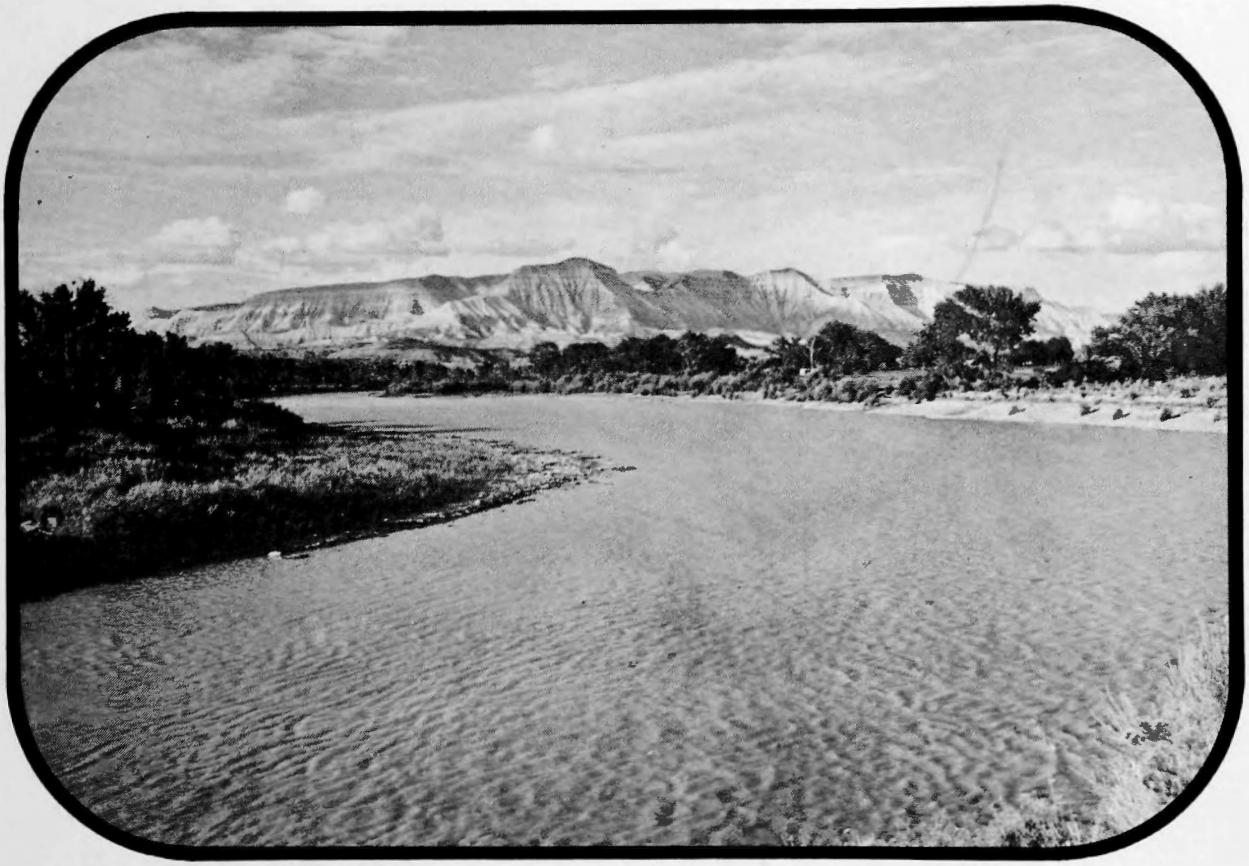
IMPACT ANALYSIS AND DEVELOPMENT PATTERNS

related to an oil shale industry



regional development and land use study

OS-05

IMPACT ANALYSIS
AND
DEVELOPMENT PATTERNS

for

The Oil Shale Region
Mesa, Garfield and Rio Blanco Counties, Colorado

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Prepared for the
Colorado West Area Council of Governments
and
The Oil Shale Regional Planning Commission

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February, 1974

To The Honorable John D. Vanderhoof,
Governor of Colorado,

To Those for Whom this Report Has Been
Prepared, and

To Those Who Sponsored and Assisted in
Colorado's Oil Shale Studies:

The Colorado West Area Council of Governments, the Oil Shale Regional Planning Commission, and the Regional Development and Land Use Planning Steering and Monitoring Committee are pleased to transmit a final report, "Impact Analysis and Development Patterns Related to an Oil Shale Industry: Regional Development and Land Use Study", prepared by THK Associates, in cooperation with the Denver Research Institute and Bickert, Browne and Coddington.

This report is part of the Colorado Oil Shale Evironmental Program, a major complex of studies and activities begun in 1971 to provide information and guidance for oil shale development in Colorado. This study program was financed with equal contributions of funds from the federal government, the State of Colorado and thirteen participating companies in the oil shale industry, amounting to a total of $738,000. Approximately 14% of the total was dedicated to the preparation of this report.

The major objective of this study of community impacts was to provide decision-makers the necessary information on which to base planning in order to mitigate the potentially great impacts of an oil shale industry. As study of impacts, it deals more with the hardware requirements of communities--schools, housing, sewers, land use, water--than the people impacts. It provides valuable regional timetables and quantification of the necessary growth hardware. As such, this report should be invaluable to the region in planning.

A good deal of the overall program effort was directed toward establishing and improving decision-making capability--such as the creation of the Colorado West Area Council of Governments and the Oil Shale Regional Planning Commission.

Despite a constantly-changing situation in Colorado's oil shale area, this report had to be crystallized at a certain point. We request understanding if certain information already appears dated or if final answers are not available. We believe that this problem will not seriously detract from the usefullness of the report.

The study does not provide individual communities with all or even most of the answers. As a regional study, it was considered neither wise nor possible to dictate solutions to diverse communities and entities. The study is, in fact, directed to a region with no real authority to legislate, regulate or control the predicted impacts. The specific dimensions of those impacts on any particular county, school district or community are left to refinement on the part of the local unit, as are solutions and the capacity to implement them. The course of real events and the creation of real rather than projected problems will be perhaps the most significant refinement of this study.

We feel that much more effort will have to be expended in order for the various impacted entities to develop the specific capacity to deal on an effective and continuing basis with the impacts of oil shale development. The study does not and could not solve this problem.

There are other limitations of this study--such as the lack of discussion of the special role and problems of public lands. But we feel that the original purpose of the study has been met. The study is the work of the three contractors. None of the sponsors and none of the local government agencies should be assumed to agree or to disagree with any particular portion or recommendation of this work. As is probably always the case, a good study very clearly leads to a better understanding of the questions we perhaps should have asked in the first place, and should now attempt to answer.

We have been sternly demanding of the contractors, who have been more than cooperative. We are satisfied that both our and their responsibilities are fulfilled by this report.

Sincerely,

John Hutchins, Chairman
Steering and Monitoring
Committee

C. W. Brennan, Chairman
Colorado West Area Council
of Governments

Frank G. Cooley, Chairman
Oil Shale Regional Planning Commission

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INTRODUCTION

This report constitutes Phase III of the Regional Development and Land Use Study which was undertaken by the Oil Shale Regional Planning Commission to assess the impact of oil shale development on Rio Blanco, Garfield and Mesa Counties. Phase I of the study, conducted between May and August of 1972, outlined a Work Program for the entire project. Phase II undertook several basic investigations. Separate reports were developed on the character of an oil shale industry, the economic base of the three county area, social attitudes in the area, significant physical features and resources and regional goals in several subject areas.

This document builds on the inventory of existing economic, social and physical conditions mentioned above and assesses the impact of growth in the three county area, whether that growth occurs as a result of normal economic trends or is caused by an expanding oil shale industry. The report begins by discussing the magnitude of possible growth under three different conditions: 1) a continuation of normal trends with no oil shale development, 2) moderate oil shale development assuming the operation of up to six plants in Colorado producing 400,000 barrels a day and 3) intensive oil shale development with up to eight plants operating in Colorado producing 750,000 barrels a day. In each case, for possibilities 2) and 3), there could be a Utah plant producing up to 50,000 barrels per day.

