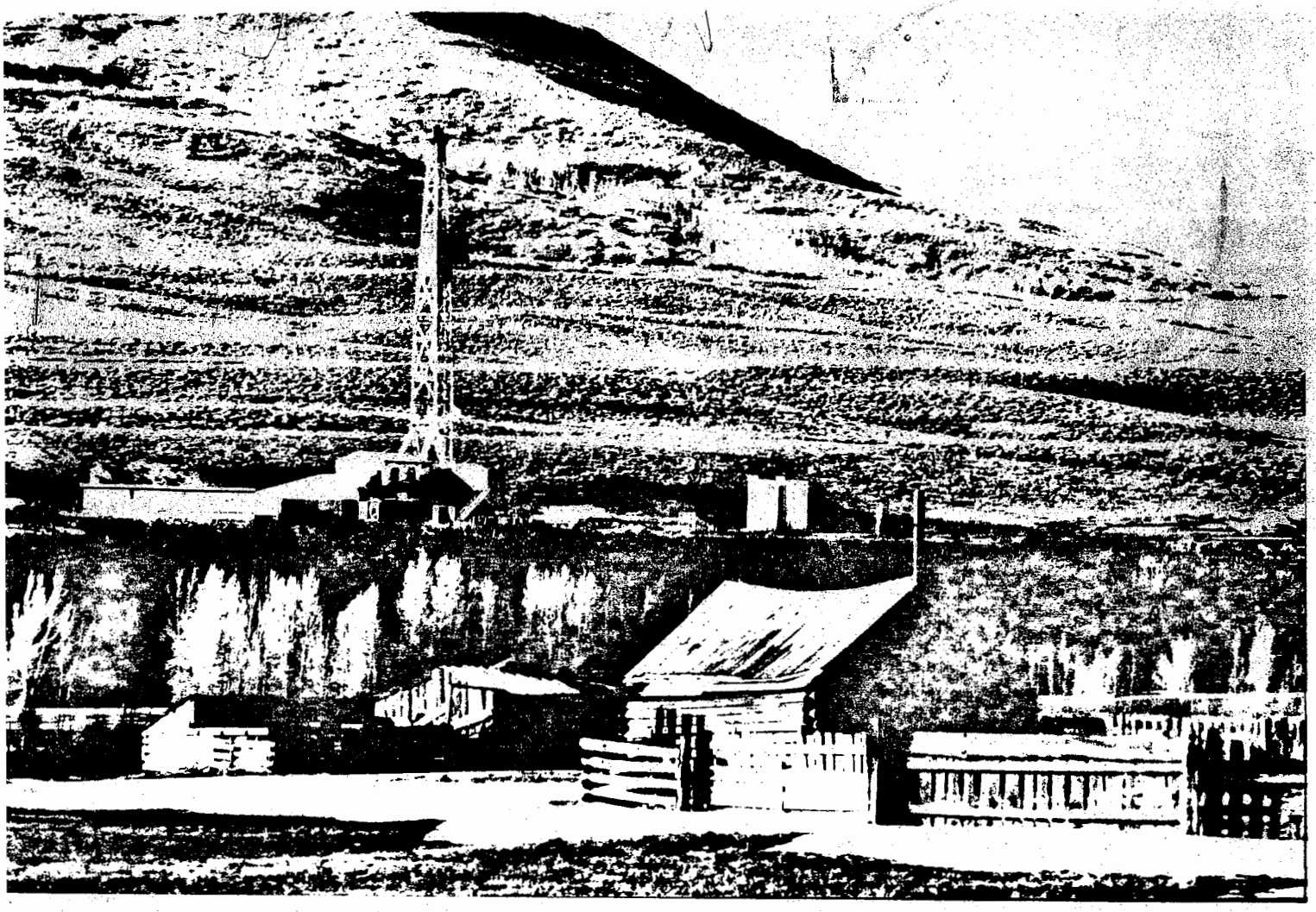

Picture Source: Wyoming Geological Association Guidebook, 1977, and Champlin Petroleum Company

SOCIOECONOMIC ASSESSMENT GUIDELINES

for

OIL AND GAS ACTIVITIES

Technical Draft
April 1979

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SOCIOECONOMIC ASSESSMENT GUIDELINES
for
OIL AND GAS ACTIVITIES

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PREFACE

The National Environmental Policy Act of 1969 (NEPA) establishes a National policy to:

> encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man ... (42 U.S.C., sec. 2).

To accomplish this, the act directs all Federal agencies to:

> utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental arts in planning and in decisionmaking which may have an impact on man's environment (sec. 102(2)(A)).

Both of these obligations are reaffirmed in the National Forest Management Act of 1976 (16 U.S.C. 1600) and other subsequent legislation.

Socioeconomic Assessment Guidelines for Oil and Gas Activities (SEA Guidelines) has been compiled in response to this Congressional emphasis on social and economic as well as physical and biological concerns in environmental assessment. It attempts to deal specifically with the effects of oil and gas activities, providing both Forest staff and general public with

- basic information about the nature of oil and gas operations,
- an analysis of the range of possible social and economic consequences of such activities, and
- suggestions about the organization and content of socioeconomic sections of environmental assessment documents.

The author is indebted to the other members of the Northern Region Minerals Impact Evaluation Group and other Regional minerals staff for reading and commenting on the first draft of SEA Guidelines. Terry Solberg, Group Leader, encouraged and gave direction to the project. Mike Burnside, Geologist, proofread the manuscript and provided valuable insights for chapter 3. Jack Weeks, Economist; Norm Yogerst, Soil Scientist; Jim Keyser, Archeologist; Bob Newman, Geologist; Bruce Ramsey, Geologist; and Buster LaMoure, Staff Director; provided additional direction.

The author welcomes additional comments that may improve the quality of the final draft. Additional copies of this technical draft are available from the Minerals and Geology Staff, Northern Region, Box 7669, Missoula, MT 59807.

A portion of this document appears in the larger, comprehensive Northern Region Oil and Gas Guide, compiled and edited by Michael Burnside, published in mid-1979, and available at the above address.

INTRODUCTION: THE WORLD PETROLEUM SITUATION

In just four decades there has been a dramatic worldwide increase in the consumption of a growing array of petroleum products. Global population has almost doubled during this period, giving us 4.3 billion consumers. Even with some decline in growth rates, this number is projected to double again in less than 50 years.

But there is an even more important reason for this unprecedented drain on the earth's petroleum and other resources. Most of the 160 nations that now coexist in this world are experiencing industrialization, a rural-urban transition, mass communications, and a mounting desire for higher material living standards. Associated with this is the growing popularity of the automobile and airplane, the switch from wood or coal to petroleum heating in homes and offices, the mechanization of agriculture, and the invention of many petrochemical products. To name a few:

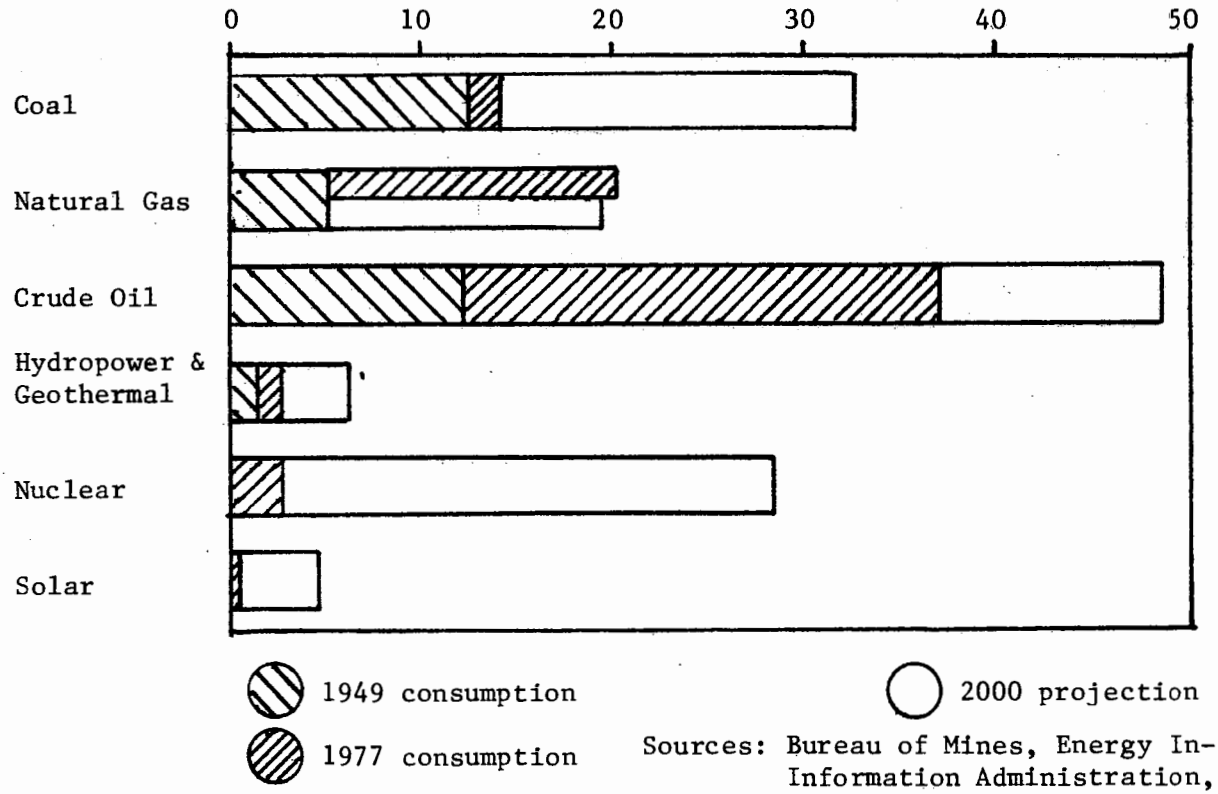
Gasoline, kerosene, fuel oil, lighter fluid, insecticides
Asphalt, roofing tar, siding and shingles, rustproofing compounds
Motor oil, transmission oil, diesel fuel, hydraulic fluids, grease
Paraffin, wax paper, candles, insulating materials, cheese coating
Aviation fuel, cleaners, solvents, lacquer thinner, naphtha
Medicines, textile additives, cosmetics, salves and creams
Synthetic rubber, plastics, alcohols, and industrial chemicals

To cite the United States example, during the 20-year interval between 1950 and 1970, energy consumption in the United States increased 98 percent while population grew only 34 percent. Petroleum consumption more than doubled and natural gas use more than tripled (table 1). Throughout Europe, population growth was considerably slower, but there was a sharp increase in energy consumption, relating to the rebuilding of many cities, industrial expansion, and the great increase in private automobiles.

Yet it is in the developing nations of Asia, Africa, and Latin America where the most spectacular gains have been made, both in population growth and energy consumption. During this same 20-year period, population in these regions increased 53 percent and per capita consumption of commercial energy was up 162 percent (table 2).

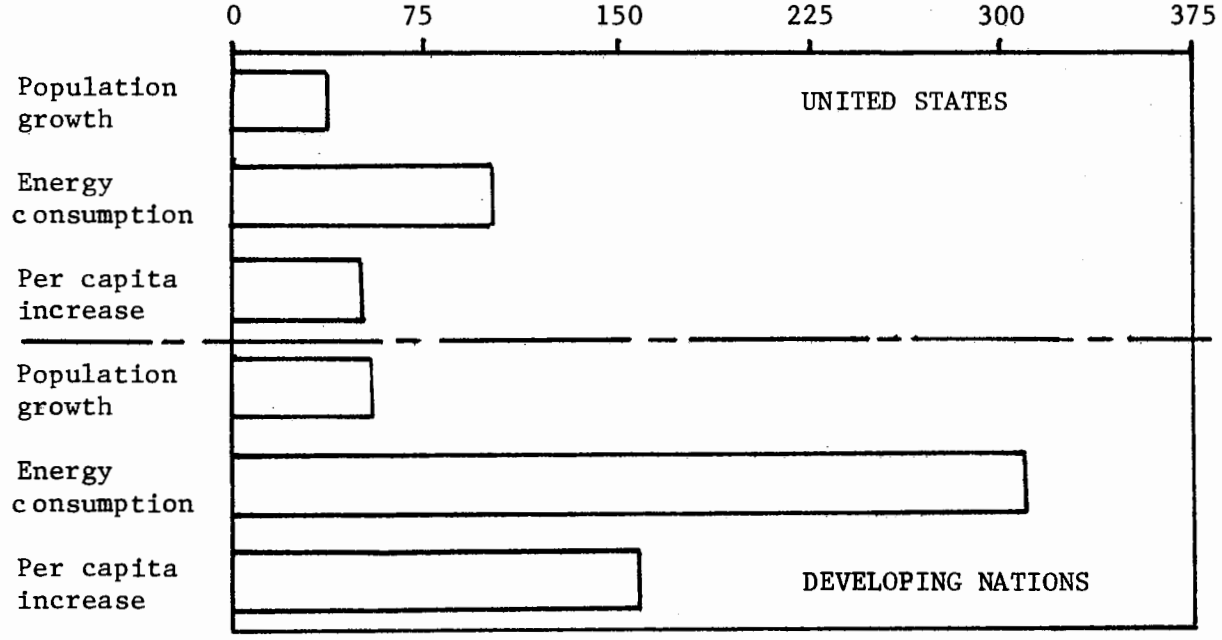
Since 1949, rising domestic demand and the depletion of some of its major oil reserves have transformed the United States from a major exporter of oil products to the world's leading importer of this resource. This trend has been hastened by the availability

Table 1.--How U.S. consumption of energy resources has increased since 1949 (expressed in quadrillion British thermal units)



Sources: Bureau of Mines, Energy Information Administration, Brookhaven Laboratories

Table 2.--How growing populations and rising living standards affected world energy consumption: 1950-1970 increases (%) in the United States and in nations experiencing industrial development



Sources: United Nations, World Bank, U.S. Census, and World Energy Conference, London, 1977

of large quantities of initially inexpensive crude oil from the Middle East. In 1977, Americans spent $41.5 billion for foreign oil compared to only $7.6 billion in 1973, and oil imports have become a major factor in our international balance of payment deficit.

Presently there is a nationwide drive for "energy independence," emphasizing the development of additional oil and coal deposits, the utilization of alternative energy sources, and increased efficiency in energy use. The movement has had some success, especially in reducing industrial and institutional use of energy, and has slowed the annual rate of increase in U.S. energy consumption. However, inefficiency is still prevalent. It has been observed that West Germans now earn incomes comparable to those of Americans and also enjoy a living standard that is about equal in most vital respects. Nevertheless, Americans consume almost twice as much energy per capita as West Germans and much more of numerous other important resources as well.

As we continue to seek solutions to our energy crises (chapter 4), consumers expect and producers seek to provide reliable interim supplies of petroleum products. The oil industry is expanding its exploration activity at home and abroad, improving its production technology, and has already revolutionized its systems of oil transport with supertankers and long-range pipelines. And each decade a greater portion of the physical environment is affected and the lives of more people are touched by oil and gas activity.

The following report discusses many of the events that occur when oil and/or gas deposits are discovered and developed in a new geographic setting, with special emphasis on National Forest lands. It responds to the questions most often asked by Forest Service District personnel and the general public:

> Just what will happen if an oil company moves into this area?
>
> What economic benefits and social and environmental costs can we expect?
>
> Should we really have oil development in this area (in view of its special qualities, as scenic, wilderness, recreational, excellent farming, future timber harvesting, or other potentials)? If so, what can be done to maximize benefits and reduce costs to the affected communities?
>
> Why is oil activity permitted in National Forests and how is it initiated, conducted, and supervised?

OIL AND GAS LEASING ON NATIONAL FOREST LANDS

Existing geological evidence suggests that the National Forest System has excellent energy as well as minerals potential. Some 6-1/2 million acres are underlain by coal and about a quarter of the National Forest acreage is thought to have oil potential. 1/ Most of this vast area, including designated wilderness areas until 1984, is open to mineral claims or leasing by any U.S. citizen, group of citizens, or domestic corporation, subject to reasonable restrictions imposed by the Forest Service.

Federal Mining Law

Legislation governing mining on public lands dates back a full century. Minerals of commercial importance have been placed in different categories, each regulated by separate laws and amendments. Major divisions include:

1. Locatable. Regulated by the Federal Mining Law of 1872 (17 Stat. 91, as amended; 30 U.S.C. 22-47). This category includes intrinsically valuable minerals such as gold, silver, copper, lead, zinc, cinnabar (mercury ore), iron, tungsten, molybdenum, etc. Some industrial minerals such as high quality gypsum or feldspar, or metallurgical or chemical grade silica and limestone are also included.

