assistantships, and fellowships.

2) State--Advance honor scholarships; high school honor scholarships; freshman cash scholarships; nonresident fee waivers.

3) Federal

   a) National Direct Student Loans--available yearly to all qualified students.

   b) Supplemental Educational Opportunity Grants--grant aid to deserving students with exceptional financial need.

   c) College Work Study--for full-time students who demonstrate financial need and who require employment to help defray educational expenses.

   d) Basic Educational Opportunity Grants--all undergraduate students from families that are unable to contribute $1,400 of annual support to their educational costs.

The general list of subjects needed to enter engineering or geology programs after high school follows:

1) English

2) History or social studies

3) Mathematics

   a) Algebra

   b) Geometry

   c) Trigonometry

4) Science

a) General science

b) Biology

c) Chemistry

d) Physics

References for this section were taken from the appropriate college catalogs, from literature distributed by the Society of Mining Engineers of AIME, and from Occupational Outlook Handbook Reprints, 1976-77.

B. TECHNICAL TRAINING PROGRAMS

Non-Professionals in the Coal Mining Field

Miners. In the past, most miners learned the trade by assisting experienced workers and learning on the job. As formal training is becoming more important, companies are supplementing on-the-job training with formal programs. The method of training done by the companies varies from skills taught in training mines to classroom instruction. The companies tend to search for recent graduates of mine technology programs. Mine technology programs are available in some colleges and focus on the field of coal mining. The programs lead to a certificate after a year or an Associate Degree after two years. These programs typically do not require a high school diploma, but they do require an entrance examination in basic math and English.

Operating Engineers. The form of training most recommended for this field is a three-year apprenticeship program. This program consists of classroom instruction plus three years of on-the-job training. The preference by an employer in filling apprenticeship jobs is for high school or vocational school graduates.

Non-Professionals in the Petroleum Field

Petroleum and Natural Gas Production and Gas Processing. Most non-professionals in this field begin as assistants and then advance into a specialized job so there is no set time frame for training at this level. New workers are usually hired in the field and move to more highly skilled jobs as they gain experience.

Well operation and maintenance jobs usually require people who live near the wells and have a mechanical ability and a knowledge of oilfield processes.

The following schools have post-high school vocational training in oilfield occupations:

- Eastern New Mexico University, Roswell, New Mexico
- Extension Service of the University of Texas, Austin, Texas
- Petroleum Industry Training Service, Edmonton, Alberta, Canada

In the petroleum area, scientific positions require at least a bachelor's degree while petroleum engineers need some sort of engineering degree. Petroleum engineer aides require two-year technical degrees.

Petroleum Refining Industry. Plantworkers generally start off in a labor pool and learn to operate equipment from experienced operators. Formal training classes are often given in plant operation.

A bachelor's degree in a physical science or engineering field is the minimum educational requirement for scientists and engineers in this field. Two-year technical school training programs are required for most laboratory assistant jobs.

Training in the Atomic Energy Field

Training in the field of nuclear energy can be obtained either through a college or university or through on-the-job experience. To begin work in this field an engineering or science curriculum is sufficient. Some of the schools offer graduate degrees in nuclear engineering or nuclear science, while others offer graduate training in these fields but only award degrees in the engineering or scientific fields.

Training for craft workers in this field is stiffer than in most industries because precision is necessary to ensure efficient operation and maintenance of the equipment and machinery. A high school graduate who has taken science courses can qualify for on-the-job training as a laborer.

Any employee who works in the vicinity of radiation is given on-the-job training in radiation and the procedures necessary in case of an accidental release.

The Energy Research and Development Administration (ERDA), at its contractor-operated facilities, supports specialized programs and on-the-job programs for scientists, engineers, technicians, and other workers in the nuclear field. ERDA also sponsors cooperative programs with colleges and universities, and temporary employment at the ERDA laboratories for faculty members and students.

Training for Drafters, Engineering and Science Technicians, and Surveyors

Persons having training in these fields would be qualified to assist engineers, geologists and other professionals in mining and oil and gas operations.

A) Engineering and Science Technicians. Training for technician jobs may be handled in many ways since employers are generally flexible; however, most employers require some specialized training for this field. This specialized training can be found in:

Technical Institutes.

- Offer training to students for a job immediately after graduation with minimum on-the-job training.
- Offer intense technical training with less theory and general education than colleges or engineering schools.

Junior and Community Colleges.

- The curriculum provides the basics so that graduates can transfer to four-year colleges or qualify for technician jobs.

Area Vocational-Technical Schools.

- Offer training for local students.
- Usually require a high school degree or its equivalent.

Other Training.

- Companies offer specific training programs in their field.
- Private technical and correspondence schools often specialize in a single field.

An engineering and science technician usually begins his training in routine positions under direct supervision. The trainee will gain increased responsibility over time and may eventually work into supervisory positions.

B) Drafters. Drafters are involved in exploration mapping, as well as in planning for mine layout and power generating plant construction. Training for becoming a drafter is acquired from technical institutes, junior and community colleges, extension divisions of universities, and vocational and technical high schools.

A high school graduate usually starts out as a tracer and then with post-high school technical training can qualify as a junior drafter. After additional time and experience he can then move to a position as a checker, detailer, senior drafter, or supervisor.

C) Surveyors. Training in the field of surveying usually entails a combination of post-secondary school courses in surveying and extensive on-the-job training. Technical institutes, vocational schools, and junior colleges offer one-, two-, and three-year programs in surveying, with a few four-year colleges offering bachelor's degrees specifically in surveying. Most programs in the surveying field admit only high school graduates. A trainee who enrolls in some post-secondary school courses in surveying can usually start as an instrument worker. A high school graduate with no formal training in surveying often starts as a rod worker. Promotions to higher level positions often are based on written examinations as well as experience gained over time.

III. SPECIAL UNIVERSITY, COLLEGE, AND VOCATIONAL OPPORTUNITIES FOR NATIVE AMERICANS

ARIZONA

Arizona State University

This university provides eight four-year scholarships that are awarded annually to incoming Arizona reservation Indian students who need assistance and who have shown scholastic and leadership capabilities. These scholarships cover registration, tuition, and class fees.

Contact. Chairman of the Scholarship Committee, Arizona State University, Tempe, Arizona 85281

Grand Canyon College

Grand Canyon College has a private loan fund that allows Indian students who are enrolled there to borrow up to $200 a year. The college's scholarship committee has approved a scholarship, which is available to all enrolled Indians, amounting to 20% of the tuition cost.

Contact. Director of Financial Aid, 3300 West Camelback Road, Phoenix, Arizona 78501

Navajo Community College

Navajo Community College is open to members of any tribe. Since this was the first college located on a reservation, it is particularly sensitive to the needs of Indian students. It provides a flexible policy for

financial assistance based on need. The college also offers several private scholarships.

Contact. Financial Aids Office, Navajo Community College, Tsaile Lake, Tsaile, Arizona 87328.

University of Arizona

The University has various types of scholarships that are available for Indian students.

Contact. Indian Student Advisor, University of Arizona, Tucson, Arizona 85721.

CALIFORNIA

Native American Career Education in Natural Resources Program

This is a special program designed to provide training opportunities for Indians in such natural resources fields as forestry and wildlife management; fishery and range management; watershed management; and natural resources and oceanography.

Contact. Humboldt State University, Arcata, California 95521.

COLORADO

Fort Lewis College

Colorado provides tuition-free education for Colorado Indian residents at Fort Lewis College. This school has an intercultural program that is of assistance to many Indian students. There is a free, six-week summer pre-college course that gives assistance in registration procedures and study habits as well as an introduction to campus living. Extra help sessions are also provided for students requiring academic assistance.

Contact. Fort Lewis College, Durango, Colorado

MONTANA

Montana College of Mineral Science and Technology

- Indian Student Fee Waivers--students must be 1) one-fourth American Indian blood; 2) a bona fide resident of the State of Montana for at least one year prior to enrollment at Montana College of Mineral Science and Technology; 3) a high school graduate; and 4) in need of financial aid. Qualifying students receive exemption from both the registration and incidental fees while attending college. Application should be through the Office of Financial Aid.

Contact. Financial Aid Office, Montana College of Mineral Science and Technology, Butte, Montana 59701.

University of Montana

The University has a Native American Studies Program that offers the following assistance for American Indian students:

- State Fee Waivers--$99 per quarter; student must be a Montana State resident, one-fourth American Indian, and exhibit a need.
- Non-resident Fee Waivers--$324 per quarter; student must be from outside the State of Montana, be one-fourth American Indian, and demonstrate a need.
- KYI-YO Scholarship Fund--amount of assistance provided varies with need; student must be one-fourth American Indian.

Contact. Native American Studies Program, University of Montana, Missoula, Montana 59801.

NEW MEXICO

New Mexico State University

This University has scholarship assistance, through the Millicent Rogers Foundation, for Native American students.

Contact. Financial Aid Office, New Mexico State University, Las Cruces, New Mexico 88003.

Southwestern Indian Polytechnic Institute (SIPI)

This Institute provides post-high school age students with General Equivalency diploma (GED) training if they do not have a high school diploma. SIPI programs are available at no cost to qualified Indian students and include programs in business, clerical, drafting, electronics, and engineering.

Contact. SIPI, P.O. Box 10146, Albuquerque, New Mexico 87114.

University of New Mexico

The University of New Mexico Kiva Club provides a limited number of tuition awards for Indian students.

The Native American Program, College of Engineering (NAPCOE), handles the recruitment of Indian students into engineering.

NAPCOE also holds a summer institute for Indian high school students who are considering engineering as a career. The summer institute involves basic academic preparation and review for the fall semester as well as allowing

the students to see if they are suited for an engineering career through actual classroom work and field trips. In the summer program students are tested in the academic areas and counselled regarding their career. NAPCOE itself is the first national intertribal program. The main goal of this program is to increase the number of Indians with degrees in Engineering.

Contact. Jim Shorty, Engineering Center, Room 319, College of Engineering, University of New Mexico, Albuquerque, New Mexico 87131.

NORTH DAKOTA

University of North Dakota

This University provides the following scholarships for Indians:

- The Gibson Scholarship--students must be from one of the four North Dakota reservations.
- The University of North Dakota American Indian Club--offers limited financial assistance to graduating seniors from any of the four North Dakota reservations.

Contact. Director of Financial Aids, c/o University of North Dakota, Grant Forks, North Dakota 58201.

Fort Berthold Community College

This is a reservation-based community college that provides college transfer programs to Native Americans.

Contact. Director, Fort Berthold Community College, New Town, North Dakota 58763.

OKLAHOMA

American Indian Manpower Program

This program handles the recruitment of undergraduate and graduate students in manpower training.

Contact. Oklahoma State University, College of Business Administration, Stillwater, Oklahoma 74074.

University of Oklahoma

- American Indian Program--this program is mainly for Indians of Oklahoma and the Southwestern United States. It offers scholarships in Petroleum and Geological Engineering to students who qualify (at least one-fourth American Indian, demonstrated need, and exhibit an interest in the field). Renewable scholarships of $500 or more annually are awarded.

Contact. University of Oklahoma, Norman, Oklahoma 73069.

SOUTH DAKOTA

Huron College

This College has two Indian scholarship funds:

- The John P. Williamson Indian Scholarship
- The Mrs. John N. Still Memorial Scholarship

Income from both scholarship funds is used for aid at about $100 annually per eligible student.

Contact. Director of Admissions, c/o Huron College, South Dakota 57350.

Sinte Gleska College Center

This center has junior college credit courses for Native Americans and is a satellite program of the University of South Dakota.

Contact. Sinte Gleska College Center, Rosebud, South Dakota 57570.

University of South Dakota

The University offers two scholarships for Indian students:

- Miss Ella C. Deloria Scholarship Fund for Indian Women--this scholarship provides assistance to qualified Indian women students at the University of South Dakota.
- The Joel McCrea American Indian Scholarship--this scholarship provides an annual $1,500 to a qualified Indian student at the University of South Dakota.

Contact. Student Financial Aid Office, University of South Dakota, Vermillion, South Dakota 57069.

UTAH

Brigham Young University

This University provides a limited number of scholarships to Indian students. It also helps students locate employment to earn room, board, and other expenses. The Indian Education Adviser (a team of teachers and administrators) provides assistance and counseling for Indian students.

Contact. Indian Education Adviser, Brigham Young University, Provo, Utah 84601.

Weber State College

This College provides several tuition waivers for Native Americans and direct financial aid for school-related costs.

Contact: Indian Student Adviser, Weber State College, 3750 Harrison Blvd., Ogden, Utah 84403.

WASHINGTON

Everett Community College

This College offers vocational courses and college transfer credits. They employ Native American faculty members and counselors to assist students.

Contact. Counselor for Native Americans, Everett Community College, 801 Wetmore Avenue, Everett, Washington 98201.

IV. CORPORATE PROGRAMS

GENERAL ELECTRIC PROGRAM TO INCREASE MINORITY ENGINEERING GRADUATES

GE has developed a multi-media mobile van designed to orient junior and senior high school students to the math and science fields, which are prerequisite to engineering and geology careers. The van is supplemented by materials for teacher and student use following their visit to the mobile unit. CERT could possibly contact GE to determine the feasibility of having the mobile unit visit CERT-member reservations.

Contact: Dr. Linden Saline,
Box 151, Crotonville, NY 10562
(914) 941-5600

WESTERN ELECTRIC CAREERS--FILMSTRIPS

Western Electric has developed a series of career filmstrips with supplementary printed materials that are available to high schools and vocational counselors. Some of the careers included are engineering associates, draftsmen, computer programming, and office positions.

Contact: Mike Cocca, Western Electric
195 Broadway
New York, NY 10007
(212) 571-2656

PHILADELPHIA REGIONAL INTRODUCTION FOR MINORITIES TO ENGINEERING (PRIME)

A consortium of companies, including General Electric, Atlantic Richfield, DuPont, Public Service & Gas, RCA, and Sun Oil have been actively involved in developing programs to increase the number of minority engineers. The program is aimed at the junior-senior high school level and until now has been mainly oriented toward inner-city students. These companies may conceivably be willing to work with CERT in adapting the program to Indian students.

Contact: Wayne L. Owens
Community Affairs Manager
General Electric Comapny
3198 Chestnut Street
Philadelphia, Pennsylvania 19101

(215) 823-3893
823-3601

V. ASSOCIATION AND ORGANIZATION PROGRAMS

ALL INDIAN DEVELOPMENT ASSOCIATION (AIDA)

AIDA is an Indian-controlled, Indian-staffed, non-profit business development association that provides business development services to the 19 Pueblos, the Ute and Apache tribes, and a few others. AIDA aims to increase the number of Indian-owned business starts, strengthen existing Indian-owned businesses, and improve opportunities for potential Indian entrepreneurs.

Contact. All Indian Development Association, 2401 12th Street, N. W., Albuquerque, New Mexico 87102.

ALL INDIAN PUEBLO COUNCIL (AIPC)

I. Manpower Program

This program provides members of the Pueblo and Apache tribes between the ages of about 16-35 with vocational-type training. The trainees receive $2.30/class hour plus their tuition, and a partial living allowance is included.