The Report then discusses the land area and service requirements to meet projected population increases. It does this in terms of an increment of population of 1,000 persons. This approach was taken because the variables of oil shale development, economic trends, and the imponderables of local policy decisions make it impossible to "assign" an accurate population figure to individual communities. This method will allow any community to judge the impact of growth based on its own growth assumptions.

Next, the report turns to physical features of the three county area and examines in some detail those areas which have slope and soil characteristics which will support urban development. Then, alternate development patterns are discussed with advantages and disadvantages listed for each. The report ends with recommendations for the three county area on matters which the study team has

found to be significant during the course of the study.

The Phase III report is a joint effort of the associated firms - Bickert, Browne and Coddington and Associates, Inc.; Denver Research Institute; and THK Associates. Each firm was responsible for parts of the report relating to its own area of expertise. Drafts of the report were then reviewed by each of the firms to assure that the parts presented an understandable whole when combined.

This report does not constitute a regional plan. The intent of the report is to provide an overall view of the nature and magnitude of growth and suggest methods for dealing with it. Time and budget limitations were such that the level of detail dealt with in this report is general in nature. Individual communities and counties in the region will need to conduct their own detailed investigations and formulate their own response to growth. Hopefully, this material will provide a common point of reference for those studies and decisions.

THE MAGNITUDE OF GROWTH

NORMAL GROWTH

The oil shale region of western Colorado - Garfield, Mesa, and Rio Blanco Counties - now has a well diversified regional economy. Agriculture, tourism and tourism-induced construction are the leading basic industries, with substantial contributions from both mining (coal, oil and gas) and manufacturing.[1] A fairly well developed local services sector supplements this. All of these activities support a population estimated at 78,200 in 1972.

The regional economy is growing. Present trends suggest a population of 90,600 in 1977 without oil shale development. With an accelerating growth rate, primarily based on expanding tourism and recreation, the 1987 population could reach 121,900 if one assumes a 3% annual rate of growth, and 147,600 if a 5% annual growth rate is assumed. Since growth creates a "snow balling" effect, the 5% annual rate of growth may be more likely from about 1978 on into the future. Table 1 shows these population estimates for the three county area. These population increases could occur without the development of an oil shale industry.

The realization of these projections would constitute a mild boom for the entire region. It could be a genuinely uncomfortable rate of growth for the eastern part of Garfield County (near Aspen and Vail) which may bear the greatest burden.

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[1] Basic employment in these industries makes up 80 percent of the approximately 10,000 basic (export-oriented) employment in the region, and supports an additional 19,000 local service employees. See Working Paper #1, The Oil Shale Regional Economic Base, by John S. Gilmore and Mary K. Duff, Denver: Denver Research Institute, for the methodology of these estimates and subsequent forecasts.

Table 1

POPULATION ESTIMATE FOR THREE COUNTY AREA
(Garfield, Mesa, Rio Blanco)
without oil shale development

Year	3% projected annual increase	5% projected annual increase*
1970	74,000	
1971	75,400	
1972	78,200	
1973	80,600	
1974	82,300	
1975	85,500	
1976	88,000	
1977	90,600	
1978	93,400	95,100
1979	96,200	99,000
1980	99,100	104,900
1981	102,000	110,100
1982	105,100	115,600
1983	108,300	121,400
1984	111,500	127,500
1985	114,800	133,900
1986	119,300	140,500
1987	121,900	147,600
1988	125,500	155,000
1989	129,300	162,700

* As the economy of the area grows and becomes more complex, the multiplier between basic industries and service industries will grow. Therefore it is assumed that population will increase at the rate of 5% per year after 1977 rather than the 3% rate.

OIL SHALE DEVELOPMENT

Oil shale development, if and when it comes, will be in addition to the normal growth. Two patterns of oil shale development are possible: an intensive effort leading to rapid development (hereafter called the intensive profile), and a moderate profile of development. Since both begin with one plant at a time, it would be difficult to determine which profile was underway during the first five to seven years.

Subsequently, development fitting the intensive profile would accelerate rapidly, building toward a million barrel a day oil shale industry.[2] Assuming that three-quarters of this million barrels a day production is in Colorado, within fifteen years 160,000 additional people would have been added to the three county region by an oil shale industry - in addition to the 147,600 already estimated for 1987. This population increment would result from the added basic employment - plant construction and subsequent mining and processing - and resulting local service employment.

This intensive level of development could support the construction of 9,000 homes in one year - possibly by 1989. Demand for new school rooms could be as high as 237 to accommodate a single year's growth. These new facilities might cost as much as $60,000 to $75,000 per classroom.

The moderate profile of oil shale development would add only about 60,000 people to the region in the same fifteen year period. However, this might be an uncomfortably erratic rate of growth for local government. Building fewer plants in the region would cause steep rises and declines in the construction force and population. Half the school rooms newly built in one year might be surplus the next.

The intensive profile of oil shale development, leading to a million barrels a day operation, is depicted in Figure 1. This covers the phasing of development in Colorado, Utah, and Wyoming. (It should

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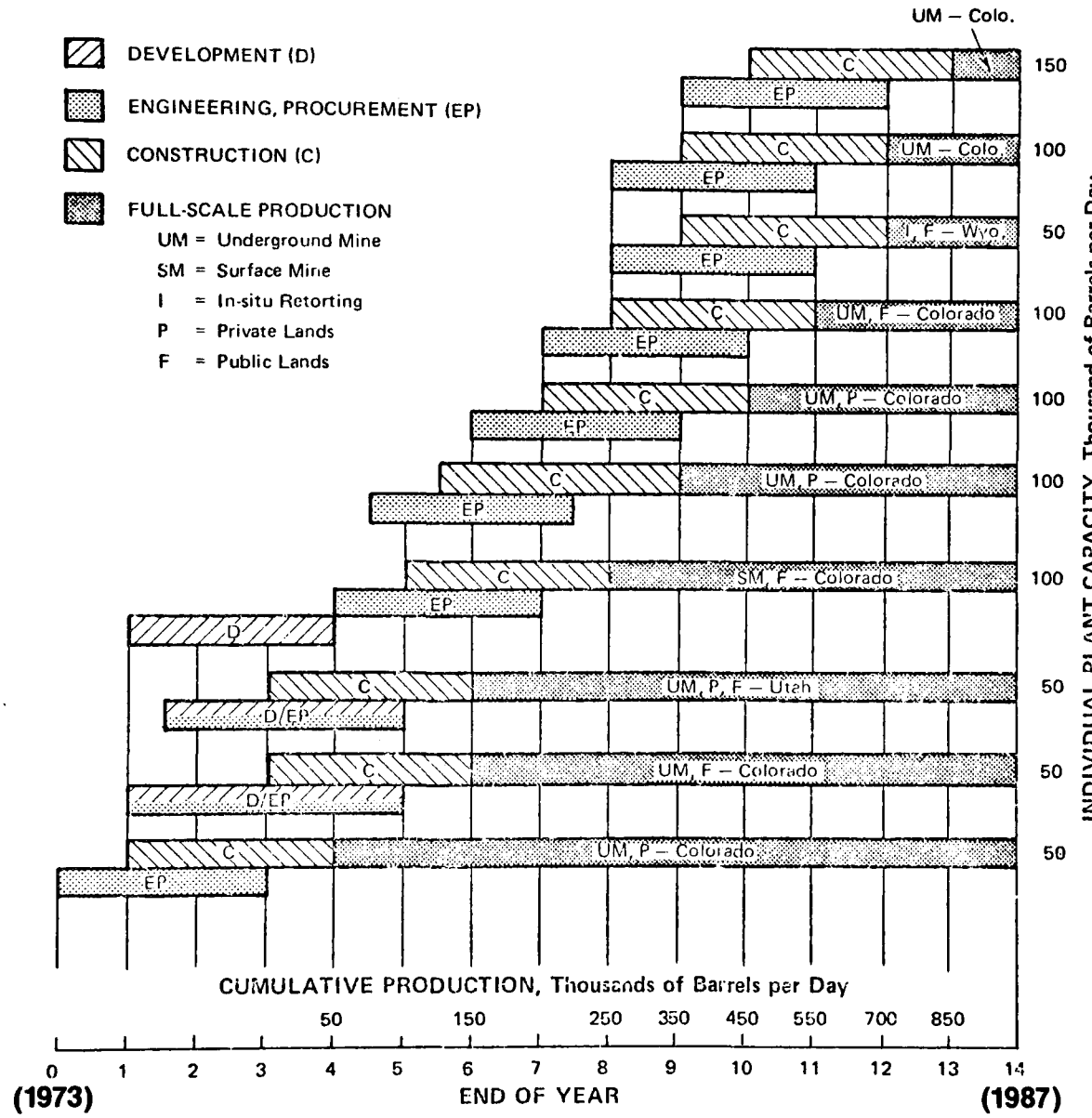
[2] The profiles of development of a Colorado oil shale industry are described in Working Paper #2, Profile of Development of An Oil Shale Industry in Colorado, by Charles Prien, John Schanz, and Richard Doran, Denver: DRI, February 1973.