Individuals may prospect for these minerals on most public lands. When they "discover" a valuable deposit, they may locate and patent (obtain a legal title to) a mining claim, thereby acquiring the right to remove and market the mineral. They are also entitled to use as much of the claim surface as is reasonably necessary for their mining activity. A small patent fee is collected, but the claimant need not pay royalties on the minerals extracted. However, $100 worth of "assessment work" must be performed annually in order to retain the claim. Claim size is limited to a maximum of 5 to 160 acres, depending on its type (placer, lode, etc.) and the number of applicants sharing it. 2/

1/ U.S. Department of Agriculture, Forest Service. Current Information Report, No. 14, January 1975.

2/ For a comprehensive discussion of mining law, see: Pruitt, Robert G., Jr. Digest of Mining Claim Laws. Boulder, Colo., Rocky Mountain Mineral Law Foundation, 1977.

2. Saleable. Governed by the Materials Act of 1947 (61 Stat. 681, as amended; 30 U.S.C. 601-602). This category includes commonly-occurring minerals of low unit value such as gravel, sand, stone, clay, cinders, etc. The Forest Service sells these materials on a price/unit basis (i.e., $1 per ton or yard) at their appraised fair market value. Competitive sale procedures are required for large sales or where competitive interest exists.

3. Leasable. Authorized by the Minerals Leasing Act of 1920 (41 Stat. 437, as amended; 30 U.S.C. 181-287); the Minerals Leasing Act for Acquired Lands of 1947 (61 Stat. 913; 30 U.S.C. 351, 352, 354, 359); the Geothermal Steam Act of 1970, and other legislation. This group of minerals, including oil, natural gas, coal, oil shale, sodium, phosphate, geothermal resources, etc., has gradually been removed from the jurisdiction of earlier mining laws. As their titles suggest the 1920 and 1947 mineral leasing acts apply respectively to original Federal public domain lands and to lands acquired through purchase, gift, condemnation, etc. Principles that apply to this group are:

- title to the land remains with the U.S.,
- a fair return (royalties) must be paid on minerals extracted,
- the decision to lease is discretionary, and
- full environmental protection is required.

The Leasing Process

Two types of oil and gas leases are issued on Federally administered lands.

1. Competitive. Applying to those located in presumptively productive areas (called KGS for known geologic structure). These areas have been identified and mapped by the U.S. Geological Survey. Available leases are announced in advance at State BLM offices and then sold to the highest bidder at public auction or by means of sealed bids. Lease units may not exceed 640 acres, are rented for 5 years, and may be renewed if profitable production is occurring. Rental is currently $2 per acre annually (1979), paid in advance, and there is a $10 filing fee.

2. Noncompetitive. Applying to areas outside a KGS (excluding established parks, recreation sites, incorporated towns, etc.) that are not presumptively productive. Leases are available at $1 per acre, paid in advance annually, to the first qualified applicant or on a lottery basis when there are multiple applications for the same acreage. Lease blocks may be as large as 2,560 acres, with a total limit of 246,080 acres per firm in any one State except Alaska. Leases are for 10 years and may be renewed if producing, or extended if being actively drilled.

Lease applications are filed with the State Office of the Bureau of Land Management and this Agency also approves and issues leases for mineral activity on Federal lands. Copies of applications for National Forest lands are first sent to the USDA-Forest Service for review and recommendations relating to surface resource management. The lease authorizes oil and gas exploration and development, with the understanding that the same area might be used concurrently for recreation, grazing, timber production, or other mining activity.

Both types of lessees agree to pay royalties on any future production, the amount depending on the volume of oil or gas. Oil royalties vary from 12-1/2 percent on wells averaging up to 110 barrels per day to 25 percent for wells producing 400 barrels or more. Gas royalties vary from 12-1/2 to 16-2/3 percent, depending on volume. Half of this lease income is returned to the host State, 10 percent goes to the U.S. Treasury, and 40 percent is deposited in the Federal Reclamation Fund (30 U.S.C. 191).

Under Section 317 of the Resources Planning Act of 1976, the State may spend its share for planning activities, the construction and maintenance of public facilities, or the provision of public services. States are also authorized to seek Federal loans to defer the extra costs stemming from mineral development. 3/

Supervision

To insure compliance with Federal laws and agency regulations, certain formal procedures exist. These are summarized briefly below:

3/ Additional information is available in such publications as The Principal Laws Relating to Forest Service Activities, USDA Handbook No. 453, Sept. 1978, pp. 78-94, and U.S. Dept. of Interior Circular No. 2357, Regulations Pertaining to Oil and Gas Leasing, 1976 or later.

1. A prospecting permit is required if any surface disturbance is anticipated; e.g., excavation, drilling, use of heavy equipment, etc. A fee is charged, unless the activity takes place on leased land. This permit authorizes exploration only; it is not required if one wishes merely to scout an area and take small soil or rock samples.

2. Drilling requires a drilling permit approved by the District Engineer, USGS. The permit gives details of location, site elevation, proposed well depth, geological characteristics of the area to be penetrated, types of equipment to be used, procedures to be employed, time schedule, etc. In addition, detailed maps of areas involved and a surface use and operations plan must be filed with the USGS District Engineer and the BLM. These give details on existing roads, planned construction of access roads or rail spurs, location of existing wells and other oil or gas facilities, water sources, site layout, expected waste disposal practices, reclamation procedures, and the sources of needed materials.

3. The Forest Service inspects the site to determine if the operating plan meets land management goals and environmental standards. The locality will also be inspected for possible archeological sites. A USDA-FS Environmental Analysis Report (EAR) is normally required, identifying any adverse environmental effects and indicating mitigating measures. Stipulations may be necessary to insure compliance with land management goals and environmental standards.

4. Field development and production is supervised by the U.S. Geological Survey which requires that lessees and operators must observe 4/

- diligent development of the lease area and efficient resource recovery,
- adequate environmental safeguards,
- proper reclamation procedures,
- protection of public health and safety, and
- the best available professional practice.

4/ See the joint BLM-USGS publication, Oil and Gas: Surface Operating Standards for Oil & Gas Exploration and Development, 1977.

5. When accidents, including spills or other environmental damage, do occur the responsible operator must provide the GS with details in a written report within 15 days. Other Federal agencies such as the Environmental Protection Agency and State governments may also supervise oil activities through their divisions concerned with health, safety, or preservation of the environment. If not already covered by a State or Nation-wide bond, operators must post a cash bond to insure proper reclamation of well sites or other disturbed areas following the production phase. Lessees must reshape the land, install environmental safeguards, plant vegetation, and properly cap wells or convert them to fresh water sources.

SCENARIO OF OIL AND GAS ACTIVITY

With the recent sharp increases in oil and gas prices, it has become profitable to explore for oil in less promising geological provinces and in areas where climate, terrain, depth of deposits, and other obstacles have discouraged previous efforts. Increasingly sophisticated exploration techniques and improved oil drilling and transportation technologies have also enhanced prospects for locating, extracting, and marketing petroleum resources. In addition, changing conceptions of the geological events that have produced oil-rich rock strata have generated new interest in certain superficially explored or previously ignored areas.

These developments have stimulated petroleum exploration in places where the local residents are unfamiliar with oil and gas activities and their social, economic, and political consequences. They have generated new technological challenges: how to harvest the oil of Alaska's North Slope or tap the continental shelves without undue environmental harm. They have created or intensified social issues: must we needlessly sacrifice remaining scenic, wildlife, or lifestyle values in our relentless quest for new energy sources?

The Situation in Region 1

There has been a new surge of interest in oil and gas leasing in the Northern Region. Already about 2,000,000 acres of National Forest lands are under lease and applications were pending for another 2,400,000 acres as of October 1978. State and private tracts are also being leased. This interest is spurred by impressive recent discoveries in the Williston Basin on both sides of the Montana-North Dakota boundary (figure 1) and in the so-called Thrust Belt which extends along the eastern portions of the Rocky Mountains from Alberta, Canada, southward to Wyoming and Utah.

Recent evidence suggests that more of western Montana than previously supposed is in the Thrust Belt, created as the western part of North America was gradually compressed to help form the Rocky Mountains. If so, potentially oil-bearing rocks may be found buried deeply beneath older, oil-free layers that have been forced over them.

Already exploration, drilling, and production are proceeding at a remarkable pace in southwestern Wyoming and are expanding into neighboring areas of Idaho and Utah. One cluster of fields including AMOCO's Whitney Canyon development in Wyoming is estimated to

Figure 1

Annual review

Significant discoveries continue in Montana

by Russ Rountree

The activity of greatest interest in Montana during 1977 seemed to be the high degree of success in exploratory ventures, particularly in the northeastern portion of the state.

The Montana Board of Oil & Gas Conservation listed 24 new oil discoveries as the result of 172 wildcat tests. The 25% success ratio in exploration drilling seems to indicate a highly selective approach, and increasing knowledge of the potential in the Williston Basin portion of Montana.

Although 76 fewer wildcat ventures were listed than last year by Montana officials, the success ratio was more than doubled and 18 more new oil and gas fields were found.

Development drilling resulted in 98 oil producers and 220 additional gas wells out of 506 completions statewide, for a success ratio of 62.8%. The total number of wells drilled in Montana, according to the Oil & Gas Board, was 678. This is 109 fewer than were completed in 1976.

Montana—5-Year Production Summary

Year	CRUDE OIL Avg. Daily Prod. bbl	CRUDE OIL Total Annual Prod. bbl	CRUDE OIL Value at Wellhead	NATURAL GAS Total Annual Prod. MMcf	NATURAL GAS Value at Wellhead
1973	94,850	34,620,182	$115,422,832	57,740	$ 9,360,000
1974	94,394	34,553,962	$236,698,022	50,392	$12,951,000
1975	89,983	32,843,674	$257,096,151	43,623	$17,179,000
1976	89,974	32,840,600	$276,846,258	44,213	$17,261,000
1977	89,906	32,816,000	....	47,179	....

Source: Montana Board of Oil & Gas Conservation.

Montana—5-Year Drilling Summary

Year	Wildcats Drilled Oil/Gas	Wildcats Drilled Dry	Dev. Wells Oil/Gas	Dev. Wells Dry	Total Wells	Total Footage
1973	42	366	211	100	719	1,834,288
1974	28	265	237	212	742	2,171,288
1975	21	236	366	222	845	2,467,838
1976	25	223	370	169	787	2,826,301
1977	43	129	318	188	678	....

Source: Montana Board of Oil & Gas Conservation.

Source: Western Oil Reporter 35(April 1978), p. 67, with permission

have reserves of 600 million barrels of oil and 2.25 trillion cubic feet of gas, about a third of the total projected for this three-State section of the Thrust Belt. 5/ AMOCO has leased 1.3 million acres in this area and several other major oil firms are leasing and exploring large tracts in that general vicinity.

5/ Patrick Chow, Overthrust Action Brisk; Williston Close Contender, and Eight of Nine Overthrust Finds in AMOCO's UPRR Lands, Oil and Gas Journal, June 12, 1978, pp. 15-19.

This activity, combined with the established pattern of continuing oil development in Alberta to the north, suggests that Montana and parts of eastern Idaho may also offer fertile prospects for oil and gas development. The geology and terrain are similar to western Wyoming and the technological challenges are comparable. In Wyoming, many of the wells are in the 12,000 to 19,000 foot range and the heavy drilling rigs necessary for reaching such depths must sometimes be transported into very remote areas. Individual wells may cost anywhere from a half million dollars to 10 times that amount. Yet the resulting discoveries have been frequent and rich enough to justify the expenditure.

If oil or gas does exist in commercial quantities in the still-undeveloped portions of Region 1, its specific location and amount are unknown. Consequently, the social and economic effects of its development can be discussed only in approximate terms, suggesting what could happen in and around some unnamed present or future lease areas at various stages of activity. Additionally, the events following an extensive gas discovery will differ considerably from those resulting from an important oil find.

The Sequence of Events

Successful exploration and development of oil and/or natural gas ordinarily involve a series of activities, some of which may occur simultaneously. 6/

1. Preliminary exploration, both before and after leasing. This may include surface geologic mapping, seismic activities, etc.

2. Exploratory drilling, including test holes for more specific information about subsurface geological features or "wildcat" wells to determine if oil actually exists in the more promising locations.

3. Following a discovery, field development by drilling additional wells and constructing necessary site facilities.

4. Producing, processing, and transporting petroleum products to refineries or markets.

6/ For more detail about the technical aspects of oil and gas development, see A Primer of Oilwell Drilling, 3rd Ed. Austin: The University of Texas Petroleum Extension Service, 1970.

5. Well or field abandonment and appropriate reclamation of the area utilized.

Oil activity is highly speculative and seldom proceeds beyond stage one or two in any specified lease area. Compared to other types of mineral development, it normally involves rather few employees, can be operated profitably on a small scale, and, if properly conducted, will have only minor social and environmental effects. But a major oil find or a combination of small discoveries can significantly affect the social and economic life of an area, as we shall see.

Each location has its own unique mix of oil potential, climate, terrain, available workers with appropriate skills, prevailing wage rates, community standards and controls, attitudes toward change, and ability to solve problems. All must be taken into account when predicting outcomes of oil activity. Thus the events portrayed in this scenario may differ substantially from what actually occurs in the reader's home region.

The following scenario is based on the past experiences of oil-producing regions of eastern Montana, Wyoming, North Dakota, Colorado, and California. 7/ Inferences have also been made from numerous articles and case studies dealing with coal and hard-rock mineral development and pipeline construction, the effects of which are easier to predict because answers to the essential questions of when, how extensive, and where are usually available in advance.

7/ Major sources of data and estimates include: A Primer of Oil Well Drilling, previously cited; BLM, Worland District, Wyoming, Grass Creek Oil and Gas Leasing EAR, 1978; BLM, Billings Regional Office, Environmental Assessment for Oil and Gas Program EAR, BLM handbook now being compiled; Oil and Gas Guidelines, Region 1 guidebook now in preparation; E. A. Wendlandt, Exploration Planning, IN Subsurface Geology, L. W. Leroy and D. O. Leroy, Eds., Golden, Colorado School of Mines, 1977; 1978 interviews with former oil company geologists, representatives of a drilling contracting firm, and an official from an oil firm currently seeking leases in western Montana; 1979 interviews with personnel from two oil exploration firms, Billings drilling contracting companies, the Bridger-Teton National Forest, State of Montana departments, State of Wyoming departments, a personal visit to oil development areas in North Dakota and Montana, and several articles in oil and gas journals, cited when quoted.

After first reviewing what is already known about the geology and other clues to the presence of oil and/or gas in some area of interest, oil firm geologists visit the area to seek additional evidence. Exploration concepts and technology are constantly improving and previously overlooked features may be noted and mapped. Resulting data are analyzed and a working hypothesis (called a "play") is developed. If it has not already done so, the company then attempts to lease the most promising sites, either to conduct more intensive exploration or to be in a competitive position if another company discovers oil or gas in the immediate area during the 10-year duration of the standard lease. According to one estimate, drilling has occurred on only 5 percent of the Federal leases in Montana.

Subsequent exploration, when undertaken, usually involves seismic crews of 15-30 persons transporting their equipment by means of trucks or helicopter, depending on terrain. Among other things, the crew will try to locate the depth and angle of possible oil-bearing formations by recording the pattern of subsurface vibrations produced by a variety of techniques, including explosives placed in shallow (2 to 200 feet) drill holes or by dropping a truck-mounted, 3-ton steel plate several feet to the ground. As far as possible, existing roads are used and attempts are made to minimize environmental disturbances.

Because they cause little surface damage, vibroseis trucks and tractors are now receiving wider use. They produce shock waves merely by vibrating a heavy weight pressed firmly against the earth.

The magnetometer, resembling a large camera, measures changes in the earth's magnetic field due to magnetic properties of subsurface rocks. A gravity meter survey gives information about hidden formations by measuring their gravitational pull. An airplane may be used to take photographs of surface features or to record the strength and direction of magnetic forces emanating from the earth below.

If exploration activity expands sufficiently, a support unit of several persons may be stationed in the area to assist in supplying field personnel and in processing their findings. Many months may be required to examine a large lease area and local residents will hear the sounds and witness various aspects of the activities.

When especially favorable sites have been pinpointed, truck-mounted drilling rigs may be brought in to drill test holes, sometimes thousands of feet deep. Subsurface rock is extracted and analyzed. Positive results require further high-level deliberation and the decision to allocate funds for a "wildcat" well may follow. In

western Montana, this would seem to require a very large rig with a crew of 20 or more. Almost all drilling is done by independent drilling contractors and it is an expensive process. In 1978 in the Wyoming Thrust Belt, drill rigs rented at $4,500 daily for 7,000-foot wells and at $7,500 for 20,000-foot wells. Simply moving a rig from one site to another within a field cost about $35,000. 8/ Crewmembers work in shifts around the clock, since up to 6 months or more may be required to drill through 1-4 miles of surface rocks to reach potentially oil-bearing formations.