II. Technical Assistance and Training

This program is contracted with ONAP and presently handles 10 grantees in New Mexico. When an Indian tribe desires technical assistance or training in a specific area, it may contract with AIPC to carry it out. AIPC

hires consultants to set up the programs with the tribes. In this program, there is classroom and on-the-job training. Since funds are minimal, training is generally for shorter programs of study.

III. Scholarship Program

All applicants must be Pueblo Indians, one-fourth or more Indian, and demonstrate financial need. This program is available for anyone who qualifies and for any university. The amount of the scholarship varies with the need.

Contact. AIPC, P.O. Box 6507, Albuquerque, New Mexico 87107.

AMERICAN INDIAN HIGHER EDUCATION CONSORTIUM (AIHEC)

AIHEC provides a variety of technical assistance services to 12 Indian-controlled community college centers located on Indian reservations. AIHEC aims to develop technical assistance through such functions as provision of training, support services, resource identification, and advocacy in the areas of:

1) Research and Data
2) Accreditation
3) Curriculum Development
4) Financial and Institutional Resources
5) Human Resources Development.

They also assist in building up the programs of individual member institutions to work toward setting up a modern higher educational framework.

Contact. American Indian Higher Education Consortium, 1626 High Street, Denver, Colorado 80218.

AMERICAN INDIAN MANAGEMENT INSTITUTE (AIMI)

The AIMI is an Indian-run, non-profit institute that works to provide Indian tribes and organizations with professional training and consulting in the management field. AIMI has recently received a pilot project grant to conduct training for tribes in the areas of commercial and industrial development (e.g., negotiating with developers).

AIMI's training is divided into two types:

- National Seminars--these seminars are held in Albuquerque, New Mexico, and they are labeled:
  - Management by objectives and results
  - Program budgeting and grant compliance
  - Small enterprise management for profit
  - Basic bookkeeping and accounting
  - Complete program management.
- On-site--AIMI, when requested, can provide on-site training. Their on-site programs generally are:
  - Accounting systems
  - Budgeting and financial analysis
  - Feasibility studies and operations audits
  - Managerial planning
  - Program management
  - Marketing
  - Tribal council and board of directors training
  - Organizational planning
  - Educational program management
  - Personnel management
  - Supervisory management

Contact. American Indian Management Institute, Inc., 302 San Pablo, S.E., Albuquerque, New Mexico 87108 (505)843-6412.

AMERICAN MANAGEMENT ASSOCIATION (AMA)

AMA provides training courses in the management field. Some of the courses cover communication, accounting, cash management, creativity, decision making, electronic data processing, leadership, joint ventures, manufacturing, and purchasing. It provides workshop seminars, orientation seminars, and briefing sessions.

Contact. American Management Association, 135 West 50th Street, New York, New York 10020.

ARROW, INC.

A non-profit organization that provides Indian students with scholarship assistance depending on availability of funds.

Contact. Arrow, Inc., 1000 Constitution Avenue, N.W., Washington, D.C. 20036.

BITUMINOUS COAL OPERATORS ASSOCIATION (BCOA)

BCOA has coal mining job skills and management training programs available, which started in June 1977. These programs will be in conjunction with the National Coal Association and plans call for developing a new program each month. Educational materials will include 16mm films, workbooks, and tests, and will be of a modular design. The first program to come out in June was a ten-hour program on mining hydraulics as it applies to equipment used in coal production. The cost for this program is $26.50 per trainee. Work is

being done on a complete 70-hour orientation program for miners.

Contact. Bituminous Coal Operators Association, World Center Building, Washington, D.C. (202)783-3195.

COLORADO ECONOMIC DEVELOPMENT ASSOCIATION

- Training Program--offers basic courses in small business management, accounting, finance, and related subjects to help new businesses.

Contact. Colorado Economic Development Association, 735 Curtis Street, Denver, Colorado 80204.

INDIAN CENTERS, INC.

- Service Program--provides job training, tutoring, adult education, and financial assistance through the centers.

Contact. Indian Centers, Inc., 1127 West Washington Boulevard, Los Angeles, California 90015.

INDIAN EDUCATION RESOURCES CENTER (IERC)

The IERC, which is part of the Bureau of Indian Affairs' Central Office of Indian Education Programs, consists of technical services such as educational functions of monitoring, curriculum, evaluation, research and development, and dissemination of information. It carries out these services through area offices in providing assistance to agencies, schools, and tribes.

The IERC consists of five divisions, which are:

- Division of Evaluation Research and Development--provides guidance and consultation in the areas of

curriculum development, evaluation, and education research.

- Division of Continuing Education--provides consultation and funding for programs serving handicapped students, career development, vocational rehabilitation, and adult education.
- Division of Educational Assistance--provides for the allocation of funds and the monitoring of programs under the NDEA and ESEA.
  - Coordinates the Johnson O'Malley Elementary and Secondary Education Act Titles
  - Coordinates flow-through funding programs.
- Division of School Facilities--provides guidance and consultation on planning, funding, and training for school construction in the area.
- Division of Educational Audio-Visual Services--distributes 16mm educational films to Bureau schools.

Contact. Indian Education Resources Center, 123 Fourth Street, S.W., P. O. Box 1788, Albuquerque, New Mexico 87103 (505)766-2602.

INDIAN EMPLOYMENT CENTERS

- Service Program--provides training in several fields: building trades, secretarial and general clerical, and medical assistant jobs.

Contact. Indian Employment Centers, 1046 West Wilson Boulevard, Chicago, Illinois 60640.

INDIAN TECHNICAL ASSISTANCE CENTER (ITAC)

ITAC, funded by BIA and the Department of Commerce provides two programs. The main program is the Indian Action Team Program. This program involves about 60 contracts with Indian tribes or groups within the United States. The major goal of the program is to train Indian heads-of-household on the reservation or in nearby Indian areas. The program is broken up into these phases:

1) Classroom--All training takes place in the classroom.

2) Shop Application--Where the trainee practices what he learned in the classroom phase.

3) On-the-Job Training--Trainees are assigned to specific projects to acquire skills. Some benefits and effects of this program are:

   - It is designed to meet varying needs among the tribes
   - Trainees receive maintenance allowances
   - Trainees work on community projects
   - It ensures that neither the trainee nor his family have to relocate
   - It enhances the development of tribally owned construction and business enterprises.

The second program is Job Opportunity Funds. It involves about 25 contracts. This program is a work program and its goal is to employ Indians in whatever area or field they contract for. ITAC's aim is to increase the income of individual Indians and of the tribe as a whole.

Contact. ITAC, 1075 South Yukon, P.O. Box 26268, Billmar Branch, Lakewood, Colorado 80226.

INDIAN EDUCATION TRAINING CENTER

This is a training organization that provides federal grants for parent committees. This organization works as a liaison between state departments of education and local Indian schools.

Contact. Indian Education Training Center, 5510 Domingo Road, Albuquerque, New Mexico 87108.

INTERNATIONAL CITY MANAGEMENT ASSOCIATION (ICMA)

- Minorities in Management Program--provides, through a special Ford Foundation grant, opportunities through a university-based work experience program in city management.

Contact. ICMA, 1140 Connecticut Avenue, N.W., Washington, D.C. 20036.

HUMAN RESOURCES DEVELOPMENT INSTITUTE (AFL-CIO)

- Minority Apprenticeship Training--this program prepares 1,000 minority youths for related jobs in the construction field and is offered in these cities: Birmingham, Mobile, East St. Louis, Rock Island, Gary, Des Moines, Topeka, Albuquerque, Oklahoma City, Chattanooga, Knoxville, Memphis, Corpus Christi, Dallas, El Paso, Fort Worth, Houston, San Antonio, Salt Lake City, Norfolk, Spokane, and Casper.

NATIONAL INDIAN TRAINING CENTER (NITC)

- Training Center Program--designs courses to meet the specific needs of a tribe.

Contact. NITC, Box 66, Brigham Young, Utah 84302.

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

- Materials and Programs--the Engineers' Council for Professional Development (ECPD) has prepared a directory of materials for educators, guidance personnel, and engineering groups to use to provide students or trainees with information in the engineering field. The directory also includes programs that provide engineering and technology guidance such as:
  - Industrial Arts Curriculum Project--a special course prepared for junior high school grades 7-8 that is divided into two sections: the World of Construction and the World of Manufacturing. Takes the place of the typical "shop" course. An excellent introduction to the world of work and the the role of the engineer and technologist. For information contact: IACP, Ohio State University, 1712 Neil Avenue, Columbus, Ohio 43210 (614) 422-7471.

- Junior Engineering Technical Society--a society that sponsors an extracurricular program for high school and junior college students interested in engineering and technology through club activities, publications, individual membership, and other experience-oriented activities. Organized nationally and by states. For information write to JETS, 345 East 47th Street, New York, New York 10017.
- National Engineering Aptitude Search--a national testing program for students in grades 9-12. It is offered in January and February every year and helps students to determine their aptitude for engineering. For descriptive brochure and application, contact JETS-NEAS, 345 East 47th Street, New York, New York 10017.

This directory is available from the National Society of Professional Engineers, 2029 K Street, N.W., Washington, D.C. 20006.

- Scholarships--the National Society of Professional Engineers (NSPE) administers a scholarship program and many of the State Societies of Professional Engineers also sponsor scholarship programs. The scholarships administered from the NSPE are provided by sponsors such as varying universities and corporations. The list can be obtained from NSPE but the ones that specify scholarships for a minority student are:
  - NSPE-Boston University (one scholarship), 110 Cummington Street, Boston, Massachusetts 02215.

- Burroughs Corporation (one scholarship)
- NSPE-Georgia Institute of Technology (one scholarship), Atlanta, Georgia 30332
- NSPE (two grants).

NATIVE AMERICAN EMPLOYMENT PROGRAM

- Service Program--offers counseling, job training, and classroom preparation for the GED for American Indians.

Contact. Native American Employment Program.

NATIVE AMERICAN TRAINING ASSOCIATES (NATA)

- Service Program--NATA is an Indian-controlled, non-profit organization that provides management and community organization expertise to help Indian tribes and Indian groups.

Contact. NATA, Box 1505, Sacramento, California 95807.

NAVAJO-HOPI INDIAN TRAINING PROGRAM

The Argonne National Laboratory conducted an intensive five-week land reclamation/conservation course for Navajo and Hopi Indians during the summer of 1976 that was supported by ERDA funds. The purpose of the course was to teach the participants the scientific principles of reclamation and conservation and how to apply them on the reservation. The subjects were varied, but they all applied to mining and land reclamation. The course included classroom and laboratory studies with frequent field investigations and visits

to mining and reclamation sites. This program is now under evaluation by Argonne Laboratory, ERDA, and the Navajo Community College.

Contact. Roy E. Cameron, Argonne National Laboratory, 9700 South Cass Avenue, Argonne, Illinois 60439.

PETROLEUM EXTENSION SERVICE--University of Texas at Austin, Austin, Texas 78712

I. Publications--(books, primers, and training manuals)

A. Rotary drilling

B. Well servicing and workover

C. Pipeline

D. Oil and gas production

E. General petroleum

II. Slide-Tape Programs

Each program costs $85 including slides, audiocassette tapes, illustrated script and sometimes review exercises.

A. Drilling technology series

B. Production technology series

C. Offshore technology series

III. Motion Picture Films

Films cover various aspects of petroleum development. Prices vary.

IV. Schools of Technology

These API-sponsored schools offer short-term courses (several weeks to months) covering various aspects of oil and gas production.

A. Kilgore Schools

Contact. Petroleum Extension Service, 1100 Broadway, Kilgore, Texas 75662 (214)984-8689.

B. Baytown Schools

Contact. Petroleum Extension Service, Drawer S, University Station, Austin, Texas 78712 (512)471-7447.

C. Houston Schools

Contact. Petroleum Extension Service, Drawer S, University Station, Austin, Texas 78712 (512)471-7447.

D. Odessa Schools

Contact. Petroleum Extension Service, College Box 176, P.O. Box 3752, Odessa, Texas 79760 (915)337-8042.

E. Austin School

Contact. Petroleum Extension Service, Drawer S, University Station, Austin, Texas 78712 (512)471-7447.

General Contact. Petroleum Extension Service, Drawer S, University Station, Austin, Texas 78712.

V. Home Study Course

This course consists of twelve lessons of training material concerning well servicing and workover.

Contact. Petroleum Extension Service, The University of Texas at Austin, Austin, Texas 78712.

SOUTHERN ILLINOIS UNIVERSITY

School of Technical Careers

The School of Technical Careers is a division of Southern Illinois University at Carbondale. It provides students with one- and two-year

programs at the semiprofessional stage of business and industrial technology. The program is designed for vocationally oriented students whose goals are not met by traditional college programs.

- Training Programs (in four basic areas):
  - Allied health and public services
  - Applied technologies
  - Aviation technologies
  - Graphic communications.
- Learning Center--here the students have a central area where they have their own individualized program. These programs include:
  - Basic education--remedial and/or review of basic skills
  - Related education--skill development relating directly to the trade
  - GED--specialized study for the High School Equivalency Certificate.
- Funding--through the Comprehensive Employment and Training Act of 1973 with participation by the U.S. Department of Labor
- Expenses (for Southern Illinois University):
  - State tuition--$599.50
  - Out-of-state tuition--$1,455.50
  - Room and board--$1,500.00

Contact. School of Technical Careers, Southern Illinois University at Carbondale, Carbondale, Illinois 62901.

Manpower Skill Center

- Training Programs:
  - Clerical Cluster (36 weeks) general office procedures, typing, stenography, bookkeeping, office machine operation.
  - Machine Trade Cluster (36 weeks) principles and skills of lathe, milling machines, shapers, grinders, drill presses and saws.
  - Welder Combination (24 weeks) principles and skills of metallic arc, oxyacetylene, TIG and MIG welding and arc air culling.
- Learning Center--here the students have a central area where they have their own individualized program. These programs include:
  - Basic education--remedial and/or review of basic skills
  - Related education--skill development relating directly to the trade
  - GED--specialized study for the High School Equivalency Certificate
- Funding--through the Comprehensive Employment and Training Act of 1973 with participation by the U.S. Department of Labor.

Contact. Manpower Skill Center, Southern Illinois University at Carbondale, Carbondale, Illinois 62901.

UNITED SIOUX DEVELOPMENT COMPANY

This is a business development organization sponsored by OMBE. They have three specialists who help the Indians to organize and set up a business. Once a proposal for a business is given, the United Sioux Development Company works with the tribe in obtaining financing through the proper agencies. Over the past year they have run two business training courses, one in bookkeeping and one on minority contractors. For a group to be eligible, they must be classified as a minority and be a South Dakota resident.

Contact. Ron Englehart, United Sioux Development Company, Pierre, South Dakota (605)224-8865.