FIG. 1
PROJECTED RATE OF SHALE OIL PRODUCTION-
INTENSIVE DEVELOPMENT



also be noted that the Utah production would probably be from a location equidistant from Vernal, Utah, and Rangely, Colorado. Rangely might be a catchment area for workers from the Utah site.) As the regional planning agency, the Colorado West Area Council of Governments should constantly revise these profiles as new information on the plans of oil companies and government agencies becomes available.

The year-by-year growth in population resulting from the intensive and the moderate development profiles is graphed in Figure 2 and tabulated in Tables 2 and 3. Year 0 is the year of announcement of plant construction, the succeeding years show the build-up of basic employment, local service employment, income, and population. The graph assumes announcement in 1973.

Population Assumptions

These population figures assume that all of those requiring housing would find it, in the form of permanent housing or mobile homes. The estimates are also vulnerable to major changes in oil shale mining and processing technology, which would reduce basic employment, local service employment, and population.

It is difficult to estimate the exact rate of build-up in local service employment; some lag is provided in the estimates for early years, but it is hard to predict this aspect of development during the later, extreme growth years. Housing construction alone would generate about 22,000 man years of local service employment between years 3 and 16; it is difficult to tell how rapidly this would build up. All of these factors could reduce population growth, or more likely, cause it to lag.

The actual course of oil shale development may fall somewhere between the two curves. However, a maximum effort oil shale development, born of response to a domestic energy crisis, might cause an even greater increase in oil shale-related population than the intensive profile. The impacts of any significant development appear to be so profound that the region should now prepare to make the decisions and seek the help that planning will indicate to be needed.

Figure 2

POPULATION OF THE THREE COUNTY AREA

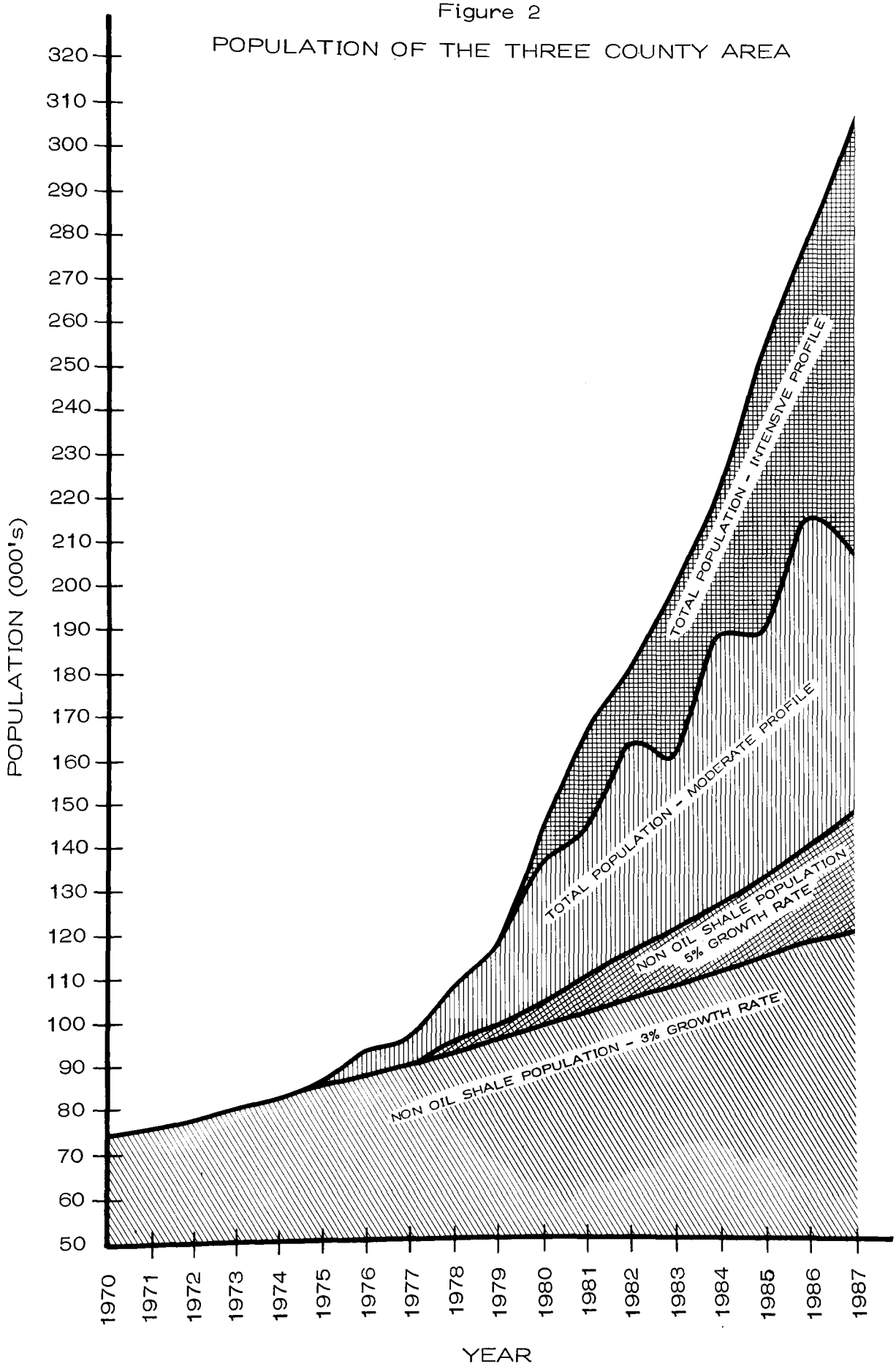


Table 2

POPULATION RESULTING FROM OIL SHALE DEVELOPMENT

Intensive Profile*

Year	Basic Employment	Basic Income ($000)**	Local Service Employment	Local Service Income ($000)**	Total Employment	Total Income ($000)**	Total Population
0	-						
1	-						
2	450	$ 5,374	50	$ 368	500	$ 5,742	1,250
3	1,650	20,402	850	6,494	2,500	26,896	6,250
4	1,050	13,440	990	7,125	1,950	20,565	4,875
5	2,565	31,474	3,000	24,612	5,565	56,086	13,913
6	2,365	29,755	4,730	40,162	7,095	69,917	17,738
7	5,280	69,324	10,560	92,801	15,740	162,125	39,350
8	7,730	107,825	15,460	140,624	23,190	248,449	57,975
9	8,700	121,717	17,400	163,804	26,100	285,521	65,250
10	10,530	148,901	21,060	205,186	31,590	354,087	78,975
11	12,810	184,988	25,620	258,352	38,430	443,340	96,075
12	16,290	243,708	32,580	340,037	48,870	583,745	122,175
13	18,720	288,048	37,440	404,427	56,160	692,475	140,400
14	21,465	337,493	42,930	479,957	64,395	817,450	160,988

* 2.0 multiplier.