Even with all of this sophisticated technology, oil reservoirs can be elusive. In the San Emidio area of south central California, for example, geologists and geophysicists, using a variety of techniques, spent 24 years in a futile search for oil, motivated by their faith that the geologic structure of the area was extremely favorable. A total of 26 exploratory wells were drilled without results. The resulting body of evidence permitted reinterpretation of the data and new drill sites were established. Three fields were eventually developed and in the last one, in 1975-78, 47 of 50 wells drilled were successful. 9/

Historically, 1 wildcat well in 16 yields a significant amount of oil or gas but only 1 in 140 is financially profitable. 10/ In 1977 in Montana, one in four proved to be "successful," a category denoting significant but not necessarily profitable production.

Before drilling commences, a site of 2-4 acres will be cleared and graded for the drilling rig, pumps and tanks, the mud pit, and vehicle parking. If a large oil reservoir is discovered, additional rigs may be obtained and drilling activity could continue for years until the boundaries of the field area are established. To maximize total field production, modern wells are generally spaced on plots ranging from one oil well for every 40-320 acres to one gas well for every 160-640 acres of a field. 11/

8/ Petroleum Information Corporation. The Overthrust Belt, 1978.

9/ See Taylor, Don S., California's Yowlumne Field--from Basics, IN Oil and Gas Journal, March 20, 1978, pp. 192-200.

10/ BLM. Environmental Assessment, previously cited.

11/ For a more detailed account of oil drilling, see A Primer of Oilwell Drilling, 3rd Ed., op. cit.

In remote areas, well drilling may require the construction of camps for workers, airports or helipads, and a system of all-weather roads for transporting equipment and hauling out oil. Field development involves building roads connecting wells, erecting storage tank batteries, and sometimes constructing facilities for separating oil from gas and water. Most fields are in the 1,000- to 10,000-acre category, but a few rich fields have encompassed a township or more and contained 500 or more wells. 12/

Natural gas fields have significantly less environmental impact because of much wider spacing of wells and equipment and fewer roads. Pipelines from these fields are constructed only when the fact of sufficient production has been established. Gas wells normally flow without assistance, so pumps and motors are not required. If the gas contains large quantities of hydrogen sulfide, a dangerous gas, a facility is constructed for removing and flaring this. If gas exists only in small quantities, it is either used locally as fuel, or the well is simply capped until enough other area discoveries have provided sufficient gas to justify commercial development. Small amounts of gas removed from oil may be flared (burning).

As each well is completed, rigs are dismantled and transported to another well site. Pumps (electrically-powered, when feasible) are installed when needed, pits are filled, tanks and gathering lines are constructed, and the drill site surface is reclaimed. A small maintenance crew and oil truck drivers or transmission pipeline workers eventually replace the one or more drilling crews and their support personnel, but years may be required to develop a large field, which will then continue to produce for another 20 years or more.

If a large discovery occurs, an oil company may wish to construct a refinery in the area in order to market finished products locally. Otherwise the petroleum will be transported to existing refineries. Since Montana's present refineries are already importing much of their (1977) supply of crude oil, a new refinery may be unnecessary. Construction of even a small refinery is a major undertaking involving hundreds of construction workers for perhaps 2 years. Following this, another 200 or more employees will be required to operate the facility. The current trend is toward larger, fewer refineries with less employees per unit produced.

12/ Estimate based on the Grass Creek, Wyoming, experience. See Grass Creek EAR, BLM, Worland District, Wyoming, 1978.

To maximize total production, enhanced recovery methods (sometimes called secondary and tertiary) may be employed. Gas or water is injected into the reservoir under the remaining oil to force more of it to the surface. Additional and sometimes deeper wells may be drilled if there is evidence of further potential. But ultimately the field will be abandoned and must then be reclaimed.

Reclamation procedures occur after each stage of activity. Reclamation includes either (1) returning oil and gas sites to their approximately original contour and vegetation, or (2) converting the site to some new and useful purpose. It ideally involves safeguards against erosion, destroying scenic values, and pollution of local water sources. Its cost and complexity varies greatly with the stage and scope of the petroleum operation.

Restoration after exploration is relatively easy. Roadways constructed for exploration purposes will be reclaimed if no further use is intended. Vibroseis or thumper trucks will trample the grass but usually not disturb the soil if wet seasons are avoided. Drill holes for seismic tests must be filled, along with any craters that may result. Normally, explosive holes are less than 4 inches in diameter; craters seldom exceed a foot or two in diameter. If fresh water acquifers are encountered, they must be sealed off immediately above and below to prevent contamination from impurities seeping in from other levels. Bentonite clay (which expands when wet) may be used to fill the hole, which is then capped with topsoil and seeded with a native grass mixture. All supply containers and marker flags should be removed.

Well sites or fields require the use of bulldozers and graders to reshape the landscape. Some oil firms now routinely begin landscaping as soon as each well is developed, hence simplifying subsequent reclamation procedures. Drill rigs, tanks, sheds, and other equipment are first removed and the mud pit is pumped as dry as possible, then filled with subsoil originally cleared from the site. Production pumps and tanks are skillfully blended into the surroundings, protective dikes and fences are neatly constructed and regularly maintained, and shrubs and grasses are planted. When the field is eventually abandoned, an oil field near an urban center may be converted to an industrial, commercial, recreational, or residential facility. Such reclamation practices are now required by law and stipulated in the leases.

THE PEOPLE OF THE NORTHERN REGION

Demographic Characteristics

Region 1 includes all of Montana and North Dakota, plus sizable portions of Idaho and South Dakota. The entire area is predominately rural, very sparsely populated, and lacking in major industrial-commercial centers. Only three cities in the entire Region have official populations exceeding 50,000 (Billings, Fargo, and Great Falls), and none of the nation's 100 major urban centers is located in the Region.

The population of the eastern half of the Region has grown very little since 1950 and this pattern is expected to continue in the near future (table 3). The mechanization of agriculture has displaced many farm workers and the increase in industry has been very modest by National standards. In the western half of the Region, where the timber industry and tourism provide additional employment, growth has approximated the National average and promises to continue in the years ahead. Energy development could alter these projections upward. Appendix A lists agencies in each Northern Region State that compute up-to-date population estimates and projections for counties and cities.

Table 3.--States of Region 1: Past, present, and projected populations

State	Persons per square mile 1976	Population 1950	1970	Est. 1978	Percent 28-year growth 1950-78	Projected for 1990	Percent projected change 1978-90
Idaho	9.9	588,637	713,008	878,000	49.2	1,061,000	21
Montana	5.1	591,024	694,409	785,000	32.8	894,000	12
North Dakota	9.1	619,636	617,761	652,000	5.2	698,000	7
South Dakota	8.9	652,740	666,257	690,000	5.7	724,000	5
U.S.A.	60.0	151,325,798	203,235,298	218,502,000	44.4	243,004,000	11

Although providing only about 2 percent of the Northern Region's personal income in 1970 (table 4), mining, and more recently mineral processing have played important roles in the economy of particular areas and have contributed some of the most fascinating chapters of the social histories of Idaho, Montana, and South Dakota. There have been literally dozens of "boom and bust" scenarios in which minerals are discovered, often in a remote, rugged, high-altitude location. A rush of miners and other opportunists ensues, a makeshift community of hundreds of homes and businesses is constructed, the mineral source is depleted, and the town is abandoned.

Minerals activity continues to affect the social and economic life of particular areas in dramatic ways. Silver Bow County, Montana (Butte), has been declining in population since the 1920 census, relating to a reduction in job opportunities in the copper mines, and Rosebud County, Montana, has grown 74 percent in the 1970-1977 period alone, following large-scale coal development. There are indications that as future minerals deposits are developed, greater efforts will be made to reduce the social and economic consequences of uneven development through better planning and scheduling of these activities.

Table 4.--1976 Per Capita income and relative size of sources of personal income (percent from each sector)

		Mfg.	Gov't.	SV	Trade	Const.	Agric.	Mining
Idaho	5,640	14.3	14.3	11.1	9.1	6.5	7.3	1.1
Montana	5,689	7.7	16.0	10.5	9.3	5.5	6.9	2.7
North Dakota	5,846	5.3	16.1	9.7	8.7	6.6	11.8	1.2
South Dakota	5,120	7.3	16.0	10.6	9.3	4.9	7.0	1.2
U.S.A.	6,399	20.0	13.5	12.5	8.0	4.4	1.8	1.1

Source: Department of Commerce

Lifestyle and Values

The people of Region 1 are both aware and proud of the abundant natural resources of their area, the vast expanses of mountains, grasslands, and wilderness, and the relative absence of urban blight. There is a strong regard for traditional values like land-ownership, private enterprise, self-sufficiency, and neighborliness. A statement in the Eureka, Montana, weekly newspaper seems to capture this sentiment: "We're not the Garden of Eden in the Tobacco Valley, but we're next in line."

This Regional pride is tempered by a growing awareness of the vital social issues of this generation, including the National energy crisis, the increasing importance attached to the energy resources of this Region, and the unique problems and challenges this poses for the residents of this area. Opinions vary, sometimes widely, on how best to respond to these challenges.

Region 1 inhabitants are themselves very energy-dependent. Winters are long and cold and each home consumes large quantities of oil, coal, wood, or hydroelectric energy, all available in the Region. People travel a great deal, usually by private automobile to get to work or to meet their consumer needs. The great abundance of cars, pickup trucks, four-wheel drive "rigs," and off-the-road vehicles, the long trips to hunt big game, and the mounting interest in snowmobiling, cross-country skiing, and wilderness hiking suggest both an appreciation of the environment and the importance of the automobile (and reliable energy supplies) in their lives.

The social effects of the Region's sparse population are very evident in Montana, where one finds many of the personal and social characteristics of rural and small-town America. Montanans are friendly and informal and tend to be open, honest, and trusting toward newcomers who are not viewed as a threat to their institutions. They are gregarious as is evidenced by the numerous clubs and organizations, even in small towns, and the lively patronage of scattered restaurants and taverns, even in rural areas. The ease with which Montanans joke and converse with strangers in public places can even be disarming to visitors from urban centers.

On the subjects of mining and industrial development, however, Montanans lack consensus, appearing to vary according to such factors as age, occupation, level of formal education, area and length of residence, financial interests at stake, the specific type of development proposed, and personal environmental philosophy. Views range from those who retain the frontier notion of

bountiful resources put there for exploitation, to those who would put a freeze on further development of natural resources, at least in certain sections of the State.

Table 5 lends some statistical support to these generalizations. It is adapted from a 1977 State-wide survey of Montanans who returned 1,500 of 5,100 questionnaires distributed by the Office of Budget and Program Planning.

As the larger cities of Region 1 continue to grow and the rural areas become less influential, we can expect the inhabitants to gravitate toward National norms. The crime rates in the growth counties of Montana and Idaho now approximate the National average, but both North and South Dakota are still well below this level (table 6). Divorce rates are below the mean in all States but Montana, but are rising at the National rate (table 7). Marriage rates remain fairly steady at a time when they are declining significantly in other sections of the country. Birth rates are not decreasing as rapidly as in most other States and are significantly above the National norm (table 8).

Average per capita income in the four-State Region is $500 to $1,200 lower than the National norm (table 4), in part a result of the large number employed in agriculture and small business and the relatively small number holding union-scale industrial jobs and professional positions.

Early in this century Region 1 was populated by a variety of ethnic groups, chiefly of European origin, but most ethnic differences have tended to disappear by the third generation of U.S. residence. About 15 percent of the population is of foreign birth or had one or both parents born abroad. Large contingents of immigrants arrived from Canada, Germany, the United Kingdom, Sweden, Norway, the USSR, Denmark, The Netherlands, Ireland, Czechoslovakia, and Austria. Many current residents have also in-migrated from the U.S. East or Middle West and there are indications that growing numbers of newcomers place a high value on the Region's low population density, scenic attributes, and recreational opportunities.

There are also more than a dozen American Indian tribes in the Region, totaling about 50,000 members distributed in all States and contributing over 3 percent of the total population (table 9). Aside from being the Region's largest minority group, Native Americans deserve special mention in this document because some of the reservations, especially in eastern Montana and western North Dakota, have great energy potential. The Crow and the Cheyenne

tribes own billions of tons of strippable low sulfur coal and possibly additional oil and gas reserves. They are now under mounting outside pressure to decide if, when, and how much of their energy to develop. This results in a basic conflict between the desire to preserve tribal property and tradition, and the goal of increasing material prosperity for Indian people.

Small populations of other ethnic groups are also represented, including Japanese, Chinese, blacks, Filipinos, and Spanish-speaking peoples (table 10). Additional minority groups are sometimes defined on the basis of religion and/or lifestyle, as the orthodox Mormons (LDS) or traditional Hutterites whose world view and moral outlook may differ significantly from the majority in the communities where they live.

Table 5.--Selected attitudes of a sample of Montana citizens

		Safe		Unsafe	
1.	How safe do you feel?	Very 21	Reasonably 64	Somewhat 13	Very 2
2.	How shall we deal with crime and criminals?	Very Important	Fairly Important	Not Important	No Opinion
	-Longer jail sentences	58	29	10	4
	-Strong gun control	7	9	76	7
	-Quick and sure punishment	83	11	3	3
	-Reduce social causes	50	26	15	9
	-Repay victims	44	32	14	9
	-Educate offenders	26	43	20	10
3.	How to deal with mentally ill or incompetent--preferred procedure?	High	Mod.	Low	No Opinion
	-Community services	65	34	5	2
	-Guidance programs	60	34	9	3
	-Institutionalize them	41	33	20	9
4.	How much priority should politicians give to:	Very High	High	Mod.	Low
	-Opinions of constituents	71	19	12	3
	-Interest groups	10	20	43	27
	-Party Leaders	8	14	34	52
5.	How shall we reduce unemployment?	For	Against	Undec.	
	-Tax breaks for private business	56	32	11	
	-Temporary public jobs	35	53	15	
	-City-county land-use planning	43	38	23	
6.	Do you favor or oppose	For	Against	Unsure	
	-Sales tax	23	70	7	
	-Public TV	30	51	18	
	-Public access for recreation	51	39	11	
7.	How shall government cope with these?	Higher Taxes	Reduced Services		
	-Law enforcement	81	19		
	-Road construction and maintenance	70	30		
	-Higher education	47	53		
	-Social health services	47	53		
	-Recreation facilities, services	23	77		

8. Energy values: What shall our priorities be?

Environment First	Economic Benefits	Mixed, economic Emphasis	Mixed, environ. Emphasis	No Opinion
11	2	39	40	8

	Yes	No	No Opinion
-Instate conversion of coal	62	24	13
-Export coal	44	41	14
-State regulation of location of coal mines	55	34	11
-Land of high agriculture capabilities be strip mined	19	73	8

9.	How should energy be conserved?	Laws 15	Incentives 39	Educational Programs 46
10.	Whose policies should government develop?	State 78	Federal 15	No Opinion 7
11.	Should there be additional mining controls?	Yes 35	No 37	No Opinion 29
12.	Do you observe wildlife in its natural setting?	Yes 71	No 29	

Source: State of Montana, Office of Budget and Program Planning: Montana Futures: A Survey of Citizen Choices, 1977, adapted by Author

Table 6.--Reported crime rates in the States of Region 1 per 100,000 population in 1976

State	Rate	U.S. Rate
Idaho	4,270	5,266
Montana	4,262	
North Dakota	2,514	
South Dakota	2,640	

Source: Uniform Crime Reports of the Federal Bureau of Investigation

Table 7.--Marriage and divorce rates in the four States of Region 1, per 1,000 population

State	Marriage rates		Divorce rates		Divorce as a percentage of marriage
	1970	1976	1970	1976	1976
Idaho	15.3	15.8	5.1	6.9	44
Montana	10.0	9.7	4.4	6.4	66
North Dakota	8.6	8.8	1.6	2.9	33
South Dakota	16.6	15.7	2.0	3.4	22
United States	10.6	9.9	3.5	5.0	50

Source: U.S. Public Health Service, adapted

Table 8.--Trends in birth and death rates in Region 1 States, per 1,000 population in 1970 and 1976

State	Birth rates		Death rates	
	1970	1976	1970	1976
Idaho	20.3	20.2	8.6	7.6
Montana	18.2	16.5	9.5	8.8
North Dakota	17.6	17.7	9.1	9.0
South Dakota	17.6	16.6	9.9	9.6
United States	18.4	14.7	9.5	8.9

Source: U.S. Public Health Service

Table 9.--Major Indian reservations in or adjacent to Region 1, with 1970 acreage and population

State	Reservation	Acres	Tribe(s)	Population
Idaho	Nez Perce	87,497	Nez Perce	1,485
Montana	Blackfeet	950,643	Blackfeet	6,216
	Crow	1,554,254	Crow	4,208
	Flathead	1,243,968	Salish, Kootenai	2,833
	Fort Belknap	616,048	Gros Ventre, Assiniboine	1,938
	Fort Peck	964,865	Assiniboine, Sioux	5,015
	North Cheyenne	433,594	North Cheyenne	2,683
	Rocky Boys	107,613	Chippewa-Cree	1,244
North Dakota	Fort Berthold	980,500	Mandan, Hidatsa, and Arikara	2,750
	Turtle Mountain	70,240	Chippewa	7,305
	Standing Rock	847,799	Sioux	4,690
	Fort Totten	244,507	Sioux	1,990
South Dakota	Cheyenne River	1,419,504	Sioux	4,308

Source: U.S. Department of Commerce

Table 10.--Minority groups in Region 1, as a percentage of the total population in each State, 1970

State	Black	Indian	Japanese	Chinese	Filipino	Spanish-speaking (1976)	Other
Idaho	0.3	0.9	0.3	0.1	0.03	3.1	0.3
Montana	0.3	4.0	0.08	0.04	0.03	0.8	0.2
North Dakota	0.4	2.3	0.03	0.02	0.03	0.3	0.1
South Dakota	0.2	4.9	0.03	0.02	0.01	0.3	0.1
United States	11.0	0.4	0.3	0.2	0.02	5.3	0.3

Source: Bureau of the Census, adapted

THE SOCIAL CONSEQUENCES OF OIL AND GAS ACTIVITY

In discussions such as this one, concerned with the consequences of development activity, the term "social" refers to people in a group setting, interacting and affecting each other's behavior.