UNITED TRIBES EMPLOYMENT TRAINING CENTER (UTETC)

This is a non-profit educational institution that is Indian-owned and governed by the United Tribes of North Dakota Development Corporation. The programs at UTETC take about one year to complete, with the student generally working at his/her own pace.

The Center has three separate programs in which the trainees participate:

- Personal development--this course covers social skills and awareness such as:
  - Communications
  - Personal management
  - Human relations
- Adult education--this course covers three skill areas:
  - Reading
  - Language arts
  - Mathematics.

This program also offers the opportunity to earn a General Education Diploma (GED).

- Vocational education department--offers the following vocations plus on-the-job training and job placement:
  - Business clerical
  - Nurses' aide
  - Painting
  - Welding.

Contact. United Tribes Employment Training Center, 3315 South Airport Road, Bismarck, North Dakota 58501 (701)255-3285.

UTAH TECHNICAL COLLEGE

Utah Technical College offers a variety of courses in the following areas of instruction:

- Occupational preparatory--these programs are designed to train students for occupational entry.
- Apprentice-related instruction--a program for the worker learning a trade through apprenticeship or on-the-job training.
- Occupational extension--provided to help a fully trained worker keep abreast of new developments and to help prepare the individual for job advancement.
- Supervisory training--provided to help people preparing for supervisory positions to become familiar with new techniques, developments,

improved methods in business and industrial supervision and management.

- Pre-technical programs--courses that upgrade the skills of students desiring to enter technical programs.

Contact. Utah Technical College, 4600 South Redwood Road, Salt Lake City, Utah 84107 (801)299-3411.

VI. GOVERNMENT PROGRAMS

A. CATALOG OF FEDERAL DOMESTIC ASSISTANCE

The following government-sponsored programs were judged to be potential funding sources for training of tribal members in environmental and energy-related careers. The programs are described briefly here in general terms, but more comprehensive descriptions may be found in the Catalog of Federal Domestic Assistance. Numbers cited with each program refer to the Catalog program number.

Department of Health, Education, and Welfare-Office of Education

1. 13.418 Supplemental Education Opportunity Grants. This program enables students of exceptional financial need to pursue higher education by providing grant assistance for educational expenses.

Contact--Chief, Program Development Branch,
Division of Student Support and Special Programs
Bureau of Postsecondary Education
Office of Education
Washington, D.C. 20202
(202) 245-2736

2. 13.454 Higher Education-Strengthening Developing Institutions. This program helps developing colleges (which could include Indian Community Colleges) to strengthen their academic, administrative, and student services programs.

Contact--Bureau of Post-Secondary Education
Office of Education
Washington, D.C. 20202
(202) 245-2474

3. 13.535 Indian Education--Special Programs and Projects. This program is designed to plan, develop, and implement programs and projects for the improvement of educational opportunities for Indian students.

Contact--Office of Indian Education
Office of Education
400 Maryland Avenue, S.W.
Washington, D.C. 20202
(202) 245-8020

4. 13.536 Indian Education-Adult Indian Education. This program is designed to plan, develop, and implement training programs for Indian adults.

Contact--Office of Indian Education
Office of Education
400 Maryland Avenue, S.W.
Washington, D.C. 20202
(202) 245-8020

5. 13.543 Educational Opportunity Center. This program provides and coordinates services for residents of low-income areas for post-secondary educational programs and provides tutoring, counseling, and other educational assistance.

Contact--Bureau of Post-Secondary Education
Office of Education
400 Maryland Ave., S.W
Washington, D.C. 20202
(202) 245-2435

6. 13.551 Indian Education-Grants to Non-Local Educational Agencies. This program provides financial assistance to schools on or near a reservation that are governed by a non-profit institution or organization of an Indian tribe. The schools receive assistance to develop and implement elementary and secondary school programs designed to meet the special educational needs of Indian children.

Contact--Office of Indian Education
Office of Education
400 Maryland Ave., S.W.
Washington, D.C. 20202
(202) 245-8020

7. 13.557 University Community Service-Special Projects. This program provides assistance for institutions of higher education to carry out special programs and projects that seek solutions to national and regional problems relating to technological and social changes and environmental pollution.

Contact--Bureau of Post-Secondary Education
Office of Education
Washington, D.C.
(202) 245-9868

8. 13.567 Mining and Mineral Fuel Conservation Fellowship Program. This program provides assistance for students of exceptional ability who exhibit a financial need to undertake graduate study in domestic mining and mineral development and mineral fuel conservation.

Contact--Bureau of Post-Secondary Education
Division of Training and Facilities
Office of Education
400 Maryland Avenue, S.W.
Washington, D.C. 20202

9. 13.491 University Community Service-Grants to States. This program encourages colleges and universities to assist in community problems by strengthening education programs that might help address community problems.

Contact--Bureau of Post-secondary Education
Division of Training and Facilities
Office of Education
400 Maryland Avenue, S.W.
Washington, D.C. 20202
(202) 245-9868

10. 13.554 Career Education. This program provides grants for demonstration projects designed to develop effective methods and techniques in career education.

Contact--Office of Education
Office of Career Education
Regional Office, Bldg. No. 3
Room 3100
7th & D Streets, S.W.
Washington, D.C. 20202
(202) 245-2331

Department of the Interior-BIA

1. 15.108 Indian Employment Assistance. This program provides vocational training and employment opportunities for Indians.

Contact--Local BIA Office or
--Office of Tribal Resources Development
Division Job Placement and Training
Bureau of Indian Affairs
1951 Constitution Avenue, N.W.
Washington, D.C. 20245
(202) 343-7408

2. 15.114 Indian Education-Colleges and Universities. This program encourages Indian students to continue their education and training beyond high school through provision of financial assistance. Both graduate level and post-secondary vocational education are included.

Contact--Office of Indian Education Programs
1951 Constitution Avenue, N.W.
Washington, D.C. 20245

3. 15.100 Indian Education-Adults. This program provides adult education in the basic fields such as reading, English, and mathematics, along with subjects such as citizenship and consumer protection. It provides instruction for high school equivalency exams.

Contact--Office of Indian Education Programs
Indian Education Resources Center
Division of Continuing Education
Bureau of Indian Affairs
123 4th Street, S.W.
P.O. Box 1788
Albuquerque, NM 87103
(505) 766-2604

4. 15.105 Indian Education-Contracts with Indian Tribal Organizations. This program encourages Indians to participate in local school affairs and provides for Indians to work with the operation of schools.

Contact--Office of Indian Education Affairs
1951 Constitution Avenue, N.W.
Washington, D.C. 20245
(202) 343-2175

5. 15.107 Indian Action Team Program. This program provides technical assistance and training to Indians and Indian groups in the areas of engineering services, engineering studies, plans, construction, operation and maintenance of facilities and enterprises owned by Indians.

Contact--Office of Tribal Resources Development
Bureau of Indian Affairs
1951 Constitution Avenue, N.W.
Washington, D.C. 20245
(202) 343-4591

6. 15.117 Indian Business Enterprise Development. The primary objective of this program is to create jobs and increase the income level. The objectives also include increased involvement in management, Indian ownership and on-the-job training.

Contact--Director, Office of Tribal Resources Development
Bureau of Indian Affairs
1951 Constitution Avenue, N.W.
Washington, D.C. 20245
(202) 343-5557

Department of Labor-Manpower Administration

1. 17.200 Apprenticeship Outreach. This program seeks qualified applicants from minority groups and assists them in entering apprenticeship programs, mainly in the construction area.

Contact--Director, Office of National Programs
Employment and Training Administration
Department of Labor
Washington, D.C. 20213
(202) 376-6093

2. 17.221 Employment and Training Research-Small Grant Research Projects. This program provides grants to public and private non-profit organizations for employment and training research.

Contact--Office of Manpower Research and Development
Employment and Training Administration
Department of Labor
Washington, D.C. 20213
(202) 376-7243

3. 17.228 National On-the-Job Training. This program provides occupational training for unemployed or underemployed people who could not be expected to otherwise secure full-time employment.

Contact--Office of National Programs
Employment and Training Administration
Department of Labor
601 D Street, N.W.
Washington, D.C. 20213
(202) 376-6093

4. 17.232 Comprehensive Employment and Training Programs. This program provides job training and employment opportunities for the economically disadvantaged, unemployed, or underemployed.

Contact--Employment and Training Administration
U.S. Department of Labor
601 D Street, N.W.
Washington, D.C. 20213
(202) 376-6366

5. 17.234 Indian Employment and Training Programs. This program provides grants for Indian employment and training programs.

Contact--Office of Indian and Native American Programs
Employment and Training Administration
U.S. Department of Labor
601 D Street, N.W.
Washington, D.C. 20218

Department of Commerce-Office of Minority Business

The objective of this program is to provide funds for local business development organizations to conduct seminars and special training programs in minority business enterprises.

Contact--Assistant Director, Administration and Field Operations Division
Office of Minority Business Enterprise
Department of Commerce
Washington, D.C. 20230
(202) 967-3007

National Science Foundation

1. 47.048 Science Education Improvement. This program provides project grants to improve capabilities of academic institutions for education and research training.

Contact--Assistant Director
Science Education
National Science Foundation
1800 G Street, N.W.
Washington, D.C. 20550
(202) 282-7920

Environmental Protection Agency

1. 66.003--Air Pollution Control Manpower Training Grants (Office of Air and Waste Management). This program awards grants for training personnel in pollution abatement and control.

Contact--Environmental Protection Agency
Grants Administration Division PM 216
Washington, D.C. 20460

2. 66.428--Water Pollution Control--Professional Training Grants (Office of Water and Hazardous Materials). This program provides grants to improve training and education for water environmental programs and for water pollution control and abatement personnel.

Contact--Environmental Protection Agency
Grants Administration Division
Washington, D.C. 20460

Nuclear Regulatory Commission

1. 77.001 Radiation Control. This program assists states in training, maintaining, and improving their capabilities to conduct radiation control programs.

Contact--Agreements and Export Branch
Division Materials and Fuel Cycle and Facility Licensing
Nuclear Regulatory Commission
Washington, D.C. 20555
(301) 492-7767

Four Corners Regional Commission

1. 38.002 Four Corners Technical and Planning Assistance. This program evaluates the needs of and develops potentialities for the economic growth of the Four Corners Region through planning, investigations, studies, demonstration projects, and training programs.

Contact--Office of Federal Cochairman
Four Corners Regional Commission
Room 1898 C
Department of Commerce
Washington, D.C. 20230

Old West Regional Commission

1. 75.002 Old West Technical and Planning Assistance. This program examines the needs and develops the potentialities for the economic growth of the area through planning, investigations, studies, demonstration projects, and training programs.

Contact--Office of Federal Cochairman
Old West Regional Commission
1730 K Street, N.W., Suite 426
Washington, D.C. 20036
(202) 967-3491

B. ADDITIONAL FEDERAL PROGRAMS

Office of Native American Programs (ONAP)

ONAP is a program oriented to creating new federal machinery to improve the position of Native Americans. It aims to attain this through programs of training, technical assistance, and financial support for unique self-help programs designed and operated by Native Americans.

ONAP's Division of Field Operations monitors reservation projects, helps off-reservation groups to develop programs, and provides training and technical assistance for Native Americans.

Contact--Director, Office of Native American Programs
Office of Human Development
U.S. Department of Health, Education, and Welfare
Washington, D.C. 20201

New Apprenticeship Initiatives

The objectives of this new program, not yet listed in the Catalog of Federal Domestic Assistance, are to expand apprenticeship opportunities in highly skilled occupations and to further apprenticeship in industries that have not used this type of training before. The primary sectors of this program will be health, auto repair, mining, petroleum, and government.

Contact--Jim MacGlafin and Hugh Murphy
601 D Street, N.W.
Room 7108
Washington, D.C.
(202) 376-7091

C. CIVIL SERVICE TRAINING CENTER

This Center's goal is to help other government agencies in meeting their employee development and training needs. It provides three types of services to agencies:

- Technical advice and assistance on training problems and all aspects of training and development systems
- Development and delivery of relevant courses of instruction to augment agency training programs
- Promotion of interagency and intergovernmental cooperation in training.

Services are available to all federal, state, local and tribal governments within the geographic region of Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.

The Training Center is divided into five organizational units that serve the training needs of agencies in the six-state region.

- General Management Training Institute--conducts training courses on general principles and practices of effective management for all levels of the management team--first-level supervisors, middle managers, and executives.
- Personnel Management Training Institute--provides training opportunities on all aspects of personnel management, with particular emphasis on the federal personnel system, for supervisors, managers, personnel specialists, and others who need to apply personnel policies and procedures.
- Management Sciences Training Institute--conducts training for supervisors, managers, professional specialists, and technicians in such subject matters as financial management, automatic data processing, management analysis, government contracting, and related technical fields.
- Communications and Office Skills Training Institute--offers training for government employees with training needs in written, oral, or interpersonal communication. Also provides training for administrative support staffs in clerical, secretarial and office management skills.
- Training Leadership Program--provides informational, technical assistance, and consultative services to agency managers and trainers to help them meet training needs and to solve training problems.

There are two other organizational units within the Denver Training Center--both national in scope:

- National Indian Training Center--located at Brigham City, Utah, provides educational and training opportunities to Indian people and government employees who work closely with them. The NITC is staffed and operated jointly by the U.S. Civil Service Commission and the Bureau of Indian Affairs.
- National Independent Study Center--offers correspondence and other independent study courses for government employees in all parts of the country. The NISC was established in 1976 and is building an independent study curriculum in the traditional Civil Service Commission classroom subject matter areas.

Contact--Denver Regional Training Center
U.S. Civil Service Commission Regional Office
Building 20
Denver Federal Center
Denver, Colorado 80225

VII. TRAINING COMPANIES

The following companies provide training on a consultant basis and develop and market programmed training packages.

DUPONT

DuPont has designed two groups of programmed learning courses: vocational training and safety training. In these programs a trainee is given a sequence of information, questions, and answers that he works through at his own pace. The trainee reads the information, answers the questions, and checks himself, moving from simple to more complex questions. These self-paced courses are supplemented with on-the-job training, plant tours, and demonstrations. Instruction is given via videotape and films.

- Vocational training--there are a large number of courses that cover the following training areas:
  - Maintenance
  - Carpentry
  - Electrical work
  - Instrumentation
  - Insulating
  - Machine shop
  - Sheet metal work

- Millwrighting
- Pipefitting
- Rigging
- Welding
- Chemical operation
- Powerhouse operation
- Service operation

- Safety training--these courses are divided into four groups:
  - For new employees--these are introductory courses to safety in three languages.
  - Safety Training Observation Program (STOP) for supervision--these courses are aimed at making skilled safety observations of people a constant habit by every level of supervision.
  - Safety Training Observation Program (STOP) for non-supervisory personnel--these courses are designed to train non-supervisory employees to observe and report unsafe acts, incidents, and conditions so that action can be taken to prevent further accidents and injuries.
  - Safe Practice Series--these courses are designed for the line supervisor to use as part of his safety program. This group of courses seeks to develop safe practices for the employees, but does not substitute as a regularly conducted safety program. Rather, they are a supplement to safety training.