** 3-1/2% per annum increase in real income.

Table 3

POPULATION RESULTING FROM OIL SHALE DEVELOPMENT

Moderate Profile*

Year	Basic Employment	Basic Income ($000)**	Local Service Employment	Local Service Income ($000)**	Total Employment	Total Income ($000)**	Total Population
0	-						
1	-						
2	450	$ 5,374	50	$ 368	500	$ 5,742	1,250
3	1,650	20,402	850	6,494	2,500	85,346	6,250
4	1,050	13,440	900	7,125	1,950	20,565	4,875
5	2,565	31,474	3,000	24,612	5,565	56,086	13,913
6	2,365	29,755	4,730	40,162	7,095	69,917	17,738
7	4,380	56,562	8,760	76,983	13,140	133,545	32,850
8	4,430	59,367	8,860	80,591	13,290	139,958	33,225
9	6,600	89,803	13,200	124,265	19,800	214,068	49,500
10	5,400	74,089	10,800	105,244	16,200	179,333	40,500
11	8,430	119,836	16,860	170,016	25,290	289,852	63,225
12	7,230	103,803	14,460	150,919	21,690	254,722	54,225
13	10,260	153,691	20,520	221,657	30,780	375,348	76,950
14	8,160	121,175	16,320	182,458	24,480	303,633	61,200

* 2.0 multiplier.

** 3-1/2% per annum increase in real income.

The Demand for Housing

Housing a major share of the influx of population in permanent housing located in viable communities will be a major challenge. If permanent housing were available for all of those seeking it, as many as 45,000 new units might be occupied by 1989 as a result of intensive oil shale development. Another 10,000 mobile homes might be in use. Assuming an average constant dollar price of $22,000 per unit (both single and multi-unit) of permanent (or site) housing, and $7,000 per mobile home (80 percent of which is assessable), this will constitute a large addition to the tax base (30 percent of value).

If less permanent or site housing is available, more mobile homes will be required. Table 4 shows the possible absorption rates for housing, assuming that site housing would be available when people are ready to buy or rent it.

Assumptions on Housing Demand

In determining housing demand, three factors were considered:

1) The availability of permanent or site housing.[3] It is assumed that people will move into rental or owner housing if it is available at the time of their arrival in the area. These figures were based on the assumption that sufficient housing units will be made available to meet the yearly demand. To the extent site housing is not provided, the number of campers, trailers, and mobile homes will be increased.

2) The perception of permanence. Until oil shale development is perceived to be a continuing industry with the accompanying growth in the area steady and stable, the in-coming employees are less likely to demand site housing or to

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3 Site housing includes single men boarding houses, and single and multi-family dwelling units, both rental and owner occupied.

Table 4

TOTAL HOUSING DEMAND

Year	Intensive Development Profile				Year	Moderate Development Profile			
	Site Housing		Trailer/Mobile Home Space			Site Housing		Trailer/Mobile Home Space	
	Requirement	Incremental Requirement	Requirement	Incremental Requirement		Requirement	Incremental Requirement	Requirement	Incremental Requirement
0	---	---	---	---	0	---	---	---	---
1	---	---	---	---	1	---	---	---	---
2	19	19	456	456	2	19	19	456	456
3	402	383	1,674	1,218	3	402	383	1,674	1,218
4	442	40	1,058	616(s)**	4	442	40	1,058	616(s)**
5	1,538	1,096	1,910	236	5	1,455	1,013	1,993	319
6	2,219	681	1,894	16(s)**	6	2,142	692	1,966	27(s)**
7	5,777	3,558	4,165	2,255	7	4,705	2,558	3,438	1,445
8	8,645	2,868	6,197	2,032	8	4,884	199	3,358	80(s)**
9	10,217	1,572	6,190	7(s)**	9	7,637	2,753	4,570	1,132
10	11,325	1,108	6,280	83	10	6,692	945(s)**	3,115	1,455(s)**
11	16,027	4,702	7,123	843	11	10,919	3,282	4,705	135
12	21,412	5,385	7,699	576	12	9,419	1,500(s)**	3,805	900(s)**
13	25,490	4,078	9,479	1,780	13	13,948	3,029	5,338	633
14	29,168	3,678	10,673	1,194	14	11,218	2,730(s)**	3,868	1,470(s)**
15*	36,337	7,169	---	---	15*	15,916	1,968	---	---
16	45,359	9,022	---	---	16	15,916	0	---	---

* No attempt has been made to estimate the total housing demand after year 14, except for years 15 and 16. These reflect the 3 year lag in plant employee purchase.

**(s) = surplus of rooms

bring their families and settle. For this reason, the 14 year period was divided into two phases: Phase I before the industry is broadly perceived by residents of the area to be permanent and growing, and Phase II (after year 8 in the intensive profile, and after year 10 in the moderate profile) after oil shale development is an acknowledged success. Phase II in-migrants are more likely to establish permanent residence. The Phase II "perception of permanence" will also lead some greater number of mobile home residents to shift into site housing. The moderate profile might not ever achieve the same proportion of permanent residents as the intensive profile because of its continual fluctuations.

3) Slow build-up of demand. The incremental increases in demand have been calculated on a gradual increase basis. This recognizes that the supply of housing often follows demand and may lag by several years. Although total housing need may be continually increasing, incremental need will fluctuate widely from year to year. Good planning and the market could serve to smooth these fluctuations. Assuming that this will happen, variation in these figures has arbitrarily been limited to no more than 5-10 percent per year.

Construction Employees

During Phase I, at least 80 percent of the incoming construction workers will be without families and will be bringing campers, trailers, or mobile homes, or seeking boarding home type housing. The high percentage not seeking site housing is accounted for because: (1) the majority of construction workers are transient; (2) in an isolated rural area many workers would assume site housing is not available; (3) the work situation would be perceived as temporary.

In Phase II as the development is perceived to be stable and growing; more workers will bring their families and seek site housing. We estimate that up to 60 percent, by the end of the 14 year period, will desire site housing if it appears likely that the industry

will continue to grow. In the moderate profile this figure may level at 50 percent desiring site housing because the development may never be perceived as a steady growth situation.

Plant Employees

It is believed that plant employees will perceive their work situation as more permanent. Therefore, the majority (betwen 75 and 80 percent) would bring their families and establish themselves as a part of the community. It was therefore assumed that 90 percent of plant management would buy or rent site housing within three years of arrival. The proportion seeking it during each of the three years is difficult to estimate, so this figure is entered as a total in the third year after arrival.

Local Service Employees

It is believed that much local service employment represents two employees per family and that there may be a high proportion of local service employees who are spouses of plant employees. Housing demand was then estimated at 50 percent of local service employment. Of this 50 percent, 25 percent in Phase I and 20 percent in Phase II could be assumed to live in trailer/mobile homes, with the remainder seeking site homes.

Demand for Education Facilities

A rapid growth in population resulting from oil shale development will demand public services before an ad valorem tax base has been generated. Even if the tax base eventually catches up, it may not be in the same jurisdiction as the people using the services. This is particularly true for schools because of the alignment of the school districts in the three county area in relation to possible oil shale plant sites and probable areas of urban growth.

While the requirements of a full range of public services are discussed in the next chapter of this report in relation to increments of population added to a given area, schools are deemed to be of such importance that the total educational requirements resulting from oil shale development are afforded additional brief discussion in this chapter on "The Magnitude of Growth". As a public service, schools require both substantial capital investment and sizable operating costs. The number of school age children added and the number of classrooms required because of oil shale development is estimated in Table 5.

Table 5

SCHOOL CHILDREN AND SCHOOL ROOM REQUIREMENTS
RESULTING FROM OIL SHALE DEVELOPMENT

Intensive Development Profile

Year	Total Children in 3 County Region	School Rooms Needed, 30 Children/Room	Incremental School Rooms Needed
0	---	---	---
1	---	---	---
2	161	5	5
3	917	31	26
4	761	25	6(s)*
5	2,667	89	58
6	3,464	116	27
7	8,671	289	173
8	12,566	419	130
9	15,813	527	108
10	19,821	661	134
11	26,300	877	216
12	33,425	1,114	237
13	38,567	1,286	172
14	44,579	1,486	200

*(s) = surplus of rooms

Assumptions:
1. 1.5 achool age children per family
2. Construction employees: Up to 20% would bring families in first 6 years.
   Up to 40%, as above, in years 7-10.
   Up to 60%, as above, in later years.
3. Plant employees: 50% would bring families first 4 years, and up to 80% later.
4. Local service employees: 33% would bring families.