Every stage of minerals activity has its social aspects. Groups of people define the need for minerals, locate and develop them, and experience the costs and benefits that result. In this broad view, "social impacts" refers to all of the ways in which social life is affected by mineral activity due to changes in population composition, employment and income patterns, availability of consumer services, community social relations, etc.

This complex pattern of change is often analyzed by subdividing it into traditional categories of academic research. Economists focus on activities in the business sector, including investment, income, employment, and patterns of resource use. The political scientist may assess the capacity of existing community organizations and political institutions for coping with change. Professional foresters or others may be concerned with reduced or enhanced scenic or recreational values.

Of equal importance is the need to assess the effects of minerals development on the lifestyle, the outlook, and the quality of social relationships of the affected communities, a subject of interest to sociologists and social or cultural anthropologists. Do people relate to each other about as they did earlier? Do they perceive life in the same way? In a dynamic society like our own, some social changes will occur daily in any community. In fact, Americans--perhaps more than most people--appear to value and welcome change and place a premium on being "up on the latest." Thus the task of social assessment is to identify the kinds of changes minerals development will generate that would not otherwise occur as rapidly, with special attention to any recognizable benefits or hardships that might be experienced by segments of the community.

The Special Case of Oil and Gas

In most other instances of minerals development in Region 1 (including coal, copper, silver, lead, talc, bentonite), the specific location of the deposit, its quantity, the probable number of persons needed to mine it, and the duration of the activity are all known months to years in advance of actual mining activity. The same holds true for major construction projects such as roads, dams, or shopping centers. This permits careful (if not always

accurate) estimates of the effects of the proposed development on population growth, housing, public services, the schools, businesses, and recreational opportunities. There may be sufficient time for systematic advance planning to minimize hardships and maximize gains.

With oil and gas activity, the time span between discovery and development is normally much shorter. We have noted the growing interest in the oil potential of western Montana, yet:

1. The extent of petroleum reserves, if any, is not known. However, any large "find" would result in rapid exploitation and great pressure to extend oil and gas activity into adjacent areas with similar geological structure,

2. the specific location of any oil or gas deposits is uncertain, complicating the task of defining areas of social and economic impacts, and

3. the general public, although somewhat acquainted with other forms of mining, lacks adequate information about the technical details, time requirements, environmental effects, and possible economic benefits of petroleum exploration and development.

Oil and gas activity is not highly labor-intensive. Compared to coal or copper mining, the timber industry, or agriculture, it utilizes rather few workers in relation to the value of the commodities produced. Nevertheless, a discovery of substantial size could significantly affect the social and economic equilibrium of just about any part of Region 1. In fact, of the many variable conditions that govern the scope and severity of socioeconomic impacts, size and specific location are the two most crucial factors.

Size of the Discovery

There is a tremendous variation in the size of commercially valuable petroleum finds and considerable difference in the quality of the oil or gas produced. At the extremes one can visualize a lone well producing 100 barrels a day or a giant field with more than a thousand wells, each averaging this amount or more. Ordinarily the "majors," the giant oil corporations that dominate the industry, are interested in locating and developing sizable discoveries; they have the resources and prefer to operate on a large scale. The many smaller "independent" operators, especially in a

time of rising oil prices, can profitably develop very small fields if the per-well production is good and there is a convenient means of exporting the oil or gas.

To facilitate discussion and reporting, fields are often loosely classified on the basis of "size," and since there are different ways of determining this, more than one system has evolved. The number of wells is misleading (one may produce 10 times the volume of another), so another measure such as estimated reserves or annual production is preferred. Table 11 is one example of a field classification that might be appropriate for Region 1.

Table 11.--Oil field size, based on estimated reserves 1/

Field Size	Estimated Median Reserves	Usual No. of Wells	Production Technological Implications
Small	1-10 million barrels (worth $15-$150 million @ $15 per barrel)	1-15	Probably will elect to use existing pipelines or transport oil by truck or rail
Medium	20-40 million barrels ($300-$600 million)	30-60	Could justify construction of a new or branch transmission pipeline
Large	50-80 million barrels ($750-$1,200 million)	100 or more	Could justify the construction of a refinery if none is available
Giant	100 million barrels or more (over $1.5 billion)	100's	Would make refinery construction economically feasible

1/ This example is a compromise, since different systems of classification exist.

Sources: Interviews with geologists with oil experience, State officials in Wyoming, and Eleanore Carruth's article, The New Oil Rush in our own Backyard, IN Fortune, June 1974, pp. 154-159 ff.

Location of the Discovery

A review of case studies of past mining activity reveals that the location of mineral deposits is important in determining both the distribution and the severity of the social and economic effects that result.

If oil or gas is discovered and developed on National Forest lands near the mythical community of Centerville, somewhat concentric local, regional, and National zones of social and economic influence will typically evolve, as follows:

1. Local: Residents within or immediately adjacent to the Centerville lease areas who will personally experience aspects of oil and gas activity. These include ranchers, tree farmers, landowners who have granted oil leases, local persons employed by the leasing firms, resort operators, and the residents of communities, if any, in the immediate vicinity. Add the inhabitants of nearby towns or cities whose facilities and services could be overburdened by extensive oil and gas activities. Previous experiences in mining areas suggest that in the absence of closer, relatively self-contained communities, incoming workers will buy or rent homes 20-40 miles away if accessible by paved highway.

2. Regional: More distant towns or cities with political, economic, or social ties to the area of oil and gas activity, e.g., a county seat, an important wholesale or retail sales center. These cities have a vital interest in expanding economic activity and increasing demands for public services. They would also supply some commuting workers. It has been observed that some daily commuters will travel up to 50-60 miles each way and some work-week commuters will drive 100 or more miles to their jobs rather than relocate.

3. National: People outside of the economic region or State who are somehow affected by development activity in Centerville. Included are those who utilize the vicinity for recreation, e.g., hunting, skiing, or summer vacations, who consume its resources, including oil, gas, or timber, or who are associated with participating oil firms as stockholders, managers, employees, equipment suppliers, competitors, etc.

Of critical importance is the density of the population in the vicinity of the discovery (zones 1 and 2). As explained in the sections on social and economic impacts, if Centerville is a large, stable community, it will absorb a given level of oil development much more readily than would a small, rural community. Not only does the larger city have a superior capacity to host both transients and new residents, but fewer newcomers would be required to meet the additional requirements for labor and services induced by petroleum development.

The importance of location is also evident when one community or county experiences most of the adverse impacts of oil and gas development while other localities harvest most of the economic gains. For instance, the people of the small town of Mud Flats may experience the noise, traffic, and reduced scenic values associated with oil development and find their few commercial

services crowded. However, most of the workers and their families elect to reside in Metroville, a city of 5,000 within easy commuting distance, but in the next county. Payrolls will be spent in Metroville and the bulk of supplementary State revenues will also be directed there, since most of the latter are distributed on the basis of resident population, school enrollment, etc.

New Business

A new machine shop and welding business is a family affair for Steve Karpyak, who left a high-paying nuclear power executive job, to return to Watford City to start the operation with his brother, Dale.

Both men have been putting in 12-hour days to keep the business rolling since it started in December, at the KMT Corporation Machine-Welding Shop. It is located in a green building on the west side of Hwy. 85, ½ mile south of Watford City.

Steve, 35, his wife , Linda, who helps them with the books, and their daughter, Anya, 4, left Vermont where he worked for a nuclear power corporation to return to his hometown.

Dale, 26, was a mechanic with S & S Motors in Watford City, and he and his wife, Vicki, have two children, Shaleesha, 7, and Lindsay Anne, 2.

Steve was attracted back to his home town by the oil boom and also his concern for the environment.

Among their customers already are Matador Services, Power Fuels and S & S Motors.

One of their most unusual jobs was to make a casting from 14 pieces of a broken aluminum air intake manifold from an old diesel engine. The Karpyaks worked two days to put together a new casting.

Eventually, the two hope to have more employees as they expand their operation. They emphasize their versatility and ability to tackle many unusual jobs.

Figure 2.--Economic effects of oil development in North Dakota

Source: Oil Patch Hotline, Vol. 2, No. 2, January 18, 1978, with permission

Oil Well Sites

Bottineau County's Wiley oil field is seeing a surge of new drilling as the result of a change in well spacing rules.

Producing wells in the field increased from 50 to 59 in the period from last December through October, says the North Dakota Geological Surveshow 15 drilling permits have been issued for the field since late September.

The field originally was drilled on 80-acre spacing, or one well for each 80-acre tract, said Jack Wilborn of the Geological Survey in Grand Forks.

Last January, he explained, the State Industrial Commission approved oil companies' request to switch the spacing to 40 acres because the oil reserves were thought sufficient to justify more wells.

This year the field has yielded an average of about 38,000 barrels per month, with individual wells averaging 21.8 barrels per day, the survey reported.

"They're not big producers, but they'll make money on them," Wilborn said. He added that the newer wells are producing "anywhere from 40 to 100 barrels a day. They'll level out at 50 or 60."

The field, opened about 1960, produces from Mission Canyon limestone in the Madison formation at about 4,400 feet, Wilborn noted. Phillips Petroleum of Bartlesville, Okla., is a major operator in the field, near Maxbass in the southwestern portion of the county.

The Economic Effects

The difficulties involved in estimating the economic effects of future oil activity in a given locality already have been suggested. Yet on the basis of current experience in other geographic areas, some rough generalizations can be made. We know that if an oil company makes a preliminary exploration of an area, suspects the presence of oil, and leases a large tract of land, more intensive exploration is likely to follow. If a significant discovery results, then a sequence of development activity will also follow, approximately as outlined in the scenario above.

At each stage of its activities the oil firm will attempt to hire some of its employees locally, but will find it necessary to transfer many others from distant points, depending on such factors as the number and skills of local workers and the individual company's organizational design, distance from the area, and hiring practices. We must also consider the extent to which the oil company will utilize subcontractors to drill its wells, build its roads, haul its equipment, etc. Normally much of this work is "farmed out," often to local or regional firms.

To illustrate this point, let us assume that two competing oil firms have done preliminary exploration in a section of western Montana, strongly suspect the presence of oil, have leased large blocks of National Forest and private lands, and are now intensifying their exploration efforts in order to pinpoint the petroleum sources and more intelligently expand their lease areas. To simplify the illustration, Apex Company, which does its own exploration, and the drilling contractor it has hired need a total of 120 workers in the area. Each has a portion of this number available for transfer, but would like to hire the remaining employees locally. Table 12 suggests what could happen and how the hiring pattern would differ, depending on the location of the exploration activity. It points out that the majority of the workers are not likely to be drawn from the ranks of the local unemployed.

Table 12.--Judgmental estimate of the source of 120 exploration and development workers

Source of worker	Activity occurring near: Farmville	Urbanville
Company employees transferred from some distant point (some will reside locally and others will move to nearby communities)	83	57
Oil workers who have moved here after learning of new employment opportunities through company contacts	6	5
Commuters from nearby communities, some of whom were unemployed	10	11
People hired locally, but who left other jobs--some of which are now vacant--due to the lure of higher wages	5	13
Women or farmers not previously seeking employment--and thus not "unemployed"	6	6
College students taking summer jobs or high school students entering the labor market for the first time--some of whom may choose careers in the oil industry	5	9
Unemployed local workers, formally identified as such by the State Employment Service	6	19
	120	120

The local-hire employees, already participating members of their respective communities, will offer no demographic (population) impacts to the area except that their increased income may enable them to make a postponed visit to the dentist or send their child to high school or junior college. The in-migrants will contribute most of the impact. Initially, they will live in campers, motels, mobile homes, and rented transient apartments. The majority will either be single or leave their families behind in the relative comfort and security of their hometowns. Later, if the prospect of continuing oil development and long-term employment looks good, growing numbers will send for their families and consider purchasing a home. The location of their residence will be

determined not only by the factor of nearness to work but by the availability of housing, the amenities each surrounding community has to offer, and individual family values like recreation, the existence of a college, career opportunities for the spouse, etc.

The median income of oil employees varies considerably with localities and is in the $12,000-$15,000 range (1978). It varies even more with the type and level of skill and training, from as low as $10,000 for unskilled, usually local-hire workers to $25,000 or more plus expenses for skilled employees who have transferred into the area. In general, the longer oil activity continues in an area, the greater the chances for local-hire jobs; i.e., in field maintenance, trucking, or any needed facilities.

Most of the oil payroll is divided among the towns and cities where the employees live, the major regional shopping centers, the cities where absentee families still live, and the several levels of government that assess taxes. But this payroll is only a portion of the total economic gains stimulated by oil exploration and development. Others include:

1. Leasing rentals. Federal leasing rentals are $1 per acre annually ($2 in known geological structures) and are shared with the State. Private rentals may be much higher, varying with the assumed value of the oil reserves on the leased property.

2. Royalties to the landowner. Federal royalties vary from 12.5 to 25 percent of the value of the production, depending on the volume of production. Royalties are also shared with the State and in Montana the State's half is divided equally between the Department of Education and the Highway Department. Private royalties are negotiated on an individual contract basis and may be even higher (see chapter 2, on leasing).

3. Loans and grants available from Federal and State sources to assist counties or communities experiencing an influx of people following minerals or industrial development. Private sources may also be available.

4. Federal, State, and local tax revenues should eventually increase, including property, sales, corporate and private income, and excise taxes. Usually there is a 1- to 3-year time lag between the need for additional revenues and their availability. In Montana, affected communities can require firms to prepay property taxes for their large industrial developments that are currently under construction.

5. Equal opportunity stipulations on Federal leases and the generation of additional service occupations may increase employment opportunities for local women, minorities, and youths just entering the labor market.

6. Increases in nonbasic employment (also called induced, derived, or secondary employment). Economists believe that certain industries are basic to an area's economy because the bulk of their products are exported, bringing "new" money into the community or region. Examples might include a fruit stand selling cherries to a tourist, a farmer exporting wheat, or a sawmill selling lumber to brokers in other states. Oil production is such a basic activity.

Much of the income from exports is spent locally, thereby supporting a number of additional businesses and services. These in turn employ more people and a new round of spending is generated. The mathematical expression of the extent of new employment generated by basic industry is called an employment multiplier, which varies from less than one to three or higher, depending on how it is computed and whatever other factors may operate to exaggerate or counteract the effects of increases in certain basic industries.

Table 13 demonstrates how one might compute a rough employment multiplier for the State of Montana, using employment data for the first 11 months of 1978.

Table 13.--Basic and nonbasic employment in Montana, 1978
(expressed in thousands of employees, January-November)

Basic Industries:	Agriculture		34.0
	Manufacturing		26.2
	Mining		6.8
	Railroads		6.9
	Federal Government		13.6
	Contract Construction		16.4
		TOTAL	103.9
Nonbasic Industries	Wholesale Trade		16.2
	Retail Trade		54.9
	Finance, Insurance, Real Estate		12.0
	Services		51.9
	State & Local Government		46.6
	Other Transportation & Utilities		14.7
	Other Employment Categories		28.0
		TOTAL	224.3

Source: Adapted from State of Montana, Department of Labor. Montana Employment and Labor Force, December 1978.

$$\text{Employment Multiplier} = \frac{\text{Nonbasic}}{\text{Basic}} = \frac{224.3}{103.9} = 2.16$$

Thus a new job in basic industry in Montana might be expected to generate 1.16 other jobs (1 x 2.16 = total of 2.16 jobs).

There are other, more sophisticated ways to compute multipliers that subdivide each category of employment for a more precise accounting, or that reflect rates of change in each sector. In Montana, the Department of Community Affairs calculates and publishes multipliers for the State and each county. These are provided in appendix C.