Contact:

E. I. duPont de Nemours & Co., Inc.
Applied Technology Division
Wilmington, Delaware 19898
(302)774-2805

HOWELL TRAINING CORPORATION

This company provides consultation on oil and gas training program systems and develops training materials geared to individual needs. Their materials range from programmed learning texts to multi-media programs. They also have access to an equipment simulator that is capable of being housed in a mobile classroom unit for training use in more remote areas. They have developed eight different series that are discussed below.

1. API PILOT Series

PILOT (Programs In Learning Operating Techniques) was developed for the American Petroleum Institute. It is a training program available to operators and other refinery employees covering the knowledge of operating basics. PILOT uses a step-by-step training technique called programmed learning that allows the trainee to study independently and at his own speed. To date, 17 pilots have been completed and one on refinery chemistry is in preparation. Each pilot is divided into units. The 17 pilots are:

- Practical Distillation
- The Nature of Heat

- Furnace Operation
- The Mechanics of Fluids
- Compressors
- Instrumentation for Operators
- Pumps
- Pump and Compressor Drivers
- Significance of Process Control Tests
- Cost Reduction for Operators
- Fire Fighting
- Accident Control Techniques
- Fractions, Decimals and Proportion
- Valves
- Costing Towers
- Heat Exchangers
- Light Ends.

2. API Profit Series

PROFIT (Program for Individual Training) was developed for the American Petroleum Institute. It provides instruction in basic fundamentals for lease operators, supervisors, technicians, and subcontractors in the oil and gas operations. The program requires an experienced supervisor to conduct and monitor sessions. Programmed learning works at all skill levels and job levels and allows the trainees to proceed at their own pace. In addition to this programmed learning, API PROFIT also has a slide tape series now in preparation. The twelve programs in the series are:

- Oil and Gas Reservoirs
- Flowing Wells
- Well Pumping: Sucker-Rod System

- Oil Well Performance and Surveillance
- Gas Measurement
- Oil and Gas Separators
- The Mechanics of Fluids
- Compressors
- Pumps
- Internal Combustion Engines
- Couplings, Gear Trains, and V-Belt Drives
- Valves.

3. GPA Plant Series

This series was developed for the Gas Processing Association and its programs are oriented toward gas processing.

4. Manufacturing Series

This series was developed for the Society of Manufacturing Engineers and its seven programs deal with machinists and manufacturing.

5. Association of Oil Well Servicing Contractors

This series of three audiovisual programs in oil well servicing was developed for the Association of Oil Well Servicing contractors. The programs are on 35mm slides with narration and sound effects on cassette tapes. The slide/tape presentation stops at set intervals to let the trainee answer problems in a workbook covering the slides just shown. The programs are:

- An Introduction to Oil Well Servicing. This shows trainees the kind of jobs done with an oil well servicing rig.
- A Rod Job. This program shows various operations required in all rod jobs while considering the special requirements of the job shown.

- Rod Fishing and Rod Stripping. This covers two common operations required of an oil well servicing rig and crew and is aimed at crewmen with minimal experience.

The remaining three series are developed by and for Howell Training Company.

6. Operator Slide Tape Series

There are seven different sets of slide/tape programs in this series. They are:

- Fundamentals of Pressure Instruments
- Fundamentals of Temperature Instruments
- Liquid-Level Instruments
- Positive Displacement Compressors
- Valves
- Flow and Analytical Instruments
- Fire Fighting.

7. Howell Training Division (HTD) Slide Tape and Workbook Series

The HTD program begins with an audiovisual presentation. The trainees then turn to a workbook exercise of constructed problems and questions. The learner works a problem page and then turns to the facing page to confirm his responses. Through this he gets immediate feedback on what he has learned before continuing with the audiovisual part of the program. There are four of these programs in preparation:

- Cooling Towers
- Process Control Instruments
- Centrifugal Compressors
- Positive Displacement Pumps.

8. Other Programs

This series is a group of varied programs, which are:

- Dealer Recruitment: Planning, Prospecting and Preselection
- Dealer Recruitment: Interviewing
- The Cooling System
- Tires
- Shock Absorbers
- Alcoholism in Industry
- Effective Written Communications

Contact:

John Connaughton, Howell Corporation Training Division
2040 North Loop West, Suite 204
Houston, Texas
(713) 688-9537

HUGHES TECHNICAL COMMUNICATIONS CO., INC.

This company carries synchronized slide-tape film strip-tape training programs. Their programs are divided by these areas:

- Material handling
- Maintenance
- Operations
- General.

Contact:

Hughes Technical Communications Co., Inc.
8319 Howard Drive
Houston, Texas 77017
(713) 644-8221

TARGET PROGRAMS

The "Target" series is designed to train employees with the latest in audio-visual techniques. There are five programs:

- Pump operation
- Pump maintenance
- Valve operation
- Furnace operation
- Distillation.

All five programs include 16mm films, student workbooks, criterion tests, instructor manuals, and answer keys. The programs are all organized in the same manner. First, short segments of film are shown after which the trainee completes the corresponding workbook exercise. When each program is completed, a criterion test is given. The criterion tests are keyed to the workbook in the event remedial work is necessary.

Target Programs Now in Production

- Instrumentation
- Heat exchanger maintenance
- Barge tankerman-oil spill prevention
- Centrifugal compressor maintenance
- Reciprocating compressor maintenance
- Energy conservation
- Catalytic reforming
- Catalytic cracking

Contact:

National Photographic Laboratories
1926 West Gray
Houston, Texas
(713) 527-8471

TECHNICAL PUBLISHING COMPANY (TPC) TRAINING SYSTEMS

This Company has developed a series of text-based learning programs called Plant Engineering Training Systems. The program is based on units that cover a specific subject, through 5-10 lessons on that subject. All lessons are identical in format, containing text, programmed exercises, and a self-check quiz. At the completion of each unit there is a test that evaluates work performance. There are a total of 63 topics covering a wide range of industrial and institutional subjects. TPC's major subject breakdowns are:

- Fundamental subject units
- Electrical subject units
- Mechanical subject units
- Welding subject units
- Power plant subject units
- Millwright subject units
- Packaging machinery subject units
- New subject units.

Contact

Ralph F. Jensen, TPC Training Systems, 1301 South Grove Avenue, Barrington, Illinois 60010 (312/381-1840).

VIII. FINANCIAL AID

BUREAU OF INDIAN AFFAIRS

A. Types of Aid

1. Loans. Application for educational loans must be made through either the tribal credit association or the Bureau's Area or Agency Offices.

2. Grants. Educational grants are administered by the Bureau's Area Offices.

Requirements for eligibility for either type of student aid are as follows:

- At least one-fourth American Indian, Eskimo, or Aleut
- Tribes served by the Bureau for educational purposes
- Enrolled or accepted at an accredited college or university.

B. BIA Programs of Assistance

1. Adult Education. Offers financial opportunities for Indians, 16 or over, who are not presently attending a regular school program.

2. Employment Assistance and Adult Vocational Training. This program provides financial assistance for Indians enrolling in vocational technical schools or other types of job training. The eligibility requirements are:

a) Member of recognized tribe

b) Live on reservation or restricted land

c) 18-25 years of age

d) Need such training to obtain reasonable employment.

In addition apprenticeship or on-the-job training can be provided.

C. BIA Higher Education Assistance Program

This program provides annual scholarship grants to Indian students for a degree program in an accredited university or college. Eligibility requirements are:

1. Must be a minimum 1/4 degree American Indian, Eskimo or Aleut
2. Must be pursuing at least a four-year degree in an accredited college or university.
3. Must have financial need.

D. BIA Working Scholarships

These scholarships involve room and board in exchange for 14 hours of work per week. The program is available to Indian students at a few federal boarding schools located near area colleges and universities.

Contact:

BIA
1951 Constitution Avenue, N.W.
Washington, D.C. 20245

STATE-SPONSORED OPPORTUNITIES

Arizona

There are scholarships covering tuition and fees available to qualified Arizona Indian students. These students must demonstrate an ability in scholastics and leadership.

Contacts:

- Board of Regents, Phoenix
- Individual State Colleges

Arizona Public Service Division

This Service offers scholarships to students attending Navajo Community College.

Contact:

Navajo Community College
Traile, Arizona 87328

Colorado Commission on Higher Education

- Undergraduate Scholarships--up to $300 a year for Colorado residents
- Undergraduate Grants--based on financial need of a Colorado resident
- Graduate Assistance Program--provides help based on financial need and previous academic achievement

Contact:

Colorado Commission on Higher Education
719 State Services Building
Denver, Colorado 80203

Montana

Indian students who are one-fourth or more Indian, have a financial need, and are legal residents of Montana are permitted to attend any Montana college or university on a tuition-free basis.

Contacts:

- Any state college or university

- Supervisor of Indian Education, Department of Public Instruction, State of Montana, Helena, Montana 59601

Montana Department of Public Instruction.

- American Indian Fee Waivers--Indian students who have graduated from a school in Montana are eligible for fee waivers amounting to approximately $225 per year.

Contact:

Montana Department of Public Instruction
Helena, Montana 59601

North Dakota Indian Affairs Commission

- Indian Scholarship Program--provides 15 or more scholarships with a limit of $1,500, which may be used at any college or university in the state.

Contact:

North Dakota Indian Affairs Commission
State Capitol
Bismarck, North Dakota 58501

North Dakota State Board of Higher Education

- Financial Aid--the state assists residents wishing to attend four-year colleges through a grant program that averages about $260 per year.

Contact:

North Dakota State Board of Higher Education
State Capitol, 10th Floor
Bismarck, North Dakota 58501

South Dakota Department of Education and Cultural Affairs

- Indian Scholarship Program--provides awards of up to $500 to Indian residents to attend a college or university in the state.

Contact:

South Dakota Department of Education and Cultural Affairs
State Capitol Building
Pierre, South Dakota 57501

Washington State Council on Higher Education

- State Grant Program--students with significant financial need may obtain grants that pay up to one-third of the unmet need of the student.
- State Tuition and Fee Waivers--community colleges are authorized to waive general tuition and activity fees for needy students enrolled in college-level courses or in a program specifically for the purpose of completing a high school degree or obtaining the equivalent of a high school diploma.

Contact:

Washington State Council on Higher Education
908 Fifth Street
Olympia, Washington 98504

Wyoming County Scholarships

- Scholarship Program--awards of up to $150 are granted to students based on need or record.

Contact:

Wyoming County Scholarships
c/o Appropriate County Commissioner

SCHOLARSHIPS AND SERVICES FOR NATIVE AMERICANS

Advanced Study Fellowships for American Indians

- Graduate Fellowships--provide grants for Indian students who are enrolled in a graduate study program.

Contact:

Advanced Study Fellowship for American Indians
320 East 43rd Street
New York, New York 10017

Alcoa Foundation

- Minority Engineering Program--provides funds to help minority students in an engineering program.

Contact:

Alcoa Foundation
Alcoa Building
Pittsburgh, Pennsylvania 15219

American Baptist Convention

- Scholarship Program--awards are made to American Indian students to assist them in college.

Contact:

American Baptist Convention
777 United Nations Plaza
New York, New York 10017

American Friends Service Committee

- American Indian Program--with assistance from the Lilly Foundation, this Committee has established a Great Plains Assistance Program.

Contact:

American Friends Service Committee
112 South 16th Street
Philadelphia, Pennsylvania 19102

American Indian Scholarships

- American Indian Scholarships--scholarships designed to assist an American Indian working toward

master's and doctor's degrees at any institution.

Contact:

American Indian Scholarships
University of New Mexico
1901 Los Lamas, N. E.
Albuquerque, New Mexico 87131

- American Indian Scholarship Fund Association--helps students with information and advice regarding colleges; also provides some scholarships and loans.

Contact:

American Indian Scholarship Fund Association
3801 Beverly Boulevard
Suite 200
Los Angeles, California 90004

Association on American Indian Affairs

- Scholarship Program--provides small grants of $50 to $150 for American Indian students
- Charles Eastman Fellowship--awards of $3,000 to a first-year medical student.

Contact:

Association on American Indian Affairs
432 Park Avenue, South
New York, New York 10016

Daughters of the American Revolution

- American Indian Scholarships--provide $200 for college or nursing education plus funds to create financial awards at St. Mary's College in South Dakota and at Bacome College in Oklahoma.

Contact:

Daughters of the American Revolution
853 Center Street
Milford, Ohio 45150

Helen Gough Scholarship Foundation

- Scholarship Awards--given to members of the three tribes of the Fort Berthold Reservation at any accredited institution.

Contact:

Helen Gough Scholarship Foundation
c/o McLean County Superintendent of Schools
Butte, North Dakota 58723

International Order of the King's Daughters and Sons

- Financial Aid--assistance is given to American Indian college students.

Contact:

International Order of the King's Daughters and Sons
North American Indian Department
475 Riverside Drive, Room 243
New York, New York 10027

Kellogg American Indian Fellowships

- Fellowship Program--awards are made to Indians to use in a health-care profession.

Contact:

Kellogg American Indian Fellowships
c/o Office of Student Affairs
Navajo Health Authority
Box 642
Window Rock, Arizona 86515

Shell Companies Foundation

- Shell Incentive Funds--this program provides outstanding minority students payment of tuition and fees plus a stipend for living expenses to pursue courses in a business or technical field.

Contact:

Shell Companies Foundation
One Shell Plaza, Box 2463
Houston, Texas 77001

The William H. Donner Foundation, Inc.

The William H. Donner Foundation has made grants since 1967 to support American Indian programs and institutions. During the past several years their support has been divided among three areas:

- Strengthening elementary and secondary education on Indian reservations
- Developing Indian law through research and training for Indian legal professionals
- Improving health care services for Indians who have moved to cities from rural areas.

The Foundation is also beginning to provide support for the administration of Indian affairs, for programs to strengthen tribal governments, and for the strengthening of the role of Indian tribes in achieving self-determination.

Contact:

William H. Donner Foundation, Inc.
630 Fifth Avenue
New York, NY 10020

UNITED SCHOLARSHIP SERVICE

A. Clearinghouse Project

This project provides information on financial aid and educational opportunities to Indian students, parents, and community groups. Counseling and referral services on financial aid matters are also available. The Clearinghouse publishes quarterly newsletters to keep students, parents, and other interested people informed on educational or financial developments that would affect the Indian community.

B. American Indian Scholarship Program

Assist students at the graduate level exclusively.

C. A Better Chance

Dartmouth College in Hanover, New Hampshire, provides placement and counseling services for Indian high school students.