Moderate Development Profile

Year	Total Children in 3 County Region	School Rooms Needed, 30 Children/Room	Incremental School Rooms Needed
0	---	---	---
1	---	---	---
2	161	5	5
3	917	31	26
4	761	25	6(s)*
5	2,667	89	58
6	3,464	116	27
7	6,858	229	113
8	6,929	231	2
9	10,494	350	119
10	8,766	292	58(s)*
11	14,174	472	122
12	12,266	409	63(s)*
13	17,358	579	107
14	13,779	459	120(s)*

*(s) = surplus of rooms

Assumptions:
1. 1.5 school age children per family
2. Construction employees: Up to 20% would bring families in first 6 years.
   Up to 30%, as above, in years 7-10.
   Up to 40%, as above, in later years.
3. Plant employees: 50% would bring families years 5-10, and up to 80% later.
4. Local service employees: 33% would bring families.

The capital costs of accommodating these students can be conservatively estimated on the basis of $2,000 - $2,500 per pupil, or $60,000 - $75,000 per incremental or new 30 pupil classroom (1973 dollars). Local operating costs are harder to estimate because of uncertainty about state and Federal contributions, but $15,000 per classroom per year is a usable figure. Both capital and operating cost are rough estimates; similar figures for other public services are harder to derive. A standard unit of service capability such as a new classroom is unusual, and average unit costs rarely reflect new unit costs. Furthermore, new unit costs tend to rise after an urban area grows past some hard-to-estimate optimum size.

The revenue side of the equation is more obscure, depending on yet-to-be-determined locations of oil shale developments, commercial areas, housing, and the nature of jurisdictional boundaries. However, if development follows the intensive profile, 31 classrooms will be needed in year 3 to accommodate oil shale-related children. If they all must be newly constructed, a bond issue of $1.9 - $2.5 million would be required. Yet the increased housing (site housing and mobile homes) expected in year 3 would only add $1 million to emergency bonding capacity.

By year 5, a total of 89 additional rooms will be needed, costing $5.3 - $6.6 million; new bonding capacity from housing will be $2.8 million. An oil shale plant will then be in operation, furnishing some $10's of millions of bonding capability, but it very possibly will not be in the school district where the new population lives.

THE IMPACT OF GROWTH

OVERVIEW

The choice in Western Colorado does not lie between growth and no growth, but rather between "normal growth" (without oil shale development), rapid growth and explosive growth. The circumstances causing this growth are largely beyond the control of the people of the area and their local units of governments. This new growth has both beneficial and detrimental aspects depending upon the perspective of the viewer. A general discussion of growth problems and opportunities is presented here before some of the more important aspects of growth are detailed.

Positive Aspects of Growth

Economic trends relating to oil shale development and the growth of the region have been discussed in two other reports in this series. It is obvious that new industrial activity will bring additional income to the area which will be translated into an increased demand for goods and services. This will enlarge the market potential for the existing merchants and service firms. To be sure, additional competition will develop. However, in a growth situation, new goods and services typically arrive on the scene only after a significant market is perceived. Therefore, there should be no question that aware and astute local businesses will continue to prosper.

The addition of a new industry will further diversify the regional economy. New and different types of jobs will be available to the present and future populations. As the region grows, the presence of an oil shale industry and a growing work force may attract other activities to Western Colorado which have nothing to do with energy production. This further diversification of the industrial base, brought about by the oil shale industry but not entirely dependent upon it, would be a healthy trend away from dependence upon a single industry.

Growth will bring new people and new ideas to Western Colorado. While considerable debate might be engendered regarding the rate and amount of growth which is desirable, the citizens of the area seem to prefer some change to the status quo. New people might bring with them different ideas for solving local problems. There will undoubtedly be a larger market for cultural activities. A larger population may also mean a stronger voice in the State legislature. The broadening of human resources could have a decidedly beneficial impact on the region.

Oil shale development will focus State and national attention on the oil shale region, even more than has been generated during the preparation of the environmental impact statement and the beginnings of the leasing program. Approaches to solving local problems are more likely to be developed as a result of the impetus of growth. As an example, Colorado water resources might be further developed for the use of Western Colorado. Other problems are more likely to be addressed if they are spotlighted by the turn of events than if they remain in the background.

Negative Aspects of Growth

The most serious negative aspect of growth is the demand for expanded services beyond the capability of local units of government to provide them. For the smaller communities impacted by growth, this means tremendous start up costs. For example, a small community without fire protection may suddenly become aware of the need for a centrally located fire station equipped with expensive equipment and full time personnel. These items, if provided in a timely manner could play havoc with an already tight budget. This example would be repeated for the full range of required services including schools, parks, water, sewer, and personnel.

Housing will be in great demand in any growth situation. It is not now apparent that there is a housing industry capable of meeting projected housing needs. Also, there presently is no agency which can provide housing to those citizens who will not share in expanded economic opportunities. This will mean continued high housing values and probably some housing inconvenience.

Apparent oil shale activity may cause an influx of job seekers to the region -- more than the industry can accommodate. This would

echo the Alaska North Slope experience. If this occurs, there may be increased unemployment and heavier welfare loads.

There will be social change in the area. These changes can be viewed as desirable or undesirable depending upon the long held beliefs of the person making the judgement. With the influx of new people with a variety of backgrounds, majority opinions may change over a period of years to be substantially different than the views of present residents. The challenge for the region in this regard is to evolve a new philosophy and life style that consists of the best parts of the old and the new.

Impacts on Agriculture, Tourism and Manufacturing

Oil shale development will require recruitment of many more construction workers than are locally available and this will absorb local labor, hiring it away from regional agriculture and construction activities. Oil shale wage rates will generally be higher than those locally paid; wages for men will be driven up.

As men come into the region to fill construction and plant jobs, members of their families will also be available for work. There may then be a surplus of employable women. This could be a resource for attracting some types of manufacturing (e.g., electronics assembly, needle trades), and some specialized clerical operations (e.g., insurance or governmental accounting). This labor surplus would also be available to fill some local service and tourism job slots.

Some beneficial effects of oil shale development might include the creation of several machine shops servicing plant operations, and also housing construction (e.g., sheet metal, door asembly). Investment capital may be more available as large housing projects bring loan and mortgage agencies into the region. On the other hand, existing resorts in and near the region might become more crowded with the sheer mass of population added by the development, and the country might lose some of its remote and primitive quality.

Oil shale operations will require large quantities of electricity. The commonest source of new electrical generating capacity in this retion is coal-fueled steam power plants. Hopefully, such plants and mines could be located in such a way that they would not seriously

interfere with existing agricultural operations. On the other hand, shale plants may generate much of their own electric power, with their own fuel. We are unable to make a judgement on which of these options will prevail.

We also are unable to estimate the development of oil shale - related manufacturing within the region using oil shale syncrude as a feedstock. We presently assume that oil shale plant outputs will be transported elsewhere for further processing; this assumption should be constantly reviewed.

A most serious impact, if it occurs, would be the diversion to oil shale processing and expanded community needs of enough water presently used for irrigation to seriously reduce agricultural activity and employment.[4] This would damage the present diversity of the region's economy and could degrade the aesthetic values upon which tourism depends. Similar effects might result from reallocation of land, particularly irrigated land, to housing. Unlike the other impacts mentioned, these are amenable to action by local government.