Considerable caution is required in applying multipliers. Industries vary in the extent to which they are truly "basic," and it is not certain that the oil industry will generate the same amount of secondary employment as existing agriculture or the wood products industry. Also, exploration, drilling, and the construction of site facilities or pipelines are all temporary activities, whereas the creation of secondary businesses and employment is a gradual process, reaching its maximum after several years of continuing incentives to grow. Meanwhile, preexisting local businesses will fill the void, some expanding their operations while others require no additional employees and little extra capital investment because they already have the capacity for a greater volume of business.

Some communities experiencing oil development will at last have sufficient consumer buying power to justify new businesses or services, since petroleum employees and associated construction workers are relatively well paid (appendix B). The private sector is likely to respond first, adding motels, restaurants, a car or mobile home dealership, or possibly a realty. Later, tax revenues should increase enough to permit increased street construction, some new utilities, additional schools or hospitals, and expanded social services, any of which would create additional local employment and income.

Small-scale oil and gas development resulting in one or two small fields (1-15 wells per field) will certainly attract local notice and will at least minimally affect the physical environment. However, it will not normally disrupt the social and economic life of most areas in any serious or permanent way. The number of employees involved is relatively small and both surface exploration and drilling are usually completed within a few years. Field maintenance requires few employees and the oil will be exported and processed elsewhere.

Oil development on a slightly larger scale could significantly affect a rural area and a major discovery in the vicinity of even the largest population center in Region 1 would make a definite impact. Billings and Sidney, Montana; Dickinson, North Dakota; and Casper, Wyoming, are examples of cities that have experienced

both social and economic repercussions from oil and gas activity. Extensive operations will spur the growth of numerous oil-related businesses at one or more central locations. Possibilities include drilling contractors and their suppliers, branch offices of oil firms, heavy construction contractors, lease brokers, truck and equipment dealers, consulting firms, and others.

Detailed assessment of the future economic consequences of oil development for a specific location is difficult because of the enormous variability of oil and gas operations. Figure 3 summarizes some of these factors.

Figure 3: Factors that Govern the Speed and Scale of Oil and Gas Development and the Nature of Its Social and Economic Effects

1. Size, locations, and number of discoveries, depth of reservoirs
2. Number of firms involved and degree to which they cooperate
3. Individual company policy on hiring and transferring employees
4. Availability of local workers with appropriate skills
5. Climate and geology of the area, sufficiency of water, topography
6. Pattern of other economic activity in the community and region
7. Availability of local subcontractors with appropriate services
8. The current market price for petroleum products
9. The quality and capacity of the other commercial and public services of affected communities or counties, e.g., schools, hospitals, utilities, shopping facilities, etc.
10. The effectiveness of community planning in maximizing potentials and minimizing adverse effects
11. Local variations in labor costs, the prices of goods and services
12. The stage of oil or gas activity experienced and the type of technology employed
13. State and local taxing and revenue-sharing policies, assistance programs
14. Distance to existing pipelines or refineries
15. Public sentiment favoring or opposing oil and gas development
16. Availability and value of land for industrial, mineral, business, and residential development
17. The aggressiveness of the petroleum corporations, i.e., are they willing to take chances, to proceed on the basis of limited evidence

18. The number of available oil drilling rigs capable of probing the necessary depths
19. The original size of the impact area population, which affects the growth rate (other things being equal, slower growth means less problems)
20. Restrictions (including lease stipulations) imposed by Federal and State regulatory agencies

Thus one can only project what might happen in a given location on the basis of certain assumptions. A chart has been prepared to illustrate possible economic and demographic effects of oil and gas development in particular situations and at different stages (table 14). It is left to the reader to determine how his local situation compares and to note whether two activities are likely to occur simultaneously, thereby magnifying the total impact.

It has been necessary to make many arbitrary assumptions in order to produce table 14, some of which are included in the table margins or "comments" column. These assumptions are consistent with oil experience in one or more areas, but may not closely coincide with realities elsewhere.

Prior to the onset of oil development in your locality it should be possible to obtain an estimate of area oil potential from a petroleum geologist familiar with your Forest's geology. This will improve the accuracy of any social or economic projections.

Probability activity will occur in a specific lease block	No. of employees in this oil activity	No. who are local hire (including commuters)	Expected duration of this stage	Annual payroll of oil employees ($1000)	No. of secondary jobs induced (using the 2.12 Montana multiplier)**	(in $1000) Annual payroll of secondary employees at 1978 Montana average	Total in-migration** (excludes locals, commuters)	Housing units (mobile homes, houses or apartments) req.***	New students expected Elementary (1-3)	Secondary (8-12)	Comments on these generalizations Cautionary Note: The estimates on this chart are arbitrary. Accurate estimates of future oil activity in undeveloped areas are impossible due to variations in the number, size, & distribution of fields, corporate policies, terrain, population density of area, local wage levels, etc.
1:1	40	10-20	2 years, 8 mo. seasons	550 for 8 mo.	45	300	75 for 8 mo	10-25	0-10	0-5	.May occur before or after leasing .Lease rentals are collected whether or not exploration occurs
1:2	90	20-40	8 mo. Season	1,240	100	735	170	20-45	10-20	5-10	.Local hire factor varies with company policy and number of suitable persons available locally .This phase occurs only if other exploration results are favorable
1:10	25	5	1 year	500	28	300	55	25	0-10	0-51	
1:70	50	10	2-4 years	1,000	56	610	110	50	15	6	.Experienced rig crews preferred; normally little local hire .Support crews must also be brought into very rural areas .Costs dictate that rigs operate 24 hours daily, year-round when possible .Another firm may be developing other fields in the same Forest .Less rigs operating more years could develop a large field .Transmission lines export oil to refineries and/or markets .Pipeline crews migrate as new sections are added to a long line
1:150 or 1:300	125	25	3-6 years	2,250	140	1,500	275	120	38	16	
1:1000 or 1:1700	200	40	5-10 years	4,000	225	2,500	440	200	62	25	
1:200	highly variable 100-300 20	50-100 10	1-2 years 40	4,500 350	280* 22	3,000* 240	560 60	245 18	78 11	34 5	
	5	3	20	85	5	55	12	4	2	1	.Field crew size varies not only with field size but with the extent of local processing of gas or oil, the type of equipment (gas engines require more attention than electric motors), other factors .Field life may be extended by new wells or using special techniques to increase well yield .Gas in quantities too small to sell may be burned or used as field power sources .Modern trend is toward large refineries; newer designs require less personnel than formerly; highly unlikely in Region One
	10	6	30	170	11	120	25	7	4	2	
	20	12	40	340	22	240	50	15	8	4	
1:100	100 50	50 30	8 mo. 30 yrs.	1,350 725	112* 56	1,230* 615	170 70	74 30	24 13	10 6	
1:5000	500-800 200	200 120	2-4 yrs. 30 yrs. or more	10,500 3,500	560* 225	6,150* 2,475	950 460	400 130	130 250 or more	60 115	
1:1 if developed	variable 5	5	1-2 months	15	5	9	-	-	-	-	.Federal and State lease agreement now require reclamation of abandoned fields; wells may be converted to water sources .Percentage of local hire tends to increase with each successive stage

ıry employment; there

ıts

***Some explorers, drillers, and construction workers will live in their own portable units or live in hotels and motels, rooming houses, etc.

Other Social Effects

It is difficult to overstress the variability of the social consequences of oil and gas activity. Extremely rich finds can transform entire societies, as has been demonstrated in Saudi Arabia, Libya, Iran, and Kuwait. In contrast, very small finds may do little more than contribute to the wealth of the lease holder, and perhaps arouse the envy and curiosity of his neighbors. Although most discoveries are at the smaller end of the scale, the possibility of a really large one must always be considered when the geology of a large region is not yet thoroughly understood.

The economic aspects of petroleum activity, including costs and benefits, can be expressed in dollars and numbers and perhaps for this reason they are most often noted and reported. But oil development has the potential to generate other types of changes, some of which will seriously affect the lives of some segments of the community. Responses to these growth-related changes will range from the delight of sports fans, now that the community can field better high school teams, to the distress of the elderly, who find that their social security checks do not reach as far as they once did. Many of these innovations are hard to measure and even more difficult to evaluate in terms of positive and negative, some people will welcome them and others will find them objectionable. Figure 3 in the previous section identifies many of the factors that account for the type and rate of growth-related changes.

Present geological evidence suggests that preliminary exploration is the only phase of oil activity that most communities in Region 1 will experience if they are outside of the existing producing areas. This exploration phase, if moderate in scale and properly conducted, will normally produce few social impacts. Many communities in Beaverhead, Flathead, Powell, Granite, Lewis and Clark, and Pondera counties in Montana have experienced this activity during the past 2 field seasons. Relatively few personnel are required and, as noted in the scenario, (chapter 3) they spend only a few weeks or months in any specific place. Most firms conduct field operations mainly during the warmer months when the areas of interest are most accessible, i.e., May to November, although a few try to operate year-round except during severe weather. Employees are often single or unaccompanied by dependents, reside in transient facilities, and eat in local restaurants or carry lunches into the field. Some live in campers or small mobile homes which are readily moved from one trailer park or forest camp to another.

Exceptions to the usually low-key pattern of exploration occur when an area becomes "hot" following a significant discovery. Exploration activity will intensify as more companies field crews, and the risk of accidents and carelessness is likely to increase. The sound of trucks, helicopters, and explosives becomes more evident, as will the increased pressure on motels, restaurants, bars, and other transient facilities. Sometimes, to reduce these impacts and also cut costs, several oil firms initially pool resources, finance a single well-equipped exploration operation, and leave it to their own company geologists to interpret the results.

Well drilling requires additional specialized employees, most transferred into the region, and a broader range of support services, often obtained locally. Because of their great expense, drilling rigs are often kept in operation around the clock and throughout the year, barring severe weather. Following a discovery, crews may remain months to years in one area and additional personnel will be needed to construct site facilities, build roads and gathering pipelines, process oil or gas on-site, etc. It is at this stage that social impacts will become more evident. Not only will dozens to hundreds of new employees be required, but the greater permanence of their jobs will encourage incoming workers to bring their families with them.

Population growth rate is probably the most critical variable. In the Northern Region, a community's annual growth rate is usually under 2 percent, requiring 40 years or more to double. Then comes development. A 7 percent increase would double the population in a decade; 15 percent annually would achieve this result in just 5 years, greatly reducing the time available for adapting facilities, expanding revenues, building homes, extending services, and adjusting traditions and attitudes.

The social impact of a certain level of oil and gas activity is directly related to community size. A given number of incoming workers, say 50, would overload a rural community but be absorbed readily in even a small city of 5,000. For purposes of illustration, let us predict the events of the next few years for two fictitious western cities. Both are in the vicinity of a recent and very significant discovery which is expected to lead to the development of a medium-sized field within a few years. In the process, upwards of 200 oil activity employees will be working in the immediate area (table 14 for rough numerical estimates of in-migrants).

Farmville is a small town of 750 people in rural Forest County, some 100 miles from Urbanville, population 50,000, the nearest sizable city. The population density of the surrounding area is very low. The closest community larger than Farmville is Railtown, over 35 miles away.

Oil and gas activity leading to the development of a medium-sized field could seriously impact this sparsely populated area in several important ways.

Figure 4

Oil Development in Eastern Montana

EDITORIAL

Sidney is becoming the real hub of the oil industry in the eastern Montana area. It is experiencing rapid growth and industrial expansion plus large investments by oilfield service companies and new retail outlets are springing up.

Sidney feels exciting and the people are excited.

The community leaders are facing most of their problems with volunteer efforts and want to do something about it. They are to be commended for the way they are going about doing something about their problems and working with them.

Two groups of volunteer business leaders are examples of that cooperative community spirit.

One is the Sidney Energy Impact Committee, which wants to work with the oil industry to solve such pressing problems as a critical housing shortage and a limited sewage system. The other is the new Air Transportation Committee, which is hustling for new airlines, a better airport and letting the Federal Government know where it stands. There is no question that Sidney is a town on the move. The town leaders are to be congratulated for their past efforts in recognizing the economic impact from the oil industry.

The chamber of commerce, again largely through volunteer efforts, organized an oil appreciation days. This year, it is set for early May and organizers say it will be twice or three times as large as last year's two day show. This is a good, positive way to give the oil industry the recognition it deserves plus a real education process on how it functions. Sidney is a good example to other towns for its ability to accept new people and new problems and do something about it by involving them in the process.

Housing Problems

The housing shortage in Sidney, brought on by the oil boom, continues to be one of the key problems facing that community.

"Housing is still a heck of a problem in Sidney," declared Eldon Kemmis, chairman of the Sidney Chamber of Commerce's Energy Impact Committee, at its meeting last week.

Members of the group discussed the "tight" money situation with local banks and the inability of buyers to come up with substantial down payments.

"The interest rate on housing has gone right through the roof," one man said.

Lynn Staub, executive vice president of the chamber, said there are still a large number of people calling about rentals. The calls to the chamber, he said have dropped from ten-15 a day to seven-12 a day. Rentals for $300 a month move quickly, Staub said.

John Shontz, an executive with Community Memorial Hospital, said a survey taken by the hospital revealed that 70 per cent of the people moving into Sidney were between the ages of 18 and 25. The next group was people over 40 who are usually supervisory personnel, married and have at least one child.

Selections from the Oil Patch Hotline.; Vol. 2, No. 2, January 18, 1979, with permission.

To begin with, oil operations would require the construction of additional roads connecting oil sites with one or more major highways in the area. This will affect the social and economic life of residents and has implications for physical and biological resources.

Many, if not most oil workers, unwilling to commute 80-100 miles from Urbanville and reluctant to move to Railtown, still 35 miles away, will seek nearer accommodations, including rentals and mobile homes. Yet they will hesitate to buy or build homes because of the uncertain duration of oil-related employment at this early stage. Vacant housing and any type of transient facilities, motels, cabins, hotels, etc., will be insufficient and rents will quickly rise.

Other circumstances contribute to the plight of the small community. With fewer available local workers than in the larger town, more "imported" labor is required to do a given amount of work. Experience reveals that villages with less than 2,000 people seldom have adequate services, even for their own residents. 13/ They may lack a dentist, high school, sewer system, adequate water supply, etc. They usually have nonprofessional, part-time civic administrators and may have no procedures for planning and zoning. They may be unincorporated or their charter provides them with only limited powers for dealing with new situations. Few local contractors are available to provide support services for exploration or drilling and these workers must also be brought in.

In contrast, a discovery of equal importance in the vicinity of Urbanville might have very different consequences. The center of a market area of 50,000, Urbanville is also the hub of a network of roads and has train, bus, and airline service. Farming, grazing, timber harvesting, wood products manufacture, and mining are mainstays of the economy. Population growth has been relatively slow since 1970 and unemployment rates are above average for the State due to a cutback in mining operations this decade.

Like the majority of cities over 10,000, Urbanville has experienced long-term growth and is accustomed to a significant level of

13/ For a summary and analysis of the effects of energy development on several Rocky Mountain communities, see the extensive four-volume study: Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development, U.S. Environmental Protection Agency, 1977.

change. 14/ It has some full-time officials, professionally administered social agencies, a wide range of commercial services, and some expertise and flexibility in solving problems of growth.

Under such circumstances, this level of oil activity would generate few hardships and could, under optimal conditions, benefit the people of the area economically. Existing roads could be used for exploration, hauling equipment, and transporting oil. Both skilled and unskilled local-hire employees, some with oil or mining experience, would be available, thereby reducing the need for in-migrants. Existing housing, schools, and public services could readily absorb the limited number of newcomers. Retail outlets, owners of apartment complexes, realtors, subcontracting firms, and other businesses would welcome the additional customers. Transportation facilities ordinarily could handle the increased load.

The story does not end here. The development of a really large field or combination of smaller discoveries could easily change the destiny of Urbanville, just as the oil industry has profoundly affected the earlier development of Dallas, Texas, and on a smaller scale, Cutbank and Sidney, Montana.

As Gilmore 15/ and others have documented in community case studies, truly large-scale mineral development, whether a single large operation or a combination of smaller undertakings, can overwhelm a community, especially when there has been no coordinated effort to anticipate and meet the challenges of rapid growth. As a result of a combination of mining, oil activity, and hydroelectric power development, Rock Springs, Wyoming grew from 18,391 to 36,910 in the 1970-74 period alone, an average of 19 percent annually. The result, reports Gilmore, was:

1. A deterioration in the quality of life as population outran the community's capacity to provide facilities and services, and newcomers were not adequately integrated while older residents were disadvantaged in several ways (more on this in next chapter).

2. Industrial productivity declined 25-40 percent due to labor shortages and rapid employee turnover as distressed newcomers left the area.

14/ Communities of intermediate size (between Farmville and Urbanville), 2,000 to 10,000 population, vary considerably in their ability to cope with the challenges of development and are difficult to characterize in a general way. See the EPA reference cited in footnote 13 for more on this.

15/ Gilmore, John S. Boom Town Growth Management. Boulder, Colo.: Westview Press, 1975.