D. Summer Internship Programs and Activities

Washington, D.C., Summer Internship Program:

- With the Department of Labor
- For 30 native American high school seniors participating in Neighborhood Youth Corps programs on or near Indian reservations
- The purpose of the program is to provide an introduction to the process within which programs are developed and an understanding of the link between federal agencies and tribal communities
- Eight-week program

Contact:

United Scholarship Service
P.O. Box 18285
Capitol Hill Station
Denver, Colorado 80218

APPENDIX B

JOB DEFINITIONS FOR ADMINISTRATIVE EMPLOYEES COAL, GEOTHERMAL, OIL AND GAS, OIL SHALE, URANIUM, AND SOLAR SPACE HEATING AND COOLING

I. INTRODUCTION

This appendix provides a definition for each energy-related occupation listed in Exhibit II-2 or Exhibit II-4 (Section II). These definitions are not detailed job descriptions, but are brief statements explaining what each job entails. The definitions are broken up into seven areas:

- Administrative Employees
- Coal
- Geothermal
- Oil & Gas
- Oil Shale
- Uranium
- Solar Space Heating & Cooling

For ease of reference, Exhibit B-1 lists each occupation and the page in this appendix where the description of the occupation is provided.

EXHIBIT B-1
GLOSSARY

EXHIBIT B-1
GLOSSARY (Cont.)

EXHIBIT B-1
GLOSSARY (Cont.)

EXHIBIT B-1
GLOSSARY (Cont.)

EXHIBIT B-1
GLOSSARY (Cont.)

II. ADMINISTRATIVE EMPLOYEES
(All Energy Fields)

The following job descriptions are general and are geared for any industry. They cover the basic requirements for administrative employees in a company.

1. Accountant--applies principles of accounting to install and maintain operation of a general accounting system.

2. Bookkeepers--keeps records of financial transactions of establishments.

3. Business machine operators--operates the business machines in the office such as: adding machines, photocopying machines, calculators, etc.

4. Clerk, general office--performs a variety of the following or similar clerical duties, utilizing knowledge of systems or procedures: copies data and compiles records and reports. Tabulates and posts data in record books. Computes wages, taxes, premiums, commissions, and payments. Records orders for merchandise or service. Gives information to and interviews customers, claimants, employees, and sales personnel. Receives, counts, and pays out cash. Prepares, issues, and sends out receipts, bills, policies, invoices, statements, and checks. Prepares stock inventory. Adjusts complaints. Operates office machines, such as typewriter, adding, calculating, and duplicating machines. Opens and routes incoming mail, answers correspondence, and prepares outgoing mail. May take dictation. May prepare payroll. May keep books. May purchase supplies.

5. Computer analyst--analyzes problems, systems and specific specialities as desired.

6. Computer programmer--one who sets up a plan, routine, or set of instructions for solving a problem on a computer.

7. Keypunch operators--operates alphabetic and numeric keypunch machine to transcribe data from source material onto punchcards and produce prepunched data.

8. Lawyer--conducts criminal and civil lawsuits, draws up legal documents, and advises clients as to legal rights and practices.

9. Personnel specialists--supervises and coordinates activities of personnel within the organization.

10. Purchasing agent--purchases machinery, equipment, tools, raw materials, parts, services, and supplies necessary for operation of an organization.

11. Secretary--schedules appointments, gives information to callers, takes dictation, and otherwise relieves officials of clerical work and minor administrative and business detail.

12. Training specialist--organizes, administers, and conducts training and educational programs in commercial plant or establishment for purposes of management and promotional development, on-the-job training, and orientation of employees regarding company policy and routine.

13. Typist--types letters, reports, stencils, forms, addresses or other straight-copy material from rough draft or corrected copy.

III. COAL MINING

A. NONMANUAL

1. Technical

a. Engineers

1. Electrical--responsible for supervising the operation and maintenance of electrical and electronic equipment.

2. Environmental--responsible for calculating and monitoring air and water pollution generated by the project, determination of pollution control requirements and the development of pollution control methods.

3. Industrial--performs a variety of engineering functions in planning and overseeing the utilization of production facilities and personnel.

4. Mechanical--responsible for supervising the operation and maintenance of engines, machines, tools and other mechanically functioning equipment at a mine.

5. Mining--responsible for designing the layout of mines, supervising mine construction and devising methods for transporting the coal to processing plants or the point of use.

6. Safety--applies knowledge of industrial processes, mechanics, chemistry, psychology, and industrial health and safety laws to prevent or correct injurious environmental conditions and minimize effects of human traits that create hazards to life and property or reduce worker morale and efficiency.

b. Draftsmen--responsible for preparing working plans and detail drawings of mine structural features and machinery.

c.1 Mine Supervisors--supervise and coordinate activities of workers employed in a coal mine.

c.2 Managers--responsible for directing supervisory personnel to attain operational goals as established by the management of a coal company.

d. Other Technical

1. Bank Boss--supervises and coordinates activities of workers operating machinery, such as front-end loaders, bulldozers, and conveyors, used in loading bank coal into trucks and railroad cars.

2. Coal Inspector--responsible for maintaining coal quality standards by visually inspecting coal samples to estimate percentage of impurities and grading coal accordingly.

3. Computer programmer--responsible for developing production simulation models, scheduling employees and equipment, and scheduling maintenance operations for mine equipment and machinery.

4. Control man--coordinates loading and dumping of coal at tipple or preparation plant.

5. Engineering technician--(Mechanical Engineering Technician) assists professional engineers in testing and maintaining machinery and equipment.

6. General pit foreman--supervises and coordinates activities of workers engaged in strip or pit mining.

7. Labor relations specialist--works with labor/union management and is liaison with company management.

8. Maintenance foreman--supervises and coordinates activities of workers engaged in keeping the mine area in clean and orderly condition and in maintaining and repairing utility systems and physical structures; directs workers engaged in structural repairs and workers who maintain and repair building utility systems.

9. Maintenance superintendent--directs activities of maintenance workers; confers with management and other department heads to plan preventive maintenance programs; schedules inspections and major overhauls of equipment in coordination with other operating activities.

10. Mine Foreman--supervises and coordinates activities of mine personnel; supervises opening of new surface cuts or pits or construction and installation of equipment as designated by mine superintendent.

11. Mine Superintendent--Plans and coordinates activities of personnel engaged in mining coal; studies survey data and confers with engineering, maintenance, and supervisory personnel to plan and carry out development of mine.

12. Paramedic-nurse--provides medical services to mine personnel; handles accidents or emergencies.

13. Pit Foreman--supervises and coordinates activities of mine workers; studies maps and photographs to determine locations for mine cuts--supervises road construction crew, blast pattern drilling, and detonation of explosives.

14. Purchaser--purchases machinery equipment, tools, raw materials, parts, services, and supplies necessary for operation of a coal mine.

15. Safety inspector--inspects machinery, equipment, and working conditions in a mine to identify hazards to workers and to prevent accidents and fires.

16. Surveyor--surveys earth's surface and oversees engineering survey party engaged in determining exact location and measurements of points, elevations, lines, areas, and contours of earth's surface to secure data used for mine planning and construction.

17. Systems analyst--analyzes and develops solutions for business problems connected with a mining operation, focusing on operational systems such as production, cost analysis, etc.

18. Warehouseman--responsible for receiving, storing and distributing materials, tools and equipment for the coal mine.

B. MANUAL-CRAFTSMEN

1. Aerial-tram operator--tends aerial tramway (buckets attached to overhead cables and pulleys supported by towers) to convey refuse, coal, and other materials from plant or mine to spoil pile, conveyor, railroad car, or plant.

2. Augerman--Sets up and operates rotary auger drilling machine to mine coal from surface seams.

3. Bit-sharpener operator--tends bit-sharpening machine to shape and sharpen detachable bits of mining equipment.

4. Blaster--determines pattern of explosions required and sets off explosives in a surface mine, to break and loosen coal, or rock from solid formations.

5. Boom-conveyor man--controls boom conveyors to move to and from railroad cars and storage piles.

6. Breaker repairman--lubricates, adjusts, repairs, and inspects machinery used to clean, crush, size, and otherwise prepare coal for commercial or industrial use, or for further processing.

7. Bulldozer operator--responsible for operation of earthmoving equipment.

8. Car cleaner--removes coal, dust or other refuse from railroad cars prior to loading coal.

9. Check viewer--inspects underground or open-pit mines to detect unsafe working conditions and violations of state and local mining regulations or contractual agreements.

10. Churn-drill operator--sets up and operates churn (cable) drilling rig to drill holes in rock or ground to secure samples for use in determining location and extent of mineral deposits.

11. Coal haulage truck driver--drives truck with capacity of more than 3 tons to transport coal to and from specified destinations.

12. Coal washer--operates equipment to size and wash coal prior to shipment or further processing.

13. Company laborer--works in underground or surface mine, or at tipple, or preparation plant, performing any combination of the following tasks: cleans working areas and haulage tracks; digs and maintains drainage ditches; or shovels muck or coal, into cars or onto conveyors; strips (clean) residue of rock and dirt from exposed coal or rock formations. Loads, separates, or sorts materials at working face, using shovel or wheelbarrow. Spreads calcium or salt around interiors of railroad cars to prevent coal or ore from freezing to cars during winter.

14. Core splitter--splits sample cores of mineral-bearing rock strata, removed from diamond core drill, for laboratory analysis.

15. Dragline oiler--oils and greases moving parts of the dragline.

16. Dragline operator--operates power-driven crane that is equipped with dragline bucket; used to excavate or move overburden and coal.

17. Driller helper--assists the driller to bore blast holes in overburden at strip or pit mine.

18. Drill operator (driller)--drills blast holes in overburden that are used to set off explosives at the mine.

19. Dump operator--tends mechanical or electrical dumping equipment to dump coal from railroad cars, or trucks onto conveyor for storage, reloading, or further processing.

20. Electrician--plans layout and installs and repairs wiring, electrical fixtures, apparatus and control equipment.

21. Fork-lift operator--operates a forklift machine that is used to lift and move heavy equipment at the mine site.

22. Front-end loader operator--operates a tractor with a mounted bucket for earth moving.

23. General truck driver--drives trucks to transport materials equipment or men.

24. Heavy-media operator--tends a gravity device to separate coal from refuse.

25. Jig runner--tends a battery of equipment used to separate slate from coal and clean coal.

26. Loading-shovel, oiler--lubricates loading shovel at strip mine. Shovels dirt and coal to keep bench (top of exposed coal seam) clear, and keeps power cable clear of treads as shovel moves into position. Guides trucks into loading position.

27. Mechanic--repairs, adjusts and maintains mining machinery, such as stripping and loading shovels, drilling and cutting machines and continuous mining machines.

28. Mobile crane operator (truck crane operator)--operates gasoline or diesel-powered crane mounted on specially constructed truck chassis to lift and move materials and objects.

29. Motor grader operator--operates self-propelled grader to spread and level dirt, gravel, and stone to grade specifications in construction and maintenance of mines.

30. Panelboard operator--operates panelboard to control conveying, blending, washing, crushing, and sizing of coal to prepare it for commercial or industrial use or further processing.

31. Pitman--a man who examines regularly the condition of the shaft, guides, etc.

32. Power-shovel operator--operates power-driven machine equipped with movable shovel, to excavate and move coal, dirt, rock, sand, and other materials.

33. Pulleyman--oils, greases, and replaces idler rollers or pulleys that support cable used in mine haulage slope. Oils and greases cable.

34. Rail car cleaner (car cleaner)--removes coal, dust or other refuse from railroad or mine cars prior to loading.

35. Rail car loader (chute loader)--pulls levers to open and close chute of storage bin to load trucks railroad cars, and conveyors with coal, or rock.

36. Rail car sampler--removes samples of coal from railroad cars to facilitate grading and blending, or for laboratory analysis.

37. Road grader operator--self-propelled grade to spread and level dirt, gravel, and stone to grade specifications.

38. Scraper operator--(wheel tractor scraper operator)--operates tractor-drawn or self-propelled scraper to move, haul or grade earth at the mine site.

39. Sewage treatment plant operator--purifies waste water from plant before it enters rivers, streams or town mains.

40. Shovel oiler (stripping shovel oiler)--lubricates specially constructed stripping shovel used to remove overburden at the strip mine or open pit.

41. Sprinkler--sprays or sprinkles water on dry coal or dust in mine to cause dust to settle to reduce hazard of explosions, using hand sprinkler, sprayer, or water hose.

42. Stripping-shovel operator--operates specially constructed stripping shovel to remove overburden at strip mine or open pit prior to actual mining operations.

43. Supply truck driver--drives truck with capacity of less than 3 tons to transport materials in liquid or packaged forms and personnel to and from specified destinations.

44. Tipple operator--(dump operator) tends mechanical or electrical dumping equipment to dump materials, such as raw coal from mine cars, into bins or onto a conveyor for storage, reloading, or further processing.

45. Track-moving-machine operator--operates vehicle that automatically moves and lays track in open-pit mine.

46. Tractor/seeder operator--drives gasoline or diesel powered tractor to move materials, draw complements, pull out objects embedded in ground or pull cable of winch to raise, lower, or load heavy material or equipment.

47. Truck driver--(explosive truck)--drives specially modified panel truck to transport explosive material. Loads and unloads containers according to prescribed safety methods and observes safety regulations in transit.

48. Utilityman--tends the machines for repairs and adjustments.

49. Water truck driver--drives tank truck to transport water to the mine for various uses in coal mining.

50. Welder--welds metal parts together as specified using electric arcwelding equipment.

IV. GEOTHERMAL POWER COMPLEX

A. NONMANUAL

1. Technical

a. Engineers

1. Electrical--designs, develops, and supervises the operation and maintenance of electrical and electronic equipment.

2. Mechanical--performs a variety of engineering work in planning and design of tools, engines, machines, and other mechanically functioning equipment.

b.1 Draftsman--prepares clear, complete, and accurate working plans and detail drawings from rough or detailed sketches or notes for engineering or manufacturing purposes, according to specified dimensions.

c.1 Supervisor--supervises and coordinates activities of workers engaged in one or more occupations within the complex.

2. Manager--employee who directs supervisory personnel to attain operational goals of an organization or department as established by the management.

B. MANUAL

1. Boilermaker--assembles, analyzes defects in, and repairs boilers, pressure vessels, tanks and vats in the field following blueprints and using handtools and power tools.

2. Carpenter--constructs and repairs structural woodwork and equipment in geothermal power complex, working from blueprints, drawings, or oral instructions.

3. Electrician--plans layout and installs and repairs wiring, electrical fixtures, apparatus and control equipment. Plans new or modified installations to minimize waste of materials and to provide access for future maintenance.

4. Ironworker--assembles structural and reinforcement steel that is used in rigs, buildings, and support structures.

5. Mechanic--repairs, adjusts and maintains machinery such as shovels, drilling and cutting machines.

6. Operator--operates several types of engines and power construction equipment.

7. Pipefitter--lays out, fabricates, assembles, installs, and maintains piping and piping systems, fixtures, and equipment for steam, hot water, heating, cooling, lubricating and production systems on the basis of knowledge of system operation and study of building plans or working drawings.

8. Welder--welds metal parts together, as specified by layout, diagram, work order, or oral instructions, using electric arc welding equipment.

V. OIL AND GAS

A. NONMANUAL

1. Technical/Refining

a. Engineers

1. Chemical - designs plant equipment, devises processes for manufacturing chemicals and products, and designs and operates pilot plants to test their work.

2. Mechanical - performs a variety of engineering work in planning and design of tools, engines, machines, and other mechanically functioning equipment.