IMPACT ASSESSMENT

An Approach

Population growth in the three county area, whether it occurs as the result of a developing oil shale industry or normal economic trends, will demand that additional open land be devoted to hous-

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[4] This is not considered inevitable; process and revegation water may be obtained from underground sources or from diversion and reservoir systems. However, the threat is sufficient that Felix Sparks, Executive Director of the Colorado Water Conservation Board has warned, "We're going to be hard put to meet the oil shale demands without diverting some water from agricultural uses. I'm afraid this will require some very painful adjustments in current uses". Rocky Mountain News, December 2, 1973.

ing and commerce and that urban services be provided for the new inhabitants. This chapter deals with those land area and service requirements.

Given the variables of oil shale development, it is impossible to make any accurate population projections for individual communities for a given point in time. How many people will be attracted to a given area depends upon many things - the availability of housing, the location of jobs, the availability of community services, transportation patterns and public growth policies to name a few. The development pattern resulting from industry operations in only Roan and Parachute Creek would vary significantly from one caused by intensive development of the Piceance Basin only. Different communities would be affected and each to a different degree.

Under the intensive development profile, the possibility exists that industrial operations will be fairly evenly spread throughout Garfield and Rio Blanco Counties. However, a specific time table within which this even distribution will occur is open to speculation. More precise projections will become possible as decisions are made and announced by private oil companies and the federal government. Therefore, the Council of Governments should continually monitor the progress of growth and refine and make available new information to local governments.

Techniques exist for manipulating a number of variables to arrive at decisions to deal with a given set of assumed circumstances. This frequently involves a computer and is beyond the scope of this study. However, without developing detailed plans for specific communities, there is considerable value in an approach which will allow local governments to judge the major impacts of growth based on different levels of development. An "incremental" approach to growth seems best suited for this purpose.

In this chapter, growth needs are reported on the basis of a 1,000 person increment in population. Figures have been d eveloped for land area and services required to support each 1,000 persons added to a community, and revenues have been projected on the same basis. This approach has some obvious limitations which are discussed below. These area and cost models are useful, however, in identifying the magnitude of the probelm which the area faces.

Limitations

Standards and criteria on the following pages have been derived from a number of relevant sources. Where applicable information was available on Western Colorado it is used. In other cases, national and State standards and criteria are applied. National and State figures are considered valid because it is assumed that Western Slope communities will reflect the characteristics of other communities of similar size elsewhere as they grow.

To make the figures applicable to a wide range of conditions, they are "typical" or "average" figures. In many cases, no local standards and criteria have been developed so that regional or national figures are the only ones available. While these figures are general in nature, they represent at this time the only resource from which a comprehensive review of the impact of growth can be made. This approach is valid if these limitations are kept in mind.

The 1973 Marshall Valuation Service served as the basis for developing capital costs for new facilities. Site costs were estimated after a review of representative land values in the Rifle and Glenwood Springs area. These varied considerably for rural and urban land. The 1973 Municipal Year Book and area budgets provided background for personnel costs, and reports of national organizations and other regional agencies were the source of other standards and criteria.

The figures for both capital and operating costs found later in this section have been adjusted to reflect early 1974 costs and also the slightly higher costs of some materials in the Grand Junction area. Construction costs continue to rise at 10% to 12% per year. The figures will need to be continually updated to keep pace with inflationary trends.

A final limitation concerns linear relationships. Since most of these standards and criteria are stated in terms of a particular requirement per 1,000 population or per X area, then, presumably, if the requirement per 1,000 population is one unit, the requirement per 10,000 population would be ten units. The actual relationship may be much more complex, however, based on a number of variables unique to each particular locality. Yet, in this case, a linear relationship provides the only basis for determining site and facility needs and, despite its contestable validity, provides at least a foundation from which unique localities can interpret their own needs.

LAND AREA REQUIREMENTS

Residential and Community Facility Requirements

The amount of land area which will be necessary to accommodate future population growth in the three county area depends upon the intensity of development which present or future land use regulations will allow and how these regulations are applied to the land. Existing county zoning regulations run the gamut in residential densities defined by zoning districts. The range is from 1 dwelling unit for every 5 acres to, in one case, a district which apparently allows 65 dwelling units per acre. While no survey has been conducted of the zoning ordinances of individual communities, it can be assumed that those ordinances, where existing, also have varied residential densities.

The relationship between density and land area covered is shown in Table 6. A range of densities is shown in the first and third columns of the table. Family sizes or numbers of persons per dwelling unit are shown in Column 2. Column 4 then shows the land area required to accommodate 1,000 persons at that density.

Residential neighborhoods seldom exist in pure state - that is with no use of the land other than residential. Streets to service individual lots typically make up 20% to 25% of a subdivision. Also included in large subdivisions are sites for schools, parks, fire stations, churches and other community facilities. The land area typically used by streets and community facilities are shown in columns 6 and 8. These must be added to land devoted to residential lots. The figures for community facilities also includes a portion of central governmental facilities which would be necessary to serve the area. Total land requirements are shown in column 10.

Commercial and industrial areas are also an integral part of most communities. It should be noted that requirements for these uses are not included in Table 6. These are discussed later and their land area requirements must be added to land devoted to residential and community facilities to arrive at a total land requirement for 1,000 persons.

Table 6

LAND AREA NEEDS BY RESIDENTIAL DENSITY [1]

(1,000 Incremental Population)

Land Use	Persons/ D.U.	D.U.'s/ Acre	Net Residential		Streets		Community Facilities		Totals	
			Acres	%	Acres	%	Acres	%	Acres	%
Single Family (Acreage)[2]										
(5 acre sites)	3.7	0.2	1350	93	85	6	12	1	1447	100
Single Family (Rural)[2]										
(2 acre sites)	3.7	0.5	540	90	50	8	12	2	602	100
(1 acre sites)	3.7	1.0	370	87	43	10	12	3	425	100
Single Family (Urban)[2]										
(12,000 sq.ft. sites)	3.7	3.6	75	70	20	19	12	11	107	100
(9,000 sq.ft. sites)	3.7	4.8	56	65	20	22	12	13	88	100
(7,500 sq.ft. sites)	3.7	5.8	47	61	18	24	12	15	77	100
(6,000 sq.ft. sites)	3.7	7.3	37	57	16	25	12	18	65	100
Mobile Homes	2.7	8.0	46	62	14	19	14	19	74	100
Multi-Family	2.4	14.0	30	58	7	14	14	28	51	100
Multi-Family	2.0	25.0	20	52	4	11	14	37	38	100

1 Does not include land area needs for commercial and industrial use.

2 Household density is expected to vary significantly with residential density - the household density of 3.7 persons per D.U. used here represents an average single family density. Average household size for other densities as shown.

Census figures indicate that family size (or persons per dwelling unit) vary with changes in densities. Larger families - 3.5 per 4.0 persons are typically found in low density, single family areas. As densities increase, the less likely it is that the units will be occupied by large families, or in the case of medium to high density apartments, the less likely that the units will be occupied by families at all. Apartment structures with several efficiency or buffet units can bring the average numbers of persons per dwelling unit down to less than two. This changing composition of family size is accounted for in Table 6.

Residential Density Mix

In order to determine the land area that might be needed to accommodate the projected populations in Mesa, Garfield, and Rio Blanco Counties it is necessary to make some assumptions about the mix of housing types which might occur. It is unlikely that all new inhabitants in a given area will be housed at a single density. Incoming families and individuals will seek the type of housing most appropriate to their needs.

There are recognized hazards involved in making assumptions about living preferences and life styles on the Western Slope over a ten to fifteen year period. Those hazards are compounded when the impact of two levels of oil shale development are considered along with normal economic growth. Living styles are changing. Because of the rising cost of permanent housing, mobile homes and multi-family units are making up increasing proportions of the housing inventory.

Public policy will also affect the density mix for any given jurisdiction. A decision by a community to allow no densities in excess of 10 dwelling units per acre will mean that any market demand for densities exceeding that will need to be accommodated elsewhere. Costs for services may play an important part in these local decisions. Communities will seek development which returns the maximum in revenue at the minimum cost for services to the community. Conceivably, this optimum situation could be an adult community at 14-20 units per acre. However, the market may dictate that other housing types are needed and local jurisdictions, to meet a need, will need to deal in less "profitable" housing. Because of the many factors affecting densities, the

assumptions in this section will need to be continuously reviewed against changing circumstances.