3. Both private investment in new commercial facilities and services and public revenues lagged significantly behind population growth and consumer requirements.

Such unrestricted, unmanaged growth is regrettable. Rock Springs was the victim of several independent corporate decisions to initiate or expand operations. Experiences elsewhere suggest that the same growth activity spread out over a much longer period might have been an orderly process, manageable, and perceived by the majority as an improvement in their quality of life.

The ability to cope successfully with the social and economic effects of energy development is assuming greater importance in the wake of an announced goal of National self-sufficiency in the future. In a 1977 report of the Region VIII Office of the Federal Energy Administration, 188 communities in six Rocky Mountain States were identified as possible impact areas. 16/ Half of these towns had less than 5,000 inhabitants; only twelve exceeded 10,000. Most are unaccustomed to the problems of growth and have developed no formal procedures for dealing with it. The future quality of life in each of these communities will be determined by the interaction of two sets of factors:

1. The speed and scale of development, and

2. The ability of individual communities to muster their resources to anticipate and deal with change.

16/ The Environmental Protection Agency, Region VIII, Denver. Action Handbook: Managing Growth in the Small Community, 1978, Vol. 1, p. 2.

Table 15 suggests the importance of confining development to a manageable level.

Table 15.--Three rates of population growth and their implications

Level of Change	Average Annual Rate	Characteristic Implications	Major Variables Which Intensify or Reduce the Problems
Manageable Growth	About 1 - 5%	Most difficulties can be resolved as they occur	Are there other local communities to share the population influx?
		With adaptations, growth consistent with community resources	Is the community large enough to offer a wide range of services?
			Are there knowledgeable persons to assume leadership roles?
Problem-Sector Growth	About 6 - 10%	Some sectors unable to cope with growth and services lag	Do existing community services have excess capacity, perhaps due to previous population loss or overbuilding?
		Revenues insufficient to meet community needs	Are there supplementary revenues from county, State, corporate, or Federal sources?
		Haphazard commercial development	Is there effective planning and zoning?

Boomtown Growth	11% or more	Multiple problems in most community sectors	Is there an integrated planning team, seriously committed, and consisting of representatives from major governmental and private organizations involved?
		Obvious breakdown in effectiveness of both public and private institutions	Is "front end" (advance) income available for meeting community needs?
		Growing public distress, worker absenteeism and turnover, increased incidence of social problems	Is the activity of long duration justifying permanent expansion of facilities and services?
			Are land, water, and other necessary resouces readily available?

Social problems are a normal aspect of life in any community. There are always conditions or situations that distress some segment of the population. Many such problems occur when groups differ in their judgment of what is most important or desirable among the many options available. A proposed change in community life may be welcomed by some of the residents and staunchly opposed by others. Some very stable communities are the result of an acceptable compromise between those who promote change and others who favor traditional approaches, each making some concessions to achieve harmony. Cross-cultural studies strongly suggest that most humans can readily acquire either perspective; either orientation is a product of selective training and experience.

The central problem posed for humans by energy development is that social change can occur so rapidly that it exceeds our individual or collective capacity to deal with it. We need time to identify needs, design strategies for meeting them, find the necessary money or other resources, expand facilities, etc.

It is difficult for most people to redefine priorities, change attitudes, and accept new lifestyles within a short span of time. The situation is especially critical when new social patterns are inconsistent with established community tradition and have been introduced by "outside" forces, whether television, the press, or newcomers in town. Although humans have become about the most adaptable of earth's creatures, there are nevertheless some very real physical and mental limits to this flexibility. Excessively rapid change brings these limits to the surface, as tables 15 and 17 suggest. Table 17 summarizes some of the more prevalent effects of prolonged "boomtown" development for Rocky Mountain communities.

In recent years most State governments have established agencies to assist towns and cities experiencing rapid growth due to industrial development.

Agencies in Region 1 are indicated below (table 16). The Federal Government has also established many assistance programs, summarized in appendix D.

Table 16.--State planning agencies that provide data, assistance, and funds to energy-impacted communities

State	Agency
Idaho	Division of Budget, Policy Planning, and Coordination (Economic Resources and Community Affairs)
Montana	Department of Community Affairs
North Dakota	State Planning Division
South Dakota	State Planning Agency

Appropriate colleges, departments, and institutes at State Universities can also provide data and assistance as a public service or on a contract basis, depending on the nature and scope of the project

Table 17.--Some possible social consequences of rapid change for major sectors of community life

Individuals and Family Groups	Quality of Neighborhood and Community Life	Schools, Churches, Voluntary Associations	Community, County Government	Social Aspects of the Economic Sector
Shortage of adequate housing; inflation of prices and rentals	Greater racial, cultural, and lifestyle diversity	New churches established; greater variety of denominations and sects	Political activity more intense, competitive; wider participation	Decline in production due to absenteeism; employee turnover due to worker out-migration
Inflation above National average creates hardship for persons with fixed incomes	Increased support for newer, less conventional movements in the community	New challenges to conventional morality and established customs of existing groups	Public services overburdened: police, fire, libraries, hospital, jails, juvenile home, social services, parks, swimming pools	TV cable, telephone, power companies unable to meet hookup demands
Greater incidence of anxiety, mental illness, alcoholism and other drug abuse, and suicide	Possibly improved social and employment opportunities for women and minorities	Organized groups oriented toward conservation and environment or resource development become more prominent	Increased traffic, street damage; inadequate parking	National chains open branch operations; some small businesses close
Increase in the frequency of divorce, separation, and remarriage	Decline in the effectiveness of informal community controls and an increase in formal/legal relationships	Crowded schools; demand for more classrooms, buildings, personnel (25-30% of all newcomers are school children); more competitive athletic teams and other groups, also more difficult to join	Public utilities insufficient: water, sewer	Shortage of responsible professionals and technicians: doctors, lawyers, dentists, TV repairmen, carpenters, mechanics, electricians, plumbers
Greater percentage of mothers employed outside of home	Increases in most categories of adult crime and juvenile delinquency	Social clubs and lodges may gain membership	Revenues for expanding facilities either very inadequate or 2-3 year lag behind needs	Rising unemployment: boom gets National publicity and excessive in-migration of jobless
More frequent abuse of spouses and children	Greater competition for and utilization of recreational facilities	Some shifts in relative prestige and influence of different organizations	Time and money required to plan and channel future development	Retail outlets unable to handle business volume with former courtesy and efficiency; loss of valued employees to energy jobs; real estate, construction, mobile home, vehicle dealerships, other growth-related businesses thrive
Rising rates of illegitimacy	Realinement of friendships as new issues generate cleavages and new contacts permit alternatives		Possible increases in litter, animal control problems	
Increase in the percentage of single male adults, at least during initial phases of activity	Increased noise, pollution of air and water		Long-range prospect of gains in per-capita revenues	Income redistribution due to higher rents, wages, profits, and land values

OIL AND GAS DEVELOPMENT AS A SOCIAL ISSUE

The review process required by the National Environmental Policy Act of 1969 (the NEPA process, Public Law 91-190) and the public involvement provisions of the National Forest Management Act of 1976 (PL 94-588) specify public input in Forest Service land-use planning and decisionmaking.

The public involvement process can be an important part of the total procedure for assessing public attitudes concerning oil and gas activity. It provides an opportunity to exchange information and to air viewpoints. When it is limited to occasional news releases and public meetings, however, it is unlikely to achieve its potential. Many people are intimidated by public sessions and the possibility of confrontations with forceful people of opposite views. News items are often overlooked. Other commitments may interfere with meeting attendance. Some individuals may feel too uninformed to pursue their interests, or believe that it is futile to try.

Some attempts to assess public reaction to Forest Service proposals or policies elicit responses from as few as 1 percent of the population and do not involve a cross-section of either individuals, communities, or special interest groups. A carefully designed and conducted public opinion survey could provide valuable additional data, but when questionnaires are used, certain limitations are apparent. Written questionnaires:

- involve considerable time, skill, and expense in preparation and often require Washington clearance,
- are often hastily or only partially completed,
- often weight equally the values of the informed and the uninformed, or those who are affected by development and those who are not,
- usually require high school reading ability to comprehend and intelligently respond,
- tend to have a low rate of return when mailed out or fail to reach a cross-section of people when administered to existing groups.

The U.S. political system has been called a "government of pressure groups," and the principle of joining an organization to pursue shared goals is well established. Organizations with a vital

interest in the approval or rejection of a certain energy development proposal are likely to send representatives to public forums on the subject. Typically, however, the majority of citizens in a community do not belong to these particular groups and it is unrealistic to expect them to join. Such pressure groups merit attention, but do not speak for all of the people.

We live in a time when traditional regional, ethnic, and class differences are fading, yet political and social issues remain with us. More than in the past, parents and their children or friends and neighbors may find themselves at odds on important issues. The terms liberal and conservative, denoting favoring or opposing change, are becoming less meaningful as designations for individuals because most of us favor some changes and oppose others on a selective basis. Accordingly, it is increasingly difficult to predict how people of a given category (Catholic, rancher, businessman, woman, black, Indian) will feel about a proposed change. Each important issue will have a somewhat different set of people supporting and opposing it. A given rancher may favor oil development, oppose coal mining, and feel uncertain about geothermal development due to his lack of knowledge on the subject.

In short, optimal public involvement requires that any persons affected by a proposal have adequate knowledge of the issues, opportunity to contribute their views, and motivation to do so. It suggests going to the public as well as asking the public to come to the Forest Service. Many people will be most frank, sincere, and insightful in small-group or person-to-person contacts and in the things they write. Others will respond well in public forums.

These are some suggestions for increasing public inputs:

1. Take advantage of opportunities for informal conversations with community leaders, special interest group representatives, or other concerned citizens. Try to tap the whole spectrum of area opinion, making a serious effort to listen sympathetically to every viewpoint, no matter how much it may differ from your own. It is very helpful to make some notes on each individual's perspective immediately following each discussion; only then can one effectively review and compare the different impressions at a later date. Table 18 demonstrates the wide-range of viewpoints that might be encountered in an area where oil and gas development has been proposed and fairly well publicized.

Table 18.--Demonstrating the wide spectrum of community viewpoints on the subject of local oil and gas development

FAVOR IT: WHY?		UNCERTAIN OR UNCONCERNED		OPPOSE IT: WHY?
Zealously promotes development	Generally supports development with environmental safeguards	Neutral, uncommitted or ambivalent	Generally opposes development but not unconditionally	Energetically opposes development
Expects to gain personally--money, power, or status	Believes development need not lead to environmental ruin; we can now avoid this	Perplexed: uncertain of what position to take--costs and benefits seem equally balanced	Believes: we need this kind of development but not in our locality (because of its special qualities)	Expects to lose personally--money, power, or status
Represents an organization that expects to profit from developmemnt	Thinks the local community would benefit economically, e.g., increased spending, reduced unemployment	His organization favors it but he thinks costs probably outweigh benefits for the community at large	Thinks: selected projects would be acceptable if carefully screened, planned, and scheduled to avoid most adverse effects	Represents an organization that expects to profit or attain its goals if development is halted
Strong personal commitment to such values as: free enterprise progress materialism hedonism	Thinks he would personally benefit, or perceives development as essential to the U.S. economy	Informed on the issue but indifferent about what happens	Thinks he would lose money or other values would be threatened: hunting, fishing, cheap land, etc.	Strong personal commitment to such values as: conservation ecological balance preservation frugality
Believes technology can solve any problems it creates	Finds this the politically most expedient position to support	Uninformed; no opinion; has not thought about it Includes: -would like to be informed, might then have an opinion -do not care about it -could not do anything about it anyway	Opposes development because of peer pressure from friends, co-workers, or ethnic group	Believes the very survival of humanity is now threatened
	Concerned about specific issues: National and Regional energy shortages, our dependence on foreign oil, international balance of payments, defense readiness, etc.		Concerned about specific issues: adequacy of natural resources for future generations, effects on wildlife, air pollution, water pollution, noise, crime, inflation, etc.	

2. Scan local publications that attempt to provide insight into the issues of the day, including articles, editorials, and letters to the editor. Back issues are often available in libraries or at publishers' offices. Include publications of concerned special interest groups in the vicinity.

3. Utilize existing surveys of State agencies, county planning commissions, communities, or other organizations. Put each survey into perspective by noting if it was done for a special purpose, if the questions were asked in an unbiased way and permitted a wide-range of answers, and if a cross-section of the community probably responded.

4. Find out if social scientists have conducted any relevant studies of your communities or other communities of similar ethnic and economic composition that have already experienced similar changes. Although some of the work of social scientists tends to be rather obsure, many community studies are quite readable and can provide significant insights or data.

5. Read the public response sections in EAR's or EIS's dealing with the same or similar situations in other Forests.

6. Attend open meetings of other organizations when they are discussing the issues at hand.

7. Consistent with Forest Service policy, keep the public informed of developments, so that their responses will become more frequent and fact-based.

8. Appendix F contains an example of a community response survey combining several of these techniques but requiring relatively little time.

For further suggestions, see the Forest Service Inform and Involve Handbook, scheduled for publication early in 1979. It includes both numerous techniques for public assessment and procedures for analyzing results.

ADVERSE EFFECTS AND MITIGATING MEASURES

Small-scale oil and gas activity in Region 1 is not expected to produce serious adverse effects for the people of the Region. Prospective lease areas are widely scattered and the number of people involved in exploration and development would be small.

Nevertheless, individual cases of hardship or inconvenience are likely to occur. Even a modest influx of people and equipment in a sparsely populated area may increase rents or result in temporary shortages of homes, vehicle mechanics, or transient facilities. The noise of explosives, thumper trucks, or drilling rigs will disturb some people. Helicopters or airplanes may add to the problem.

With small-scale development of oil or gas, local increases in water or air pollution are possible due to accidents, carelessness, or increased vehicle use. Some recreation seekers may find oil activity distracting and visually "out of place" in a scenic mountain setting. Sportsmen may feel that hunting or fishing potentials have been reduced. Wilderness advocates will be concerned about possible harm to plants and animals in the impacted area.

Large-scale development could and often does have serious negative effects, especially in the absence of advance local planning and carefully programmed, gradual development by the firms involved. Rapid development has the potential to produce a series of events and problems that exceed the community's capacity for resolving them. Aside from substantial increases in behavior patterns locally defined as deviant, communities will experience rapid price increases, intensified competition for goods and services, uncoordinated real estate development, overloaded public services, and a weakening of informal controls, thus forcing greater reliance on police and the courts. Add this to the dilemma faced by developing communities when local tax revenues are insufficient or too tardy to permit officials to deal with the wide range of emerging problems.

A substantial oil find in one Forest unit could create tremendous political and economic pressures to extend the search to adjacent areas with similar geological features. Preventing adverse impacts would become more difficult with each successive thrust of development.

Many Rocky Mountain West communities have already come to grips with the full sequence of energy exploration and development, particularly in the coal-rich areas. Their experiences reveal that advance planning can reduce the adverse effects that might otherwise occur. Possibilities include:

1. Stipulations in the leasing agreement can insure that scenic values and water and air quality are maximally safeguarded during exploration and development. Such stipulations can require careful reclamation of drill sites and camouflaging of facilities.

2. The following measures, if implemented, should also reduce adverse local effects from oil and gas activities:

a. Secure commitments from participating oil or gas firms to hire as many local employees as possible.

b. Keep impact area residents fully informed of development plans, including specific areas involved, personnel requirements, procedures used, duration of activity, and prospects for local contractors.

c. Involve the Forest Service, participating oil firms, and local communities in joint advance planning to insure orderly development.

3. Identify appropriate Federal, State, county, and private sources of financial assistance. Some of these are listed in table 16 and appendix D in this document.

FUTURE OPTIONS IN ENERGY UTILIZATION

Many observers believe we are still on a collision course between a growing population with aspirations for high living standards and a rapidly depleting supply of energy and other resources. 17/ Some of these critics predict that we will run out of petroleum, natural gas, and new sources of hydroelectric energy by the end of this century, with grave implications for succeeding generations, not only in the U.S. but for much of the world. Additionally, the future political climate of some exporting countries and growing competition from oil customers on other continents can readily result in insufficient or prohibitively expensive oil products.

Part of this pessimism has been a tendency to confuse known or proven reserves of fossil fuels (and other resources) with total resources, which are much more extensive. The discovery and development of these energy sources is contingent on our willingness to pay higher prices for gasoline, fuel, oil, and for assorted petrochemcial products. There are additional costs in lost scenic values, potentially greater pollution, and possible hazards like oil spills.

The scope and complexity of our energy problem is greater than a lot of us like to admit. It cannot be reduced to "greedy corporations with insatiable appetites" or "impractical visionaries from prosperous families who now want to 'sit on' resources." We are a growing nation of people increasingly "addicted" to fossil fuels. Our homes have been getting larger in relation to the number of people living in them and we like them very warm in winter and cool in summer. We now utilize one automobile for every two people and most of us drive more miles than our parents did. Recent increases in the cost of gasoline have hardly reduced our consumption. Although some believe we must either "kick the habit" or suffer the consequences, others see room for compromise.