3. Petroleum - recovers the greatest amount of oil over a long time by developing the most efficient drilling methods.

4. Waste Treatment - supervises efficient operation of waste treatment systems.

b. Draftsmen - drafts plans and drawings for layout, construction, and operation of oil fields, refineries, and pipeline systems from field notes, rough or detailed sketches, and specifications; develops detail drawings for construction of equipment and structures, such as drilling derricks, compressor stations, gasoline plants, frame, steel, and masonry buildings, piping manifolds and pipeline systems, and for manufacture, fabrication, and assembly of machines and machine parts.

c. Supervisor - supervises and coordinates activities of workers engaged in petroleum refining.

1. Process-Control Clerical Supervisor - supervises and coordinates activities of personnel concerned with obtaining control data on petroleum refining processes.

2. Manager, Bulk Plant - manages plant in which gasoline, lubricants, and petroleum fuels are stored and distributed in bulk lots, formulating policies in regard to storage, distribution, and other operating problems.

3. Manager, Contracts - engages in negotiations involving representatives of oil producers, refiners, and pipeline carriers to draw up contracts for purchase, sale, or delivery of crude oil, petroleum distillates, natural gas and gasoline.

4. Manager, Industrial Organizations - coordinates activities of departments, such as production, distribution, engineering, maintenance, personnel, and selling. Plans and directs marketing of product to develop new markets and to maintain sales volume and competitive position in industry. Plans and develops personnel program to maintain efficient staffing of organization.

2. Other Technical/Refining

a. Cargo Inspector. Inspects crude and refined petroleum before and after transfer from terminal tanks to ship tanks, to determine whether it meets prescribed standards.

b. Car Inspector. Inspects and repairs refinery tank cars.

c. Chemist. Controls the quality of petroleum products by making tests and analyses to determine chemical and physical properties.

d. Chemist's Helper. Performs chemical tests under direction of chemist on materials, such as petroleum or coal tar, to provide data to processing-unit operators for controlling the distillation and treatment of material according to standards.

e. Construction and Maintenance Inspector. Inspects petroleum-dispensing equipment and machinery at wholesale distributing plants of refinery for defects.

f. Fireman. Controls operation of burners to maintain temperature in furnaces of petroleum processing units according to specifications.

g. Fire Marshal. Supervises and coordinates activities of firefighting personnel of industrial establishment and inspects equipment and premises to ensure adherence to fire regulations.

h. Foreman, Dehydrogenation. Supervises and coordinates activities of workers engaged in operation of preheat furnaces, catalytic-reactors, quench and stripper towers, absorbers, stabilizer, re-run continuous stills, and auxiliary equipment, such as inert-gas generating system, condensers, heat exchangers, pumps, compressors, and blowers to produce petro-chemicals such as butadiene, styrene, butylene, and ethylbenzene.

i. Foreman, Dock. Supervises and coordinates activities of workers involved in loading and unloading crude oil and liquid and packaged petroleum products, such as gasoline, kerosene, fuel oil, motor oil, and grease into and from barges, ships, or tankers at marine terminals.

j. Foreman, Maintenance. Supervises and coordinates activities of workers engaged in construction, maintenance, and cleaning activities at the refinery.

k. Foreman, Purification. Supervises and coordinates activities of workers engaged in operating superfractionation towers, absorbers, stabilizers, rerun towers, naptha-desulphurizing units, caustic wash units, separators, catalytic reactors, furnaces, stripper towers, and auxiliary equipment, such as pumps, engines, and compressors to separate light naptha blends from crude naptha, compound hydroformates from light naptha, and extract products, such as benzene, toluere, and xylene from hydroformates.

l. Foreman, Salvage. Supervises and coordinates activities of workers engaged in salvaging valves, flanges, pipe fittings, tubes, and traps, and in sorting, storing, and issuing reclaimed articles.

m. Foreman, Specialty Plant. Supervises and coordinates activities of workers engaged in blending, compounding, packing, loading, and shipping special petroleum products, such as asphalt paints, paint primer, mastics, and lighter fluid. Confers with department heads to coordinate work of department with sales, billing, and other refinery activities.

n. Foreman, Tower. Supervises and coordinates activities of workers engaged in operation of stills and related units, such as absorbers, debutanizers, catalyst hoppers, reboilers, heat and vapor exchangers, desalters, clay towers, stabilizers, furnaces, strippers, and desulfurizers, in which crude oil and resultant distillates are processed to separate and recover various petroleum products.

o. Foreman, Treating and Pumping. Supervises and coordinates activities of workers engaged in treating petroleum products with chemicals, steam, water, or air to remove sulfur and other impurities, in blending products to specification, and in pumping products to storage tanks, loading racks, and other processing units.

p. Inventory Clerk. Compiles records of amount, kind, and value of merchandise, material, or stock on hand in establishment or in division of establishment.

q. Laboratory Technician. Helps chemists in research and quality control and does routine testing and sample taking.

r. Loading-Rack Foreman. Supervises and coordinates activities of workers engaged in loading and unloading petroleum products, such as oils, gasoline, and kerosene, into and from tank cars and trucks.

s. Mechanical Inspector. Inspects processing and storage tanks, pipelines and fittings, stills, towers, and pumping units for defects following specified inspection procedures.

t. Meter-and-Regulator-Shop Foreman. Supervises and coordinates activities of workers engaged in repairing, adjusting, and testing meters, regulators, gages, and recording instruments for measuring and regulating the flow of gas, water, and petroleum.

u. Production Superintendent. Coordinates, through subordinate supervisors, all activities of production departments or subdivisions, applying knowledge of plant layout, and production capacities of each department.

v. Title Clerk. Procures testimonial documents required to remove restrictions affecting title of landowners to property and requisition purchase orders and bank checks to satisfy requirements of contracts and agreements covering lease or purchase of land and gas, oil, and mineral rights.

3. Other Technical/Transportation and Pipeline

a. Dispatcher, Chief I. Chief dispatcher. Plans, schedules, and prepares operating procedures to direct movement of gas, crude oil, or petroleum products through pipelines from point of origin to distribution points or destinations.

b. Dispatcher, Chief II. Coordinates activities of gas dispatcher to deliver natural gas from oil fields through pipelines to delivery points.

c. Dispatcher, Oil. Directs and coordinates field activities of workers who route and control flow of oil and petroleum products through pipelines from point of origin, such as wells and storage tanks, to delivery points, such as terminals, carriers, refineries, and tank farms, according to delivery schedules.

d. Tank-Truck Driver. Drives tank truck to deliver gasoline, fuel oil, lubricating oil, or liquefied petroleum gas to customers.

4. Other Technical/Natural Gas Processing

a. Foreman, Natural Gas Plant. Supervises and coordinates activities of oilfield workers operating equipment, such as compressors, boilers, pumps, and dehydration vessels to remove sediment and water from crude oil, extract natural gas, and separate natural gasoline from gas by means of heat, pressure, and chemical action.

5. Other Technical/Exploration

a. Geophysicist. Studies physical aspects of earth, including its atmosphere and hydrosphere. Investigates and measures seismic, gravitational, electrical, thermal, and magnetic forces affecting earth, utilizing principles of physics, mathematics and chemistry. Analyzes data obtained to compute shape of earth, estimate composition and structure of earth's interior, determine flow pattern of ocean tides and currents, study physical properties of atmosphere, and help to locate petroleum and mineral deposits. Other geology specialists include:

1. Paleontologist - studies fossil remains in the earth to locate oil-bearing layers of rock.

2. Mineralogist - studies physical and chemical properties of mineral and rock samples.

3. Stratigrapher - determines the rock layers most likely to contain oil and natural gas.

4. Photogeologist - examines and interprets aerial photographs of land surfaces.

5. Petrologist - investigates the history of the formation of the earth's crust.

b. Lease Buyer. Before a company begins exploration, a lease buyer must make the necessary arrangements with landowners or owners of mineral rights.

c. Petroleum Geologist. Tries to locate oil traps by examining types of rock formations on and under the earth's surface. A petroleum geologist makes detailed ground surveys, aerial explorations and magnetic surveys for a broad picture of the area. From these tests petroleum geologists draw cross-section maps of the underground formations to show where oil or gas may be found.

d. Prospecting Computer. Performs calculations and prepares maps from information recorded by the seismograph.

B. MANUAL

1. Craftsmen

a. Critical Skills - Exploration

1. Observers - operate and maintain electronic seismic equipment

2. Planimeter Operator - traces boundary lines of land plots on aerial photographs to determine acreage, using planimeter.

3. Chart Clerk - computes flow of oil or gas by means of charts taken from flowmeters and other recording instruments, using planimeter.

4. Shooters - places and detonates explosives in bored oil wells to start or renew flow of oil in wells.

5. Shothole Drillers - (prospecting driller) operates portable rotary drilling rig to drill shallow boreholes to obtain samples of earth formations, for placement of explosives in seismic prospecting or for other prospecting tests to discover petroleum.

Drilling

1. Derrick Operator (hoisting engineer) - operates compressed air, diesel, electric, gasoline, or steam drum hoists to control movement of cableways, cages, derricks, draglines, loaders, rail cars, or skips to move men and materials for construction logging, mining and other industrial operations; works on a small platform high on the rig to help run pipe in and out of the well hole and operates the pumps that circulate mud through the pipe.

2. Engine Operator - is in charge of engines that provide the power for drilling and hoisting.

3. Rig Builder - erects and repairs steel rigs (derricks) to support tools, cable, and machinery used in drilling gas and oil wells, using handtools.

4. Rig Builder's Helper - assists the rig builder in erecting steel rigs or derricks to support oil-well drilling tools, equipment and machinery.

5. Rotary Driller - supervises the crew, operates gasoline, diesel, electric, or steam draw works that control drilling speed and pressure of oil or gas wells; records operations.

6. Roustabout - assembles and repairs oilfield equipment, using handtools and power tools; does general oilfield maintenance and construction work.

7. Rotary Driller's Helper - assists rotary driller in operating machinery to drill oil or gas wells, using handtools and power tongs and wrenches; guides the lower end of the pipe to and from the well opening and connects and disconnects pipe joints and drill bits.

8. Tool Pusher - supervises and coordinates the activities of workers engaged in drilling oil and gas wells in areas consisting of one or more wellsites; supplies materials and equipment to rig crews.

Refining

1. Blender - controls equipment to blend straight-run or natural gasoline with chemicals, tetra-ethyl leads, and light distillates of crude oil to produce commercial fuel, according to formula.

   - Asphalt Blender - blends asphalt with products, such as naptha, kerosene, distillates, and additive agents, according to specifications, to improve its quality, viscosity, and performance.

   - Compounder - controls equipment to blend industrial, automotive, and special lubricating oils with other oils and with chemical additives, such as antioxidants, corrosion inhibitors, detergents, dispersants, pour point depressants, foam inhibitors, and viscosity index improvers, to improve quality of oil according to specifications.

2. Blender's Helper - assists blender in blending, loading, and weighing powdered plastic materials.

3. Boilermaker - assembles, analyzes defects in, and repairs boilers, pressure vessels, tanks and vats in the field, following blueprints and using handtools and power tools.

4. Chemical Operator II - reactor operator tends equipment units or semiautomatic system that processes chemical substances into industrial or consumer products, such as detergents, emulsifiers, salts, bleaching agents, acids, and synthetic resins.

   - Alkylation Towerman - tends semiautomatic acid contractors (reactors), debutanizers, deisobutanizers, depropanizers, and fractionation towers to facilitate production of alkylates (saturated isoparaffins) used in high-octane gasolines.

5. Chemical Operator III, reactor operator - controls equipment units or system that processes chemical substances into specified-industrial or consumer products, according to knowledge of operating procedures and chemical reactions, laboratory test results, and correlation of process instrumentation.

   - Alkylation Operator - controls semiautomatic alkylation unit consisting of acid contactors (reactors), debutanizers, deisobutanizers, depropanizers, and fractionation towers with such auxiliary equipment as chillers, reboilers, coolers, condensers, heat exchangers, caustic and water wash systems, pumps, and compressors, to form alkylates (saturated isoparaffins) used in high-octane gasolines.

6. Clay Roaster - tends clay roasting kilns and auxilary equipment in which clay, used as filter in treating oil, is cleaned and treated for reuse.

   - Wedge-Furnace Kilnman - tends type of kiln known as wedge furnace, in which clay, used to treat lubricating oil to remove impurities and improve its color, is roasted for reuse.

7. Control Man - operates control panel to regulate temperature, pressure, rate of flow, and tank level in petroleum refining, processing, and treating units and petro-chemical units, according to process schedules.

8. Electrical Repairman - repairs, maintains, and installs electrical systems and equipment, such as motors, transformers, wiring switches, and alarm systems.

9. Grease Maker - controls gas or steamheated kettles to produce various grades of lubricating grease.

10. Grease Maker Head - supervises and coordinates activities of grease makers engaged in producing various grades of lubricating grease, performing duties as described under foreman.

11. Helper - maintains and operates pumps that control all production throughout the refinery.

12. Industrial-Truck Operator - drives gasoline- or electric-powered industrial truck or tractor, equipped with forklift, elevating platform, or trailer hitch, to push, pull, lift, stack, or tier merchandise, equipment, or bulk materials in warehouse, storage yard, or factory.

13. Lead-Recovery Man, Continuous-Naptha-Treating Plant - operates centrifuge (machine in which solid substance is separated from solution by action of centrifugal force) to recover lead compound used in treating gasoline.

14. Molder, Wax - tends equipment that molds wax, recovered from processed petroleum, into cakes.

15. Painter, Spray - performs duties where coating of surface or product is required without need for finished appearance. Workers may spray manufactured articles on assembly line or may travel to work site to spray materials, such as waterproofing, adhesive, or paint onto surfaces of articles.

16. Paraffin-Plant Operator - operates filter presses to separate oil of paraffin distillate from paraffin wax.

17. Paraffin-Plant-Sweater Man - operates sweater unit to separate liquid from slack wax (wax obtained from processed paraffin distillate).

18. Pilot-Plant Operator - sets up experimental miniature petroleum-refining units to conduct tests for developing and improving methods, products, and equipment.

19. Pumpman, process pumper - operates steam- or electric-driven pumps to circulate crude, semiprocessed, and finished petroleum products, water, and chemical solutions through processing, storage, and shipping departments of refinery, according to work orders.

    - Cooling-Tower Operator - operates water-cooling system to condense oil vapors or to cool oil during processing.

20. Pumpman's Helper - assists pumpman I and pumpman II in pumping crude semi-processed, and finished petroleum products, water, and chemical solutions through processing, storage, and shipping departments of refinery.

21. Refinery Operator - a chief operator who is responsible for one or more processing units - makes adjustments for changes in temperature, pressure, and oil flow.

22. Salvageman - repairs defective valves and pipefittings removed from refinery pipelines, following specifications and using handtools and power tools.

23. Salvage-Man Helper - assists salvage man in repairing defective valves and pipefittings removed from refinery pipelines.