As an indicator of existing conditions, Table 7 shows 1970 housing figures for selected Colorado communities and Mesa, Rio Blanco and Garfield Counties. There is considerable variation even at present. Fort Collins and Greeley show the impact of educational institutions on the ratio of single family housing to multi-family units. Pueblo, with a high percentage of single family units, shows the slow growth of a relatively stable industrial community. Meeker, similarly, shows the high single family percentage of a small, stable town.

Table 7

DENSITY MIX
for
SELECTED COLORADO COMMUNITIES

(Source: 1970 Census)

Community	Single Fam. D.U.'s	%	Multi-Fam. D.U.'s	%	Mobile Homes	%	Total
Colorado Springs	30,893	66	14,616	31	1,005	3	46,514
Pueblo	24,402	78	5,741	19	811	3	30,954
Fort Collins	7,864	57	5,393	39	581	4	13,838
Greeley	7,299	59	4,499	37	451	4	12,249
Aspen	599	54	*		*		1,103
Steamboat Springs	611	73	*		*		832
Grand Junction	5,434	72	1,858	24	333	4	7,625
Rifle	596	74	*		*		803
Glenwood Springs	981	62	494	32	99	6	1,574
Meeker	538	82	*		*		655
Rangely	325	65	*		*		502
Mesa County	14,986	80	2,361	13	1,469	7	18,816
Rio Blanco County	1,450	71	-		-		2,028
Garfield County	3,894	70	-		-		5,537

* Unreported for small communities
\- Unreported for counties

What will happen in the three county area at different rates of population growth? Table 8 shows possible density mixes for the three county area at the end of fourteen years for the three different rates of growth outlined in the previous chapter.

Table 8

REGIONAL HOUSING COMPOSITION
14 year level at various
rates of growth

Rate of Growth	Mobile Homes	Multi Family	Single Family	Total
Normal Economic Trends	10%	30%	60%	100%
Moderate Oil Shale Development	25%	30%	45%	100%
Intensive Oil Shale Development	25%	25%	50%	100%

Even under normal growth conditions, housing composition will change. Table 8 assumes that families will continue to prefer single family housing and that new housing will become available to meet part of the demand at a price the consumer can afford. However, there will also be an increase in the number of mobile homes and multi-family housing units. Mobile homes now constitue 20% of all single family housing starts. In this table there is an assumed preference for permanent housing if it is available.

If and as oil shale develops, Denver Research Institute has suggested that mobile homes may constitute as high as 70% of the new housing during the early years, tapering down to about 25% of the total housing demand by the fourteenth year even if substantial permanent housing is made available. That 25% figure for mobile homes is included for both the moderate and successful rates of growth along with other assumptions on the relationship between single family and multi-family housing.

After fourteen or fifteen years, the percentage of single family housing might increase somewhat as population moves from mobile homes and apartments into more permanent housing. Figures for Colorado cities and national trends suggest, however, that the percentage of single family homes to total dwelling units might not return to the 70% - 80% level that is shown for Grand Junction, Rifle and Meeker at the present time - 60% would be more likely.

Commercial and Industrial Requirements

As noted earlier, commercial and industrial land use needs are in addition to that required for residential use. Total land requirement per 1,000 population at a single family density of 4.8 dwelling units per acre - including 1.17 acres of commercial use and 12 acres of industrial use - is slightly over 100 acres. Table 9 summarizes commercial and industrial needs per 1,000 population.

For purposes of definition, neighborhood centers - the major function of which is the sale of convenience goods and personal services - average 5 - 20 stores with a service radius of approximately ½ mile. Community centers - the major function of which, in addition to neighborhood center functions, is shopping goods - average 15 - 40 stores with a service radius of approximately 2 miles. Regional centers - combining the functions of neighborhood and community centers - include the sale of general merchandise, apparel, furniture, etc., and average 40 - 80 stores with a service radius of 4 miles. Not all three types of centers will be found in any given community.

In applying these definitions to the three county area, central Grand Junction probably constitutes the only regional shopping area. Business uses there are larger and more varied than in any other area of the region. It will probably continue to play that role. Growth in the region will probably mean the gradual increase of special, regionally oriented uses in Grand Junction.

The downtown areas of the several smaller towns - Rifle, Glenwood Springs, Meeker - serve as community shopping centers. Their trade area extends out into the surrounding rural areas. These downtown areas will add retail space as the community grows.

Only Grand Junction and Glenwood Springs are experiencing neighborhood shopping centers at this point in time. These small shopping areas follow growth with convenience goods. They will become more prevalent as Western Slope Communities increase in size to the 5,000 - 10,000 population category.

Land Area Requirements for Growth

Based on the density mix shown in Table 8 and assuming some

Table 9

SUMMARY OF COMMERCIAL AND INDUSTRIAL FACILITY NEEDS/1,000 POPULATION

	NEIGHBORHOOD SHOPPING CENTER (MINIMUM SITE SIZE OF 4 ACRES)	COMMUNITY SHOPPING CENTER (MINIMUM SITE SIZE OF 10 ACRES)	REGIONAL SHOPPING CENTER (MINIMUM SITE SIZE OF 30 ACRES)	TOTAL CUMULATIVE REQUIREMENTS FOR ALL TYPES
SITE REQUIREMENTS/1,000 POP.	0.56 ACRE	0.32 ACRE	0.29 ACRE	1.17 ACRE
AVERAGE GROSS LEASABLE AREA[1] REQUIREMENTS/1,000 POP.	5,973 SQ. FT.	2,143 SQ. FT.	2,000 SQ. FT.	10,116 SQ. FT.
AVERAGE PARKING AREA REQUIREMENTS/1,000 POP.	11,946 SQ. FT.	8,571 SQ. FT.	8,000 SQ. FT.	28,517 SQ. FT.
AVERAGE CIRCULATION, SERVICE, ETC., REQUIREMENTS/1,000 POP.	6,453 SQ. FT.	3,333 SQ. FT.	2,428 SQ. FT.	12,214 SQ. FT.

[1] AS A FUNCTION OF AVERAGE POPULATION SERVED.

	LIGHT INDUSTRY	HEAVY INDUSTRY	TOTAL INDUSTRY
SITE REQUIREMENTS FOR INDUSTRY/1,000 POPULATION	2 ACRES	10 ACRES	12 ACRES

possible densities of development from the range of densities shown in Table 6, it is now possible to speculate on the amount of land which will be required to support the fourteenth year (say 1987) level of growth under the three conditions: 1) no oil shale development, 2) moderate oil shale development and 3) intensive oil shale development. This is summarized in Table 10.

The Table assumes that single family development will average about five dwelling units per acre, that mobile home development will average eight units per acre and that multi-family development will average about fourteen dwelling units per acre. The table could be reconstructed with different density assumptions and different percentage relationships between the types of residential uses.

The area figure for no oil shale development should be added to either of the other two columns for oil shale development to arrive at a total land area requirement since it is expected that oil shale growth will be in addition to normal growth. The table indicates then that 9.1 square miles will be required for development without oil shale, 14.9 square miles for moderate oil shale development and 26.0 square miles for successful oil shale development. The land actually devoted to oil shale plants and ancillary facilities are not included in these estimates.

PUBLIC FACILITY NEEDS AND COSTS

Table 11 is a summary of the major public facility and site costs which would be incurred in serving an incremental population of 1,000 persons. Neither the most expensive nor the cheapest construction was the model for the physical facilities listed here. The figures should reflect the moderate construction costs of a workable facility. Site costs will vary widely depending upon where the desired land is located and at what point in the urbanization process the land is acquired. As growth occurs it may be possible to secure the dedication of sites for many public facilities at no cost during the development process. The following example will demonstrate how the table works and the many underlying assumptions on each facility:

Table 10

LAND AREA REQUIREMENTS

Based on 14th year (1987) level of population and housing projections

Land Use	No Oil Shale Development (70,000 pop. increase)	Moderate Oil Shale Development (61,000 pop, increase)	Successful Oil Shale Development (161,000 pop. increase)
Residential	3541 Acres	2140 Acres	6500 Acres
Single Family	(2760)	(1350)	(4000)
Multi-family	(493)	(321)	(1250)
Mobile Homes	(288)	(469)	(1250)
Community Facilities	290	191	505
Streets	1080	587	1744
Commerce	82	71	188
Industry	840	732*	1932*
TOTALS	5833 Acres 9.1 sq. miles	3721 Acres 5.8 sq.miles	10869 Acres 16.9 sq.miles

* Does not include lands devoted to oil shale plants and ancillary facilities necessary to serve those plants.