17/ Prominent among these assessments is the work of Dennis L. Meadows, whose computer scenarios predict eventual disaster for mankind, e.g., in the The Futurist, August, 1971, or Paul R. Ehrlich's books and articles, e.g., Population, Resources, Environment, latest ed., San Francisco; W. H. Freeman Co. These are but two of literally thousands of books and articles on this theme published during the early 1970's when the Nation-wide Environment Movement enjoyed its greatest vigor. For an alternative perspective, see: Solow, R. M. "The Economics of Resources or Resources of Economics," American Economic Review. Vol. 50, No. 2, and David A. Stockman, "The Wrong War?" The Case Against a National Energy Policy," The Public Interest, No. 53, Fall 1978.

In our expanding quest for new sources of oil and gas, we are also considering alternative fuel sources. The rising cost of petroleum and public concern for the future are stimulating interest in some of the following options to growing dependence on foreign oil.

1. Convert the organic wastes of cities to fuel; this is already being done on a very limited scale. Manufacture gas from coal.

2. More efficiently allocate petroleum products by substituting whenever possible existing alternative fuels or chemicals, e.g., wood, coal, and their by-products, or nuclear energy.

3. Reduce consumption through such mechanisms as improved insulation, higher fuel taxes, smaller autos, raised age for licensed drivers, electric "second" cars, realistic heating and cooling practices in homes and other buildings, rewarding the use of buses, trains, and bicycles (in place of private autos and airplanes), gasoline rationing, and improved community design to make consumer facilities more accessible. Currently we are moving slowly in some of these directions.

4. Increase the efficiency and reduce the cost of alternative energy forms, e.g., hydrogen (a promising petroleum substitute) 18/; solar, wind, and tidal power; nuclear fusion; geothermal power; and shale and tar sand oils.

5. Stabilize population levels, thereby reducing the number of new consumers each generation.

6. Produce factory goods of far better quality, capable of lasting much longer. This could conserve both energy and mineral resources.

7. Reclaim and recycle lubricating oils and other petroleum products.

18/ See, for example, Cox, Kenneth E., Ed. Hydrogen Energy: A Bibliography with Abstracts. Albuquerque, N.M.: The University of N.M. College of Engineering, 1974. Hydrogen fuel is viewed as very promising and no more dangerous to utilize than natural gas.

The National Academy of Science has effectively argued that there are ultimate technological and economic limits to our supplies of conventional forms of energy. 19/ Sometime in the future it will become too difficult or prohibitively expensive to tap further natural sources of petroleum. One may therefore expect greater reliance on some combination of the above or other, yet unidentified alternatives in the near future. The question seems to be: will we move rapidly enough to avoid serious and widespread energy shortages along the way?

19/ National Acadamy of Sciences. Mineral Resources and the Environment. Washington, D.C.: National Academy of Sciences, 1975.

Appendix A: State Agencies Preparing Populations Estimates and Projections.

Idaho: Bureau of Vital Statistics
Idaho Dept. of Health and Welfare
Statehouse
Boise, Idaho 83720

Montana: Bureau of Business and Economic Research
University of Montana
Missoula, Montana 59801

Research and Information Systems Division
Montana Dept. of Community Affairs
Capitol Post Office
Helena, Montana 59601

North Dakota: Office of Statistical Services
North Dakota Dept. of Health
State Capitol
Bismarck, North Dakota 58505

REAP Economic Demographic Model
Contact REAP, c/o Legislative Council
State Capitol
Bismarck, North Dakota 58505

South Dakota: South Dakota State Planning Bureau
Pierre, South Dakota 57501

Public Health Statistics
State Dept. of Health
Foss Building
Pierre, South Dakota 57501

United States: U.S. Bureau of the Census,
U.S. Dept. of Commerce
Current Population Reports, Series P-26
Washington, D.C.

Available in most major libraries

Sources: U.S. Dept. of Commerce Survey, 1975-76, published December 1978; individual publications of these State Agencies.

RESIDENCE DATA
(ESTABLISHMENT DATA in italics)

Table IV

MONTANA

Statewide Employment by Industry

February 1979
in Thousands

INDUSTRY	Feb. 1979	Jan. 1979	Feb. 1978	Net Changes to Current Month from: Jan. 1979	Feb. 1978
CIVILIAN LABOR FORCE - PERSONS[1]	357.2	356.2	342.5	1.0	14.7
EMPLOYED PERSONS	335.1	329.6	316.8	5.5	18.3
Persons Employed in Agriculture	23.2	21.3	23.9	1.9	-.7
UNEMPLOYED PERSONS	22.1	26.6	25.7	-4.5	-3.6
Percent of Labor Force, Unadjusted[2]	*6.2*	*7.5*	*7.5*	*-1.3*	*-1.3*
Percent of Labor Force, Seasonally Adjusted[2]	*4.9*	*6.0*	*6.1*	*-1.1*	*-1.2*
NON-FARM WAGE AND SALARY JOBS (Establishment Data)	*270.6*	*271.2*	*261.3*	*-.6*	*9.3*
MANUFACTURING	*26.6*	*26.5*	*25.0*	*.1*	*1.6*
Durable Goods	*17.2*	*17.2*	*16.4*	*0*	*.8*
24 Lumber and Wood Products	*10.8*	*10.8*	*10.2*	*0*	*.6*
33 Primary Metal Industries	*3.1*	*3.1*	*3.2*	*0*	*-.1*
Other Durable Goods	*3.3*	*3.3*	*3.0*	*0*	*.3*
Nondurable Goods	*9.4*	*9.3*	*8.6*	*.1*	*.8*
20 Food and Kindred Products	*4.3*	*4.3*	*4.0*	*0*	*.3*
27 Printing and Publishing	*2.3*	*2.3*	*2.2*	*0*	*.1*
29 Petroleum and Coal Products	*1.0*	*1.0*	*1.0*	*0*	*0*
Other Nondurable Goods	*1.8*	*1.7*	*1.4*	*.1*	*.4*
MINING	*7.5*	*7.5*	*6.0*	*0*	*1.5*
10 Metal Mining	*2.3*	*2.3*	*2.0*	*0*	*.3*
12 & 14 Bitum. Coal, Quarrying, Non-Metal Mining	*2.0*	*2.0*	*1.6*	*0*	*.4*
13 Oil and Gas Extraction	*3.2*	*3.2*	*2.4*	*0*	*.8*
CONTRACT CONSTRUCTION	*13.3*	*13.4*	*12.2*	*-.1*	*1.1*
15 General Building Contractors	*4.3*	*4.4*	*4.1*	*-.1*	*.2*
16 Heavy Construction Contractors	*3.7*	*3.6*	*3.5*	*.1*	*.2*
17 Special Trade Contractors	*5.3*	*5.4*	*4.6*	*-.1*	*.7*
TRANSPORTATION AND PUBLIC UTILITIES	*21.5*	*21.5*	*20.3*	*0*	*1.2*
40 Railroad Transportation	*6.5*	*6.5*	*6.3*	*0*	*.2*
41-47 Transportation, except Railroad	*6.6*	*6.6*	*6.1*	*0*	*.5*
48 & 49 Commun., Electric, Gas, Sanitary Services	*8.4*	*8.4*	*7.9*	*0*	*.5*
WHOLESALE AND RETAIL TRADE	*70.1*	*70.3*	*65.4*	*-.2*	*4.7*
Wholesale Trade	*16.1*	*16.2*	*15.5*	*-.1*	*.6*
Retail Trade	*54.0*	*54.1*	*49.9*	*-.1*	*4.1*
53 & 56 General Merchandise, Apparel, Accessories	*8.3*	*8.6*	*7.8*	*-.3*	*.5*
54 Food Stores	*7.6*	*7.6*	*7.0*	*0*	*.6*
55 Automotive Dealers, Service Stations	*8.4*	*8.5*	*8.1*	*-.1*	*.3*
58 Eating and Drinking Places	*19.1*	*18.9*	*17.2*	*.2*	*1.9*
52, 57, 59 Bldg. Mat., Farm Equip., Furn., Misc.	*10.6*	*10.5*	*9.8*	*.1*	*.8*
FINANCE, INSURANCE AND REAL ESTATE	*12.6*	*12.2*	*11.6*	*.4*	*1.0*
SERVICES	*51.4*	*51.5*	*49.1*	*-.1*	*2.3*
70 Hotels and other Lodging Places	*6.4*	*6.3*	*5.8*	*.1*	*.6*
72 Personal Services	*2.6*	*2.7*	*2.5*	*-.1*	*.1*
80 Medical and other Health Services	*16.5*	*16.2*	*16.6*	*.1*	*.3*
Other Services	*25.5*	*25.7*	*24.2*	*-.2*	*1.3*
GOVERNMENT	*67.6*	*68.3*	*71.7*	*-.7*	*-4.1*
91 Federal Government	*11.2*	*11.5*	*12.5*	*-.3*	*-1.3*
92 State Colleges and Universities	*8.5*	*8.5*	*8.9*	*0*	*-.4*
92 Other State Government	*10.1*	*11.0*	*11.2*	*-.9*	*-1.1*
93 Local Education	*24.3*	*24.1*	*25.4*	*.2*	*-1.1*
93 Other Local Government	*13.5*	*13.2*	*13.7*	*.3*	*-.2*

1/ *Estimates based on National Household Sample, Census and Other Relationships; includes self-employed, unpaid family, and domestic workers. Current month preliminary. Revised to 1978 benchmarks.*
2/ *Computed from whole (unrounded) numbers.*
Establishment Series Base: January 1964; Residence Series Base: Dec. and 1970.

Source: Montana Dept of Labor and Industries, Montana Employment and Labor

Appendix B, continued

1978 data

Average Hours and Earnings of Private Nonagricultural Industries, 1978 (1)

AVERAGE WEEKLY EARNINGS

	Jan.	Feb	Mar	Apr.	May	June	July	Aug	Sept.	Oct.	Nov.	Dec	Avg
TOTAL PRIVATE	$205.19	$209.19	$211.28	$207.77	$208.58	$216.58	$217.49	$214.68	$215.27	$218.40	$218.19	$217.56	$212.51
MANUFACTURING	322.77	323.79	324.00	323.04	328.94	343.54	330.03	338.35	328.75	337.42	355.18	341.01	333.89
Durable Goods	325.13	329.18	329.29	319.40	324.72	345.28	325.58	334.22	323.78	332.05	356.26	340.69	331.70
Primary Metal Industries	321.19	322.97	319.60	328.32	316.23	335.79	328.10	329.02	327.71	341.56	345.71	326.38	328.87
Nondurable Goods	318.38	312.42	332.21	330.81	340.69	338.86	342.27	350.83	341.14	350.24	351.53	341.48	337.41
Food and Kindred Products	265.41	254.04	287.29	270.73	267.44	270.95	280.90	284.20	273.62	270.82	270.09	280.45	273.08
MINING	371.13	336.15	363.65	372.75	374.22	373.57	377.31	361.78	411.77	436.49	423.65	434.73	387.56
Metal Mining	422.92	380.15	392.22	394.61	402.20	384.38	420.39	379.84	415.42	460.63	420.20	477.17	411.98
CONTRACT CONSTRUCTION	438.51	446.88	414.59	406.55	386.51	386.63	373.11	367.89	354.45	367.74	355.98	339.35	388.02
TRANSPORTATION AND PUBLIC UTILITIES	298.69	297.66	297.36	305.34	298.29	300.24	304.29	311.52	319.28	311.66	312.94	321.62	306.45
Commun., Elec., Gas, San., Services	284.93	291.98	284.57	306.68	291.41	289.07	294.53	300.71	324.88	310.31	316.24	312.18	300.84
WHOLESALE AND RETAIL TRADE	156.60	158.58	159.56	161.05	160.36	173.06	176.17	165.50	166.32	169.16	167.84	170.84	165.31
FINANCE, INSURANCE, AND REAL ESTATE	150.22	144.14	144.36	148.47	144.09	146.17	148.73	148.32	148.08	149.76	149.23	144.90	147.01
SERVICES	133.27	132.80	131.27	132.73	132.80	133.53	135.14	134.40	137.02	137.09	137.02	137.76	134.61

AVERAGE WEEKLY HOURS

TOTAL PRIVATE	35.5	35.5	35.6	35.7	35.9	36.4	36.8	35.9	35.7	36.1	36.0	36.2	35.9
MANUFACTURING	43.5	43.0	43.2	42.9	43.8	44.5	41.1	42.4	41.3	41.3	43.0	42.1	42.7
Durable Goods	43.7	43.6	43.4	42.7	44.0	44.9	40.8	42.2	41.3	41.3	43.5	41.7	42.8
Primary Metal Industries	40.3	39.1	40.0	39.7	36.9	37.9	37.2	36.5	37.7	37.7	38.2	37.5	38.2
Nondurable Goods	43.2	41.6	42.7	43.3	43.4	43.5	42.1	43.1	41.4	41.4	41.7	42.9	42.5
Food and Kindred Products	46.4	43.8	45.1	45.5	42.7	44.2	44.8	45.4	43.5	43.4	42.4	44.8	44.4
MINING	41.7	40.5	41.8	42.6	42.0	41.6	41.6	42.5	45.2	47.6	46.2	47.1	43.4
Metal Mining	41.1	40.1	39.9	39.9	40.1	36.4	39.4	35.8	38.5	41.8	38.2	43.3	39.5
CONTRACT CONSTRUCTION	32.7	32.5	31.6	34.6	34.2	34.8	35.1	34.6	33.0	34.4	34.0	33.8	33.9
TRANSPORTATION AND PUBLIC UTILITIES	41.6	41.0	41.3	42.0	41.2	41.7	40.9	41.1	41.9	40.9	40.8	41.5	41.3
Commun., Elec., Gas, San., Services	42.4	42.5	42.6	45.3	43.3	43.6	43.7	43.9	45.5	43.4	43.8	43.0	43.6
WHOLESALE AND RETAIL TRADE	32.9	32.9	33.1	32.8	33.2	34.0	36.1	33.1	33.0	33.9	33.5	34.1	33.6
FINANCE, INSURANCE, AND REAL ESTATE	37.0	36.4	37.4	36.3	36.0	37.1	36.1	36.6	36.2	36.0	35.7	35.0	36.3
SERVICES	33.4	33.2	32.9	33.1	33.2	33.3	33.7	33.6	33.5	33.6	33.5	33.6	33.4

AVERAGE HOURLY EARNINGS

TOTAL PRIVATE	$5.78	$5.89	$5.71	$5.82	$5.81	$5.95	$5.91	$5.98	$6.03	$6.05	$6.06	$6.01	$5.92
MANUFACTURING	7.42	7.53	7.50	7.53	7.51	7.72	8.03	7.98	7.96	8.17	8.26	8.10	7.81
Durable Goods	7.44	7.55	7.38	7.48	7.38	7.69	7.98	7.92	7.83	8.04	8.19	8.17	7.75
Primary Metal Industries	7.97	8.26	7.97	8.27	8.57	8.86	8.82	8.85	8.95	9.06	9.05	8.97	8.63
Nondurable Goods	7.37	7.51	7.78	7.64	7.85	7.79	8.13	8.14	8.24	8.46	8.43	7.96	7.94
Food and Kindred Products	5.72	5.80	6.37	5.95	6.12	6.13	6.27	6.26	6.29	6.24	6.37	6.26	6.15
MINING	8.90	8.30	8.70	8.75	8.91	8.98	9.07	8.92	9.11	9.17	9.17	9.23	8.93
Metal Mining	10.29	9.48	9.83	9.89	10.03	10.56	10.67	10.61	10.79	11.02	11.00	11.02	10.43
CONTRACT CONSTRUCTION	13.41	13.75	13.12	11.75	11.36	11.11	10.63	10.63	10.74	10.69	10.47	10.04	11.48
TRANSPORTATION AND PUBLIC UTILITIES	7.18	7.26	7.20	7.27	7.24	7.20	7.44	7.58	7.62	7.62	7.67	7.75	7.42
Commun., Elec., Gas, San., Services	6.72	6.87	6.68	6.77	6.73	6.63	6.74	6.85	7.14	7.15	7.22	7.26	6.90
WHOLESALE AND RETAIL TRADE	4.76	4.82	4.73	4.91	4.83	5.09	4.88	5.00	5.04	4.99	5.01	5.01	4.92
FINANCE, INSURANCE, AND REAL ESTATE	4.06	3.96	3.86	4.09	4.00	3.94	4.12	4.03	4.09	4.16	4.18	4.14	4.05
SERVICES	3.99	4.00	3.99	4.01	4.00	4.01	4.01	4.00	4.09	4.08	4.09	4.10	4.03

(1) *based on reports from cooperating establishments, and covers both full and part-time production and related workers who worked during or received pay for any part of the weekly pay period including the 12th of each month. Figures are average of gross earnings including overtime and premium pay. Selected Industries series began January 1950; Total Private Sector series began January 1968.*
Prepared in cooperation with U.S. Department of Labor, Bureau of Labor Statistics.