24. Sampler - draws samples of petroleum products from various parts of refinery for laboratory analysts, using sample container.

25. Sheetmetal Worker - fabricates, assembles, installs, and repairs sheet metal products and equipment according to job order or blueprints.

26. Stillman - analyzes specifications and controls continuous operation of petroleum refining and processing units to produce products, such as gasoline, kerosene, and fuel and lubricating oils, by such methods as distillation, absorption, extraction, absorption, thermal and catalytic cracking and reforming, polymerization, isomerization, coking, visbreaking, and alkylation.

27. Stillman's Helper - assists stillman in distillation and processing of crude and refined oil: patrols area and inspects equipment, such as furnaces, distilling units, lines, and pumps to detect malfunctioning and leakage. Reads flow-meters operating condition of units to stillman.

28. Still Pump Operator (pumpman I) - operates steam or electric driven pumps to circulate crude, semiprocessed, and finished petroleum products, water, and chemical solutions through processing, storage, and shipping departments of refinery, according to work orders.

29. Tank Cleaner - cleans interiors of boilers, storage tanks, kilns, and tank cars to remove emulsion and incrustations, using shovels, squeegees, brooms, scrapers, hoses, water, and solvents.

30. Test-Engine Operator - subjects petroleum fuels and lubricants to simulated operating conditions in full-scale test engines to obtain evaluating data.

31. Tester - tests and analyzes samples of crude oil and petroleum products during processing stages, using laboratory apparatus and testing equipment, and following standard test procedures to determine physical and chemical properties and insure products meet quality control standards.

    - Fuel-Research Engine Operator - determines, by actual motor performance, the knock intensity of gasoline and kerosene fuels, and the amount of lead tetraethyl necessary to raise fuels to required rating.

32. Treater - operates chemical, electrical, and centrifugal oil-treatment units to remove sediment and water from crude oil before transporting it by pipeline to refineries.

33. Treater's Helper - assists treater in processing petroleum products, such as gasoline, kerosene, oils, and wax, with chemicals, steam, water, or air to remove impurities, such as sulfur.

34. Tube Cleaner - cleans scale from inside of tubes that are used in boilers, kilns, and stills to circulate hot air or water.

35. Wellpuller - controls power hoisting equipment to pull casing, tubing, and pumping rods from oil and gas wells for repair and to lower repaired equipment, testing devices, and servicing tools into the well.

36. Wharfinger, Head - directs departmental activities concerned with receipt and delivery of crude oil and petroleum products to and from tankers, barges, or ships, with storage of products in warehouses and tanks, and with maintenance of terminal facilities.

Natural Gas Processing

1. Catalyst Operator, Gasoline - controls machines that combine ingredients, such as sodium silicate, sulfuric acid, water and caustic soda, to make catalysts used in manufacture of high octane gasolines.

2. Catalyst Operator's Helper, Gasoline - assists catalyst operator, gasoline in mixing and drying ingredients used to produce or recondition catalysts.

3. Dehydration-Plant Operator - tends an automatically controlled treating unit that removes water and other impurities from natural gas.

4. Field-Mechanical-Meter Tester - installs, tests and maintains mechanical metering, regulating, indicating, and testing instruments and equipment used in production and distribution of fuel gas.

5. Gas-Compressor Operator - operates steam or internal combustion engines to transmit, compress, or recover gases, such as butane, nitrogen, hydrogen, and natural gas, in various production processes.

6. Gasoline-Plant Operator - tends compressors that raise the pressure of the gas for transmission in the pipelines.

Well Operation and Maintenance

1. Electrician - plans layout and installs and repairs wiring, electrical fixtures, apparatus and control equipment - plans new or modified installations to minimize waste of materials and to provide access for future maintenance.

2. Gager, Chief - supervises and coordinates activities of gagers controlling flow of oil into pipe lines and gaging amount of oil stored in tanks or railroad cars.

3. Gager - gages amount of and tests oil in storage tanks, and regulates flow of oil into pipelines at wells, tank farms, refineries and marine and rail terminals, following prescribed standards and regulations.

4. Gas-Governor Repairman - tests, repairs, and adjusts regulators (gas governors), relief valves, and related equipment used to control gas pressure in city gas mains and service pipes, pipelines, in-plant gas systems, and petroleum refineries.

5. Gas-Governor Repairman's Helper - assists gas-governor repairman in repair and installation of regulators.

6. Gauger - measures and records the flow and takes samples of the flow to check the quality.

7. Instrument Repairer - installs, repairs, maintains, and adjusts indicating recording telemetering, and controlling instruments used to measure and control variables, such as pressure, flow, temperature motion, force, and chemical composition, using handtools and precision instruments.

8. Laborer - performs any combination of the following tasks in a refinery; digs ditches, builds dikes and levees, and fills holes with earth, rock, sand and asphalt gravel, using pick and shovel. Smooths ground surfaces and roadways and cleans refinery equipment.

9. Line Walker - patrols oil and gas pipelines and communication systems on foot, horseback, or in automobile to locate and repair leaks, breaks, washouts, and damaged utility wires and poles.

10. Machinist - sets up and operates machine tools, fits and assembles parts to make or repair metal parts, mechanisms, tools, or machines, supplying knowledge of mechanics, shop mathematics, metal properties, and layout machining procedure; studies specifications, such as blueprint, sketch or description of part to be replaced; and plans sequence of operations.

11. Pipefitter - lays out, fabricates, assembles, installs, and maintains piping and piping systems, fixtures, and equipment for steam, hot water, heating, costing, lubricating and production systems on the basis of knowledge of system operation and study of building plans or working drawings.

12. Pumper (oil pumper) - operates steam, gas, gasoline, electric, or diesel pumps and auxiliary equipment to restore and control flow of oil from wells; regulates the flow of oil according to a schedule set up by the petroleum engineer and production supervisor.

13. Switcher - works in fields where oil flows under natural pressure and does not require pumping.

14. Welder - welds metal parts together, as specified by layout, diagram, work order, or oral instructions, using electric arc welding equipment.

Other Oilfield Services

1. Acidizer - controls blending and pumping equipment to treat oil or gas wells with acid to increase their production.

2. Cementer - controls cement mixing and pumping equipment to caulk openings in walls or casings of gas or oil wells and in permeable rock formations; computes amount of cement and drilling fluid that would be used in a well.

3. Performance Operator - uses subsurface "guns" to pierce holes in drill pipes or casing to make openings for oil to flow through.

VI. OIL SHALE

Oil Shale Mining

A. NONMANUAL

1. Technical

a. Engineers

1. Electrical--designs, develops, and supervises the manufacture of electrical and electronic equipment.

2. Environmental--calculates air and water pollution generation, determines pollution control requirements, designs pollution control methods (including treatment equipment and technological methods).

3. Geological--uses geological principles to analyze and design engineering principles in such fields as minerals exploration, minerals economics, mining and ground control and stabilization. He will normally be searching for economic mineral deposits or be involved in the construction engineering field.

4. Mechanical--performs a variety of engineering work in planning and design of tools, engines, machines, and other mechanically functioning equipment.

5. Mining--finds, extracts, and prepares minerals for manufacturing industries to use. He designs the layouts of mines, supervises the construction of mine shafts and tunnels in underground operations, and devises methods for transporting minerals to processing plants.

6. Reclamation--incorporates geological and mining knowledge to evaluate mine reclamation feasibility and designs reclamation techniques and materials.

7. Safety--applies knowledge of industrial processes, mechanics, chemistry, psychology, and industrial health and safety laws to prevent or correct injurious environmental conditions and minimize effects of human traits that create hazards to life and property or reduce worker morale and efficiency.

b.1 Draftsman--prepares clear, complete, and accurate working plans and detail drawings from rough or detailed sketches or notes for engineering or manufacturing purposes, according to specified dimensions.

c.1 Supervisor - supervises and coordinates activities of workers engaged in one or more occupations.

c.2 Manager - directs supervisory personnel to attain operational goals of an organization or department as established by management.

d. Other Technical

1. Doctor--examines patients utilizing all types of medical equipment, instruments, and tests, following standard medical procedures.

2. Engineering Aide--works in direct support of engineers or scientists, utilizing theoretical knowledge of fundamental scientific, engineering, mathematical, or draft design principles.

3. Nurse-paramedic--nurse who rushes to meet emergency needs.

4. Surveyor--surveys earth's surface and oversees engineering survey party engaged in determining exact location and measurements of points, elevations, lines, areas, and contours of earth's surface to secure data used for construction, mapmaking, land valuation, mining and other purposes.

B. MANUAL

1. Boilermaker--assembles, analyzes defects in, and repairs boilers, pressure vessels, tanks and vats in the field following blueprints and using handtools and power tools.

2. Carpenter--constructs and repairs structural woodwork and equipment in an establishment, working from blueprints, drawings, or oral instructions.

3. Electrician--plans layout and installs and repairs wiring, electrical fixtures apparatus and control equipment; plans new or modified installations to minimize waste of materials and to provide access for future maintenance.

4. Machinist--sets up and operates machine tools, and fits and assembles parts to make or repair metal parts, mechanisms, tools, or machines, applying knowledge of mechanics, shop mathematics metal properties, and layout machining procedure. Studies specifications such as blueprint, sketch or description of part to be replaced, and plans sequence of operations.

5. Mechanic--repairs, adjusts and maintains machinery, such as shovels, drilling and cutting machines.

6. Operator--operates several types of engines and power construction equipment.

7. Truck driver--drives trucks to transport materials, merchandise, equipment or men.

8. Underground miner-- works in one of these areas:

   a. Beltman--repairs and replaces canvas, leather, or rubber belts used to drive machinery and convey materials.

   b. Bottomman--works at foot of haulage slope or plane leading to surface of mine.

   c. Bratticeman--builds doorways and brattices (ventilation walls or partitions in underground passageways of canvas or wood), or erects partitions of concrete block, brick, or concrete, as specified to control circulation of air through passageways and working areas, or to support roofs in areas unsuited to timbering or bolting.

   d. Continuous miner operator--operates a mining machine designed to remove coal from the mine opening and to load that coal into cars or conveyors without the use of cutting machines, drills or explosives.

   e. Dozer operator--operates a tractor that is equipped with a concave blade that gouges out, levels, and distributes earth and pushes trees and rocks away from the land used for construction and agriculture; able to run a bulldozer.

f. Electrician--plans layout and installs and repairs wiring, electrical fixtures apparatus and control equipment; plans new or modified installations to minimize waste of materials and to provide access for future maintenance.

g. Fork-lift operator--drives gasoline or electric-powered industrial truck or tractor, equipped with forklift, elevating platform, to push, pull, lift, stack or tier merchandise, equipment, or bulk materials in or around a mine.

h. Front-end loader operator--one who operates a tractor loader with a digging bucket mounted and operated at the front end of the tractor.

i. Hoist operator--operates compressed air, diesel, electric gasoline, or steam drum hoists to control movement of cableways, cages, derricks, draglines, loaders, rail cars or skips to move men and materials for construction.

j. Mason--a worker who works with artificial stone brick, concrete, stone, and the like.

k. Mechanic--repairs, adjusts, and maintains machinery, such as shovels, drilling and cutting machines.

l. Mobile crane operator--operates gasoline or diesel powered crane mounted on specially constructed truck chassis to lift and move materials and objects.

m. Motor grader operator--operates self-propelled grader to spread and level dirt, gravel, and stone to grade specifications in construction and maintenance of mines.

n. Motorman (Slate Motorman)--controls dinkey engine powered by electric, gasoline, steam, compressed air, or diesel engine to transport and shunt cars at the mine.

o. Preparation Plant Operator--supervises and coordinates activities of workers engaged in crushing, sizing, cleaning, treating or loading coal at tipple or preparation plant.

p. Pumper--maintains the pump in a mine.

q. Rail car cleaner--removes coal, dust, or other refuse from railroad or mine cars preparatory to loading.

r. Rail car loader--pulls levers to open and close chute of storage bin to load trucks, railroad cars, and conveyors with ore, coal, or rock.

s. Rail car sampler--removes samples of coal or ore from railroad cars to facilitate grading and blending, or for laboratory analysis.

t. Roofbolter operator--operates self-propelled machine to install roofsupport bolts in an underground mine.

u. Sewage treatment plant operator--purifies waste water from plant before it enters rivers, streams, or city mains.

v. Shuttle car operator--operates diesel or electrically powered shuttle car in underground mine to transport materials from working face to mine cars or to conveyor.

w. Trackman--lays and repairs track for standard and narrow - gage railroad equipment used in quarries and mines.

x. Water treatment plant operator--tends water plant equipment that scrubs and purifies gases from smelting furnaces.

VI. OIL SHALE (Cont.)

In-Situ Recovery

A. NONMANUAL

1. Technical

a. Engineers

1. Chemical--designs chemical-plant equipment and devises processes for manufacturing chemicals and products; designs and operates pilot plants to test their work.

2. Electrical--designs, develops, and supervises the operation and maintenance of electrical and electronic equipment.

3. Geological--uses geological principles to analyze and design engineering principles in such fields as minerals exploration, minerals economics, mining and ground control and stabilization. He will normally be searching for economic mineral deposits or be involved in the construction engineering field.

4. Mechanical--performs a variety of engineering work in planning and design of tools, engines, machines, and other mechanically functioning equipment.

5. Mining--finds, extracts, and prepares minerals for manufacturing industries to use. He designs the layouts of mines, supervises the construction of mine shafts and tunnels in underground operations, and devises methods for transporting minerals to processing plants.

6. Safety--applies knowledge of industrial processes, mechanics, chemistry, psychology, and industrial health and safety laws to prevent or correct injurious environmental conditions and minimize effects of human traits that create hazards to life and property or reduce worker morale and efficiency.

b.1 Draftsman--prepares clear, complete, and accurate working plans and detail drawings from rough or detailed sketches or notes for engineering or manufacturing purposes, according to specified dimensions.

c.1 Supervisor--supervises and coordinates activities for workers engaged in one or more occupations.

c.2 Manager--directs supervisory personnel to attain operational goals of an organization or department as established by management.

d. Other Technical

1. Engineering aide (Technician)--works in direct support of engineers or scientists, utilizing theoretical knowledge of fundamental scientific, engineering, mathematical, or draft design principles.

2. Instrumentation Technician--devises, sets up, and operates electronic instrumentation and related electromechanical or electrohydraulic apparatus involved in operational and environmental testing of mechanical, structural, or electrical equipment, and translates test data for subsequent use by engineering personnel in making engineering design and evaluation decisions.

3. Nurse--performs acts requiring substantial specialized judgment and skill in observation, care and counsel of ill, injured, or infirm persons and in promotion of health and prevention of illness.

4. Surveyor--surveys earth's surface and oversees engineering survey party engaged in determining exact location and measurements of points, elevations, lines, areas, and contours of earth's surface to secure data used for construction, mapmaking, land evaluation, mining and other purposes.

2. Nontechnical

1. Fireman--controls and extinguishes fires, protects life and property and maintains equipment.

2. Foreman--supervises and coordinates activities of workers engaged in one or more occupations.

B. MANUAL

1. Carpenter--constructs and repairs structural woodwook and equipment in an establishment, working from blueprints, drawings, or oral instructions.