Appendix C: Employment Multipliers for Montana Counties, 1976.

The State	2.29	Lincoln	1.26
Beaverhead	2.29	Madison	1.84
Big Horn	1.21	McCone	.95
Blaine	1.81	Meagher	1.42
Broadwater	1.31	Mineral	1.54
Carbon	1.98	Missoula	3.96
Carter	1.01	Phillips	1.86
Cascade	2.49	Pondera	2.47
Chouteau	.89	Powder River	.98
Custer	3.52	Powell	1.05
Daniels	1.74	Prairie	1.48
Dawson	2.47	Ravalli	1.55
Deer Lodge	1.32	Richland	2.08
Fallon	1.58	Roosevelt	1.88
Fergus	2.52	Rosebud	2.06
Flathead	1.96	Sanders	1.85
Gallatin	2.18	Sheridan	1.70
Garfield	1.18	Silver Bow	2.66
Glacier	1.51	Stillwater	1.34
Golden Valley	.98	Sweet Grass	1.68
Granite	1.35	Teton	1.46
Hill	2.55	Toole	2.12
Jefferson	.91	Treasure	.99
Judith Basin	1.14	Valley	2.78
Lake	1.84	Wheatland	1.85
Lewis & Clark	2.28	Wibaux	1.49
Liberty	1.49	Yellowstone	2.28

Source: Summary of the Construction of the Montana Alternative Simulation System, Montana Department of Community Affairs, April 1978.

Source: U.S. Environmental Protection Agency, Office of Research and Development. Energy from the West: A Progress Report of a Technology Assessment of Western Energy Resource Development. Vol. III, pp. 1059-1066, July 1977.

TABLE 14-6: FEDERAL ASSISTANCE PROGRAMS AVAILABLE TO ENERGY-IMPACTED COMMUNITIES

Community Facility or Service Category	Source of Funds	Title of Program	Uses, Restrictions and Eligibility Requirements
Housing	Economic Development Administration	Economic Development - Technical Assistance	Referred to as "Title 3". Flexible[a] Uses. A-95 review required. Requires state plan.
	Farmers Home Administration	Rural Housing Site Loans	A-95 review required.
		Rural Rental Housing Loans	Occupants must be low- to moderate-income families or senior citizens. A-95 review required.
		Rural Self-Help Housing Technical Assistance	Project grants. To help peple build homes. Limited to low-income rural families.
		Business and Industrial Development Loans	To improve economic and environmental climate. Flexible. Preference for projects benefiting people living in rural areas next to cities of less than 25,000 in population. A-95 review required.
		Industrial Development Grants	To improve economy of rural areas. Very flexible. A-95 review required.
	Housing and Urban Development (HUD)	Community Development Block Grants/Discretionary Grants	Does not include community facilities. Flexible.
	Other Assistance		Contact HUD for information on mortgage insurance programs.

TABLE 14-6: (Continued)

Community Facility or Service Category	Source of Funds	Title of Program	Uses, Restrictions and Eligibility Requirements
Water Supply and Sewage Treatment	Economic Development Administration	Economic Development-Technical Assistance	Referred to as "Title 3". Flexible Uses. A-95 review required. Requires state plan.
		Economic Development - Special Economic Development and Adjustment Assistance Program.	Profit-making organizations are not eligible. Very Flexible. Referred to as "Title 9".
	Farmers Home Administration	Irrigation, Drainage, and Other Soil and Water Conservation Loans	Limited to helping organizations serving residents of open country and rural communities up to 5,500 population. A-95 review required.
		Rural Housing Site Loans	A-95 review required.
		Resource Conservation and Development Loans	To increase economic opportunities for local people. Public agencies and local non-profit corporations in authorized Resource Conservation and Development areas. A-95 review required.
		Water and Waste Disposal Systems for Rural Communities	Guaranteed/insured loans and project grants. Service area must not exceed population of 10,000. A-95 review required.
		Community Facility Loans	Very flexible. Must serve rural people and communities less than 10,000 in population. A-95 review required.
		Industrial Development Grants	To improve economy of rural areas. Very flexible. A-95 review required.

TABLE 14-6: (Continued)

Community Facility or Service Category	Source of Funds	Title of Program	Uses, Restrictions and Eligibility Requirements
Water Supply and Sewage Treatment	Environmental Protection Agency	Construction Grouts for Wastewater Treatment Works	Community must be high on state's Priority list. A-95 review required.
	Four Corners Regional Commission	Four Corners Regional Economic Development	Only available to communities in Arizona, Colorado, New Mexico, and Utah. A-95 review required.
	Housing and Urban Development	Community Development Block Grants/Discretionary Grants	Does not include community facilities. Flexible.
	Old West Regional Commission	Old West Regional Economic Development	Only available to communities in Montana, Nebraska, North Dakota, South Dakota, and Wyoming.
	Other Assistance		Contact Federal Disaster Assistance Administration at HUD; Soil Conservation Service and EPA for technical assistance.
Hospitals, Health Facilities and Social Services	Economic Development Administration	Economic Development - Technical Assistance	Referred to as "Title 3", flexible. A-95 review required. Requires state plan.
		Economic Development - Special Economic Development and Adjustment Assistance Program	Profit-making organizations are not eligible. Very flexible. Referred to as "Title 9".
	Farmers Home Administration	Business and Industrial Development Loans	To improve economic and environmental climate. Flexible. Preference for projects benefiting people living in rural areas next to cities of less than 25,000 in population. A-95 review required.

TABLE 14-6: (Continued)

Community Facility or Service Category	Source of Funds	Title of Program	Uses, Restrictions and Eligibility Requirements
Hospitals, Health Facilities and Social Services		Community Facilities Loans	Very flexible. Must serve rural people and communities less than 10,000 in population. A-95 review required.
	Four Corners Regional Commission	Four Corners Regional Economic Development	Only available to communities in Montana, Nebraska, North Dakota, South Dakota, and Wyoming.
	Health, Education and Welfare (HEW)	Family Planning Projects	Any public or non-profit private entity is eligible.
		Drug Abuse Community Service Programs	Project grants and research contracts.
		Mental Health - Community Health Center	Project grants for construction. Federal share from 1/3 to 2/3 costs.
		National Health Services Corps	Provides for the assignment of health personnel in communities.
		Family Health Center	Very flexible.
		Emergency Medical Services	Very flexible. A-95 review required.
		Alcohol and Drug Abuse Prevention	Project grants for alcohol and drug abuse education.
		Child Development - Head Start	Designed for children of low income families.
		Child Development - Child Abuse and Neglect Prevention and Treatment	Project grants. Flexible.

TABLE 14-6: (Continued)

Community Facility or Service Category	Source of Funds	Title of Program	Uses, Restrictions and Eligibility Requirements
Hospitals, Health Facilities and Social Services	General Services Administration	Disposal of Federal Surplus, Real Property	Flexible.
	Other Assistance		Contact State Health Department for Assistance and Grants
Roads	Economic Development Administration	Economic Development - Technical Assistance	Referred to as "Title 3". Flexible. A-95 review required. Requires state plan.
		Economic Development - Special Economic Development and Adjustment Assistance Program	Profit-making organizations are not eligible. Very flexible. Referred to as "Title 9".
	Farmers Home Administration	Rural Housing Site Loans	A-95 review required.
		Community Facilities Loans	Very flexible. Must serve rural people and communities less than 10,000 in population. A-95 review required.
	Four Corners Regional Commission	Four Corners Regional Economic Development	Only available to communities in Arizona, Colorado, New Mexico, and Utah. A-95 review required.
	Housing and Urban Development	Community Development Block Grants/ Discretionary Grants	Does not include community facilities. Flexible.
	Old West Regional Commission	Old West Regional Economic Development	Only available to communities in Montana, Nebraska, North Dakota, South Dakota, and Wyoming.

TABLE 14-6: (Continued)

Community Facility or Service Category	Source of Funds	Title of Program	Uses, Restrictions and Eligibility Requirements
Roads	Other Assistance		Contact Federal Disaster Assistance Administration at HUD.
Law Enforcement and Fire Protection	Farmers Home Administration	Community Facility Loans	Very flexible. Must serve rural people and communities less than 10,000 in population. A-95 review required.
	Forest Service	Cooperative Law Enforcement	Local law enforcement unit must be able to enforce state and local laws on lands within the national forests.
		Cooperative Forest Fire Control	Assistance is available indirectly through state.
	Other Assistance		Contact Law Enforcement Assistance Agency for technical assistance. Contact Bureau of Mines for mine fires. CFDA No. 15,301.[b]
Recreation	Bureau of Land Management	Public Land for Recreation, Public Purposes and Historic Purposes.	Flexible.
		Small Reclamation Projects	Limited to 17 western-most states. Very flexible.
	Economic Development Administration	Economic Development - Technical Assistance	Referred to as "Title 3". Flexible. A-95 review required. Requires state plan.
		Economic Development - Special Economic Development and Adjustment Assistance Program	Profit-making organizations are not eligible. Very flexible. Referred to as "Title 9."
	Farmers Home Administration	Recreation Facility Loans	To help farmers and ranchers to convert land into recreational facility. Must seek other loans first.

TABLE 14-6: (Continued)

Community Facility or Service Category	Source of Funds	Title of Program	Uses, Restrictions and Eligibility Requirements
Recreation	Farmers Home Administration	Resource Conservation and Development Loans	To increase economic opportunities for local people. Public agencies and local non-profit corporations in authorized resource conservation and development areas. A-95 review required.
		Rural Rental Housing Loans	Occupants must be low- to moderate-income families or senior citizens. A-95 review required.
		Watershed Protection and Flood Prevention Loans	Cannot exceed $5,000 in one watershed. Very flexible. A-95 review required.
		Business and Industrial Development Loans	To improve economic and environmental climate. Flexible. Preference for projects benefiting people living in rural areas next to cities of less than 25,000 in population. A-95 review required.
		Community Facility Loans	Very flexible. Must serve rural people and communities less than 10,000 in population. A-95 review required.
	Four Corners Regional Commission		Only available to communities in Arizona, Colorado, New Mexico, and Utah. A-95 review required.
	Old West Regional Commission	Old West Regional Economic Development	Only available to communities in Montana, Nebraska, North Dakota, South Dakota, and Wyoming.

TABLE 14-6: (Continued)

Community Facility or Service Category	Source of Funds	Title of Program	Uses, Restrictions and Eligibility Requirements
Recreation	Old West Regional Commission Other Assistance	Assistance	Only available to communities in Montana, Nebraska, North Dakota, South Dakota, and Wyoming. Contact Soil Conservation Service, CFDA No. 10.901 and 10.904.[b] Contact National Park Service for Surplus Wildlife.

Source: Information adapted from Rapp, Donald A. Western Boomtowns, Part I, Amended: A Comparative Analysis of State Actions, Special Report to the Governors. Denver, Colo.: Western Governors' Regional Energy Policy Office, 1976, pp. 58-68 and U.S., Department of Housing and Urban Development, Office of Community Planning and Development. Rapid Growth from Energy Projects: Ideas for State and Local Action, A Program Guide. Washington, D.C.: Government Printing Office, 1976, pp. 35-45.

[a]Term "flexible" indicates the application of the program is broad with regard to what kinds of projects can be funded, who can apply, and/or the financial requirements placed on the applicant.

[b]Program code number from U.S., Office of Management and Budget. Catalogue of Federal Domestic Assistance. Washington, D.C.: Government Printing Office, printed annually.

Appendix E: Suggested Content for the Socioeconomic Sections of an EIS or Program EAR on Oil and Gas Leasing.

The outline below summarizes the topics normally included in a major ES. Related chapters presented earlier in this document contain guidance and data for preparing most sections on this outline.

Your ES narrative will have to be oriented to your unique social, economic, and cultural environment. A combination of Federal, State, county, and public and private local sources will be needed to present a complete set of baseline information, realistic projections, and public input.

Ordinarily the information is presented in a narrative supplemented with tables, charts, maps and/or photographs. The sequence below is typical.

A. Define the impact areas. Especially critical are the local (communities most directly involved) and regional (one or more counties most affected) areas. Chapter 5, "Location of the Discovery."

B. Describe the existing environment. The resulting portrait is the "baseline" data. Significant levels of energy development are likely to stimulate changes which would not otherwise occur, or would not occur as rapidly.

The guiding principle in selecting information for inclusion is: Could this aspect of social life be affected by energy development?

1. Social data

a. A brief history of the area's social and economic transformation, dating from the American Indian period to the present (some Forests have historians who may provide assistance on this).

b. Characterize the life-styles, values, and contemporary attitudes of the peoples of the affected areas.

(1) Do the majority of the people share a set of distinctive Regional characteristics or orientations? If so, summarize them.

(2) Describe any local minority groups: racial, ethnic, religious, or lifestyle.

(3) Are there distinguishable special interest groups that are in opposition on the oil and gas issue? If so, who are they and what is the basis for their disagreement?

(4) Types and extent of deviant behavior could be included here.

2. Demographic data

a. Population statistics (appendix A for State sources)

(1) Present size and trends from say, 1950-2000.

(2) Rural-urban distribution, identity of major population centers.

(3) Vital statistics: birth, death, marriage, divorce, in-migration, and/or out-migration rates may be relevant.

(4) Health data, when significant: disease, traffic accidents, etc.

(5) Age distribution or median age of population.

(6) Educational attainment.

b. Statistics in this section will be more meaningful if the affected area is compared with both State and National averages. In fact, this process will help you decide when statistics are or are not relevant enough to include, i.e., if your area has been growing much less rapidly than the State (or even losing population), energy development may be more welcome than in an area that is already fast growing.

3. Economic data

a. Major sources of employment and any significant trends in the level of employment in each sector.

b. Unemployment rates and trends since, say, 1970. Explain trends if you can: What is causing them?

c. Summarize the range of available commerical facilities and services and their adequacy: Do they serve the communities of the area satisfactorily? Could they serve additional people without major modification?

d. Characterize the living standards of the area. Indicators might include family or per-capita income, quality of housing, percentage who own their own homes, attractiveness of the residential areas, percentage receiving income supplements, etc. Again, comparisons with State or National averages will impart meaning to your statistics.

e. Is future development other than oil and gas anticipated for the area? If so, approximately when, what is its scale, and will its activities contribute additional socioeconomic impacts?

4. Political data

a. Type(s) of local government and their capacity to deal with growth-related problems of the area: Do they have the authority and existing organization to act promptly?

b. Describe existing public facilities and services and their sufficiency, e.g.

(1) Water
(2) Sewers
(3) Streets
(4) Health
(5) Recreation
(6) Electicity (if not described under 3c above)
(7) Public safety: police and fire departments
(8) Planning commissions, if any, and policies
(9) School system
(10) Public transportation, if applicable

c. Revenues

(1) What are the major sources of local income: taxes, grants, license fees, etc.

(2) Do they meet present local (city or county) needs?

(3) How readily are these sources expanded in response to growth?

d. Are specific land areas firmly committed by law or tradition to other purposes?

C. The Projected Development (this may be accomplished elsewhere in your ES)

1. When will it occur? How long will it last?

2. What is its scale? How many people will be involved?

3. Are there distinct stages in its development?

4. Is future development other than oil and gas anticipated for the area? If so, approximately when, what is its scale, and will its activities produce significant socioeconomic impacts? Will the combined development activities be manageable?

D. The Projected Effects of Development at Each Stage of Its Occurrence:

1. Social: Changes in life-style, traditional social relationships, customs, morality, opportunities for minority group participation, etc.

2. Economic: Changes in employment patterns, level of joblessness, number and adequacy of commercial facilities and services, living standards, income levels, etc.

3. Demographic: Changes in in-migration, rural-urban population balance, community growth, vital statistics, etc.

4. Political: Changes in form of government or patterns of authority, adequacy of public facilities and services, sufficiency of revenues, possible supplementary revenue sources, legal implications of development, etc.

E. Unavoidable Adverse Effects and Mitigating Measures

1. Some documents attempt to identify negative social and economic effects that will inevitably occur. Others assume that negative effects, along with positive outcomes, have been adequately discussed in section D above.

A central problem in socioeconomic assessment is that people differ in their perceptions: what some persons might regard as a negative impact others perceive as an unobjectionable or positive consequence of energy development. Nevertheless, there are always some areas of general agreement on effects or there may be legal limits which may not be exceeded.

2. When there is identification of negative consequences, a discussion of mitigating measures is desirable. That is, what can be done to reduce or eliminate the negative effects?

Sources of the above social and economic information are not included here because the Minerals and Geology Group of Region 1 expects to publish an annotated bibliography entitled "Socioeconomic Assessment Bibliography for Minerals Activities," to become available shortly after the publication of the present document.

The sources included in the bibliography were selected for their apparent utility in preparing social assessment documents.