2. Electrician--plans layout and installs and repairs wiring, electrical fixtures, apparatus and control equipment; plans new or modified installations to minimize waste of materials and to provide access for future maintenance.

3. Helper--maintains and operates pumps that control all production throughout the refinery.

4. Heavy equipment operator--operates several types of power construction equipment, such as compressors, pumps, hoists, derricks, cranes, shovels, tractors, scrapers, or motor graders, to excavate and grade earth, erect structural and reinforcing steel, and pour concrete.

5. Insulation worker--selects type of insulating material and applies insulating material to exposed surfaces of equipment.

6. Ironworker--assembles structural and reinformcement steel that is used in rigs, buildings, and support structures.

7. Mason--works with artificial stone, brick, concrete, stone and the like.

8. Miner--mines ore coal, or rock in underground mine, performing any combination of tasks in areas where high production equipment is limited by economic factors or natural formations.

9. Operator--operates several types of engines and power construction equipment.

10. Painter--sprays surfaces of machines, manufactured products or working area with protective or decorative materials, such as paint, enamel, or lacquer, using spray gun.

11. Pipefitter--lays out, fabricates, assembles, installs, and maintains piping and piping systems, fixtures, and equipment for steam, hot water, heating, cooling, lubricating and production systems on the basis of knowledge of system operation, and study of building plans or working drawings.

12. Powderman (blaster)--determines patterns of explosions required and charges, lamps, and sets off explosives in underground or surface, mine, pit or quarry to break and loosen ore, coal, or rock from solid foundations. He also determines from rock formation amount and position of charge required and type of blasting procedure to be followed.

13. Welder--welds metal parts together, as specified by layout, diagram, workorder, or oral instructions, using electric arc welding equipment.

VI. OIL SHALE (Cont.)

Retorting and Upgrading

A. NONMANUAL

1. Technical

a. Engineers

1. Chemical--designs chemical-plant equipment and devises processes for manufacturing chemicals and products. Designs and operates pilot plants to test their work.

2. Civil--designs and supervises the construction of roads, harbors, airports, tunnels, bridges, water supply and sewage systems and buildings.

3. Electrical--designs, develops, and supervises the manufacture of electrical and electronic equipment.

4. Environmental--calculates air and water pollution generation, determines pollution control requirements, designs pollution control methods (including treatment equipment and technological methods).

5. Mechanical--performs a variety of engineering work in planning and design of tools, engines, machines, and other mechanically functioning equipment.

b.1 Draftsman--prepares clear, complete, and accurate working plans and detail drawings from rough or detailed sketches or notes for engineering or manufacturing purposes, according to specified dimensions.

c.1. Supervisor--supervises and coordinates activities of workers engaged in one or more occupations.

2. Manager--directs supervisory personnel to attain operational goals of an organization or department as established by management.

d. Other Technical

1. Chemist--performs chemical tests, qualitative and quantitative chemical analysis or conduct chemical experiments in laboratories for quality or process control or to develop new products or new knowledge.

2. Engineering Aide--works in direct support of engineers or scientists, utilizing theoretical knowledge of fundamental scientific, engineering, mathematical, or draft design principles.

3. Laboratory technician--helps chemists in research projects or in doing routine testing and sample taking.

4. Nurse--performs acts requiring substantial specialized judgment and skill in observation care and counsel of ill, injured, or infirm persons and in promotion of health and prevention of illness.

5. Surveyor--surveys earth's surface and oversees engineering survey party engaged in determining exact location and measurements of points, elevations, lines, areas, and contours of earth's surface to secure data used for construction, mapmaking, land valuation, mining and other purposes.

2. Nontechnical

1. Foreman--supervises and coordinates activities of workers engaged in one or more occupations.

B. MANUAL

1. Boilermaker--assembles, analyzes defects in, and repairs boilers, pressure vessels, tanks and vats in the field following blueprints and using handtools and power tools.

2. Carpenter--constructs and repairs structural woodwork and equipment in an establishment, working from blueprints, drawings, or oral instructions.

3. Craftsmen helper--works with masons, carpenters, electricians, etc.

4. Crane operator--operate cranes to hoist, move and place materials and objects.

5. Derrick operator (hoisting engineer)--operates compressed air, diesel, electric, gasoline, or steam drum. Hoists to control movement of cableways, cages, derricks, draglines, loaders, rail cars, or skips to move men and materials for oil shale upgrading.

6. Electrician--plans layout and installs and repairs wiring, electrical fixtures, apparatus and control equipment. Plans new or modified installations to minimize waste of materials, and to provide access for future maintenance.

7. Insulation worker--selects type of insulating material and applies insulating material to exposed surfaces of equipment.

8. Machinist--sets up and operates machine tools and fits and assembles parts to make or repair metal parts, mechanisms, tools, or machines, applying knowledge of mechanics, shop mathematics, metal properties, and layout machining procedure. Studies specifications such as blueprint, sketch or description of part to be replaced, and plans sequence of operations.

9. Mechanic--repairs, adjusts and maintains machinery, such as shovels, drilling and cutting machines.

10. Operator--operates several types of engines and power construction equipment.

11. Pipefitter--lays out, fabricates, assembles, installs, and maintains piping and piping systems, fixtures, and equipment for steam, hot water, heating, cooling, lubricating and production systems on the basis of knowledge of system operation and study of building plans or working drawings.

12. Welder--welds metal parts together, as specified by layout, diagram, work order, or oral instructions, using electric arc welding equipment.

VII. URANIUM

Surface Uranium Mine

A. NONMANUAL

1. Technical

a. Engineers

1. Environmental--calculates air and water pollution generation, determines pollution control requirements, designs pollution control methods (including treatment equipment and technological methods).

2. Geological--uses geological principle to analyze and design engineering principles in such fields as minerals exploration, minerals economics, mining, and ground control and stabilization. He will normally be searching for economic mineral deposits or be involved in the construction engineering field.

3. Mechanical--performs a variety of engineering work in planning and design of tools, engines, machines, and other mechanically functioning equipment.

4. Mining--finds, extracts, and prepares minerals for manufacturing industries to use. He designs the layouts of mines, supervise the construction of mine shafts and tunnels in underground operations, and devise methods for transporting minerals to processing plants.

5. Safety--applies knowledge of industrial processes, mechanics, chemistry, psychology, and industrial health and safety laws to prevent or correct injurious environmental conditions and minimize effects of human traits that create hazards to life and property or reduce worker morale and efficiency.

b.1 Draftsman--prepares clear, complete, and accurate working plans and detail drawings from rough or detailed sketches or notes for engineering or manufacturing purposes, according to specified dimensions.

c.1 Supervisors--supervises and coordinates activities of workers engaged in one or more occupations.

c.2 Managers--directs supervisory personnel to attain operational goals of an organization or department as established by management.

d. Other Technical

1. Geological engineering aide--works as an assistant for a geological engineer.

2. Mining engineering aide--an assistant for a mining engineer.

3. X-Ray emission spectograph technician--works with x-rays on research projects or on routine testing and sampling.

B. MANUAL

1. Boilermaker--assembles, analyzes defects in, and repairs boilers, pressure vessels, tanks and vats in the field following blueprints and using handtools and power tools.

2. Electrician--plans layout and installs and repairs wiring, electrical fixtures, apparatus and control equipment - Plans new or modified installations to minimize waste of materials and to provide access for future maintenance.

3. Mechanic--repairs, adjusts, and maintains mining machinery such as stripping and loading shovels, drilling and cutting machines, and continuous mining machines.

4. Operator--operates several types of engines and power construction equipment.

5. Welder--welds metal parts together as specified by layout, diagram work order, or oral instructions, using electric arc welding equipment.

VII. URANIUM (Cont.)

Underground Uranium Mine

A. NONMANUAL

1. Technical

a. Engineers

1. Geological--uses geological principle to analyze and design engineering principles in such fields as minerals exploration, minerals economics, mining and ground control and stabilization. He will normally be searching for economic mineral deposits or be involved in the construction engineering field.

b.1 Draftsman--prepares clear, complete, and accurate working plans and detail drawings from rough or detailed sketches or notes for engineering or manufacturing purposes, according to specified dimensions.

c.1 Supervisors--supervises and coordinates activities of workers engaged in one or more occupations.

c.2 Managers--directs supervisory personnel to attain operational goals of an organization or department as established by management.

d. Other Technical

1. Engineering geological aide--works as an aide to a geological engineer.

B. MANUAL

1. Mechanic--repairs, adjusts and maintains mining machinery, such as stripping and loading shovels, drilling and cutting machines and continuous mining machines.

2. Electrician--plans layout and installs and repairs wiring, electrical fixtures, apparatus and control equipment; plans new or modified installations to minimize waste of materials and to provide access for future maintenance.

3. Underground miner--works in one of these areas:

   a. Beltman--repairs and replaces canvas, leather, or rubber belts used to drive machinery and convey materials.

   b. Bottomman--works at foot of haulage slope or plane leading to surface of mine.

   c. Bratticeman--builds doorways and brattices (ventilation walls or partitions in underground passageways of canvas or wood), or erects partitions of concrete block, brick, or concrete as specified to control circulation of air through passageways and working areas, or to support roof in areas unsuited to timbering or bolting.

   d. Continuous miner operator--operates a mining machine designed to remove coal from the face and to load that coal into cars or conveyors without the use of cutting machines, drills, or explosives.

   e. Dozer operator--operates a tractor that is equipped with a concave blade which gouges out, levels and distributes earth and pushes trees and rocks away from the land used for construction and agriculture; able to completely run a bulldozer.

   f. Electrician--plans layout and installs and repairs wiring, electrical fixtures, apparatus and control equipment; plans new or modified installations to minimize waste of materials and to provide access for future maintenance.

   g. Fork-lift operator--drives gasoline or electrical-powered industrial truck or tractor, equipped with forklift, elevating platform, to push, pull, lift, stack or tier merchandise, equipment, or bulk materials in or around mine.

h. Front-end loader operator--operates a tractor loader with a digging bucket mounted and operated at the front end of the tractor.

i. Hoist operator--operates compressed air, diesel, electric gasoline, or steam drum hoists to control movements of cableways cages, derricks, draglines, loaders, rail cars or skips to move men and materials for construction.

j. Mason--works with artificial stone, brick, concrete, stone, and the like.

k. Mechanic--repairs, adjusts, and maintains machinery, such as shovels, drilling and cutting machines.

l. Mobile crane operator--operates gasoline- or diesel-powered crane mounted on specially constructed truck chassis to lift and move materials and objects.

m. Motor grader operator--operates self-propelled grader to spread and level dirt, gravel, and stone to grade specifications in construction and maintenance of mines.

n. Motorman (Slate Motorman)--controls dinkey engine powered by electricity, gasoline, steam, compressed air, or diesel engine to transport and shunt cars at the mine.

o. Preparation Plant Operator--supervises and coordinates activities of workers engaged in crushing, sizing, cleaning, treating or loading coal at tipple or preparation plant.

p. Pumper--maintains the pump in a mine.

q. Rail car cleaner--removes coal, dust, or other refuse from railroad or mine cars preparatory to loading.

r. Rail car loader--pulls levers to open and close chute of storage bin to load trucks railroad cars, and conveyors with ore, coal, or rock.

s. Rail car sampler--removes samples of coal or ore from railroad cars to facilitate grading and blending, or for laboratory analysis.

t. Roofbolter operator--operates self-propelled machine to install roof support bolts in an underground mine.

u. Sewage treatment plant operator--purifies waste water from plant before it enters rivers, streams, or city mains.

v. Shuttle car operator--operates diesel or electrically powered shuttle car in underground mine to transport materials from working face to mine cars or to conveyor.

w. Trackman--lays and repairs track for standard and narrow-gage railroad equipment used in quarries and mines.

x. Water treatment plant operator--tends water plant equipment that scrubs and purifies gas from smelting furnaces.

VII. URANIUM (Cont.)

Uranium Mill

A. NONMANUAL

1. Technical

a. Engineers

1. Metallurgical--develops methods to process and convert metals into useful products. These engineers generally work in one of the three main branches of metallurgy--extractive or chemical, physical and mechanical. Extractive metallurgists are concerned with extracting metals from ores, and refining and alloying them to obtain useful metal. Physical metallurgists deal with the nature, structure, and physical properties of metals and their alloys, and with methods of converting refined metals into final products. Mechanical metallurgists develop methods to work and shape metals such as casting, forging, rolling, and drawing.

b.1 Draftsman--prepares clear, complete, and accurate working plans and detail drawings from rough or detailed sketches or notes for engineering or manufacturing purposes, according to specified dimensions.

c.1 Supervisor--supervises and coordinates activities of workers engaged in one or more occupations.

2. Manager--directs supervisory personnel to attain operational goals of an organization or department as established by management.

d. Other Technical

1. Analytical lab technician--helps chemists test mineral products in research projects or do routine testing and sample taking.

2. Chemist-- performs chemical tests, qualitative and quantitative chemical analyses, or conduct chemical experiments in laboratories for quality or process control or to develop new products or new knowledge.

B. MANUAL

1. Boilermaker--assembles, analyzes defects in, and repairs boilers, pressure vessels, tanks and vats in the field, following blueprints and using handtools and power tools.

2. Electrician--plans layout and installs and repairs wiring, electrical fixtures, apparatus and control equipment. Plans new or modified installations to minimize waste of materials and to provide access for future maintenance.

3. Mechanic--repairs, adjusts and maintains mining machinery, such as stripping and loading shovels, drilling and cutting machines and continuous mining machines.

4. Operator--operates several types of engines and power construction equipment.

VIII. SOLAR SPACE HEATING AND COOLING

A. NONMANUAL

1. Technical

a. Engineers

b.1 Draftsman--prepares clear, complete, and accurate working plans and detail drawings from rough or detailed sketches or notes for engineering or manufacturing purposes, according to specified dimensions.

c.1. Supervisor--supervises and coordinates activities of workers engaged in one or more occupations.

2. Manager--directs supervisory personnel to attain operational goals of an organization or department as established by management.

2. Nontechnical

1. Foreman--supervises and coordinates activities of workers engaged in one or more occupations.

2. Safety/Insurance Inspector--checks for compliance with federal and state regulations on solar space heating and cooling.

B. MANUAL

1. Craftsmen

a. Critical Skills

1. Electrician--plans layout and installs and repairs wiring, electrical fixtures, apparatus and control equipment. Plans new or modified installations to minimize waste of materials and to provide access for future maintenance.

2. Sheet Metal Worker--fabricates, assembles, installs, and repairs sheet metal products and equipment.

3. Glazier--installs glass for solar heating and cooling systems.

4. Refrigeration mechanic--fabricates and assembles components of refrigeration systems for environmental test equipment according to blueprints or schematic drawings and knowledge of refrigeration systems.

5. Plumber--assembles, installs, and repairs pipes, fittings, and fixtures of heating water, and drainage systems according to specifications and plumbing codes.