Table 11

PUBLIC FACILITIES
SITE AND PHYSICAL PLANT NEEDS
(INCREMENTAL POPULATION OF 1,000)

SERVICE	FACILITY	SITE			PHYSICAL PLANT			Total Site and Plant Cost Per Service
		Site Requirements	Totals	Site Costs (without Improvement)	Physical Plant and Facilities	Initial Capital Costs	Totals	
Education	Elem School	2.8 Acres		$ 5,600	0.2 Elem. School	$ 677,590		
	Jr. High School	1.5 Acres		3,000	0.06 Jr. High School	286,350		
	Sr. High School	1.7 Acres	6.0 Acres	3,400	0.04 Sr. High School	336,300	$ 1,200,240	
					1.8 School Buses	20,000		$ 1,232,240
Parks and Recreation	Playgrounds	1.5 Acres		$ 3,000	Improvements	$ 43,125		
					0.3 SB Field	6,210		
	Neighborhood Parks	2.0 Acres		4,000	Improvements	10,580		
					0.2 Tennis Courts	2,070		
	Playfields	1.5 Acres		3,000	Improvements	43,125		
					0.6 BB Field	17,250		
	Community Park	2.0 Acres		4,000	0.1 Swimming Pool	6,900		
					0.2 Community Bldg.	4,500		
					0.3 Golf Holes	6,040		
	District Park	3.0 Acres	10.0 Acres	2,400			$ 139,900	$ 156,300
Libraries	Main or Branch	0.14 Acres	0.14 Acres	$ 350	0.14 Library (700 s.f)	$ 24,320	$ 24,320	$ 24,670
Hospitals	District Serving	0.25 Acres	0.25 Acres	$ 625	4.0 Hospital Beds	$ 192,610	$ 192,610	$ 193,235
Fire Protection	Fire Station	0.07 Acres	0.07 Acres	$ 175	0.1 Fire Station	$ 9,370		
					0.1 Pumper	5,520		
					0.1 Truck	6,480	$ 21,370	$ 21,545
Police Protection	Police Station	0.06 Acres	0.06 Acres	$ 150	0.08 Station	$ 10,305	$ 10,305	
					0.4 Vehicles	1,325	1,325	$ 11,780
General Control	Government Offices	0.003 Acres	0.003 Acres	$ 10	124 Sq. Ft.	$ 6,620	$ 6,620	$ 6,630
Financial Admin.	Government Offices	0.001 Acres	0.001 Acres	$ 5	80 Sq. Ft.	$ 4,270	$ 4,270	$ 4,275
Public Works	Garage	0.03 Acres	0.03 Acres	$ 60	400 Sq. Ft.	$ 7,820	$ 7,820	
					Vehicles	20,250	20,250	$ 28,130
Water Supply	Supply Development				To insure 200 acre feet/1,000 pop.	$ 200,000		
	Treatment Plant	1.0 Acres		$ 2,000	500,000 gallon additional capacity.	125,000		
	Distribution		1.0 Acres		Storage, mains hydrants.	450,000	$ 775,000	$ 777,000
Sewer System	Treatment Plant	1.0 Acres		$ 2,000	(No advanced treatment)	$ 100,000		
	Collection System		1.0 Acres			$ 450,000	$ 550,000	$ 552,000
	TOTALS		18.55 Acres	$33,775			$ 2,974,030	$ 3,007,805
Streets*		18.3 Acre	18.55 Acres		Total Improvement Plan			$ 1,968,000

* Generally, Streets and Street Improvements in new residential developments are provided by the developer and costs are reflected in property costs.

Service:	Education
Facility:	Elementary School

Based on the standard assumed population characteristics of 175 children of elementary school age/1,000 population, an average sized elementary school of 800 pupils and an average sized elementary school site of 13 acres, the equivalent site and physical plant needs for an elementary school per 1,000 population would be:

Site:	2.8 Acres
Site Cost (2.8 x $2,000/ Acre)	$5,600
Physical Plant	0.2 Elementary School (Bldg.)
Capital Costs	$577,590

The costs given in Table 11 represent only acquisition and construction costs. Yearly operating expenditures and expenditures for personnel are discussed later and will be in addition to these capital costs. It should be noted that the construction of some facilities is more dependent on service radius than population served. In the case of these facilities, density and proximity to existing facilities is more likely to influence needs than standards for population per facility.

Ideally, new community facilities will be built as existing facilities reach capacity. In many situations though, new growth is able to utilize excess or slack capacity in a community facility, thus disguising its burden on the community until that facility reaches capacity and a new one is required. For very small communites with no vestige of the necessary urban systems to support growth, start up costs will be tremendous. Per capita costs will be very high. Communities in the 1,000 to 5,000 population range must provide expensive facilities and spread the cost over a relatively few people. Cities over 5,000 make more efficient use of their facilities at a smaller per capita cost.

In view of the complexities of growth and public policy, the tables and figures in this report can serve only as a general tool to enable communities to judge the impact of population growth. A further discussion of some of the components of growth found in Table 11 is continued below.

Subdivision Development Costs

While a total figure for street development is included in Table 11, a further breakdown may be useful to outline the costs normally associated with the development of a typical subdivision. These costs are normally associated with the development of the street system since services are placed within the public right-of-way. Additional preparation costs may include planning, engineering, surveying, and overlot grading but are not included here.

Streets

Generally, initial costs for residential street improvements in new residential developments are not a public cost but, instead, represent a cost borne by the developer or secured against the developed property. These costs are then passed along to the home buyer in the cost of the home. Table 12 summarizes recent typical component costs of residential street improvements, assuming that existing utilities are at or near the subdivision boundaries with no special connection problems or costs. Although costs vary greatly according to local code requirements for different materials, street types and layouts, and utilities, the following table will provide a useful guide.

The typical 40' street described here would be a collector street in most communities. That is, it is a size between the local subdivision street width of 27' to 36' and the major street with a pavement width ranging from 48' to 80' or more. In some cases, the development of an area will require that the basic city street system which provides initial access to the area be improved. If this improvement is of general community benefit, the costs for these improvements typically accrue to the community.

Utilities

Like street improvements, the initial installation of street lighting, water, gas and electricity are usually accomplished by the developer of an area with costs passed along to the consumer. Unit utility costs are shown in Table 13.

Table 12

STREET COSTS

STREET IMPROVEMENT	UNIT	AVERAGE UNIT COST	TYPICAL 40' STREET (LINEAL FT.)
GRADING AND SURPLUS DISPOSAL	SQ. FT.	$ .06	$ 3.60
4" ROCK BASE	SQ. FT.	.13	5.20
PAVING, 4" ASPHALTIC CONCRETE	SQ. FT.	.33	13.20
CONCRETE CURB 6", 1' GUTTER	LIN. FT.	2.50	5.00
CONCRETE CROSS GUTTER AT INTERSECTION	SQ. FT.	1.10	.55
CONCRETE SIDEWALK, 3" THICK	SQ. FT.	.50	4.00
CONCRETE APRONS, 5"-6" THICK	SQ. FT.	.80	1.40
SEWER MAIN, 6" V.C. PIPE, 9' AVERAGE DEPTH	LIN. FT.	7.50	7.50
SEWER LATERALS, 6" V.C. PIPE, 5' AVERAGE DEPTH	LIN. FT.	5.65	5.65
SEWER MANHOLES, 600' O.C.	EACH	555.00	.93
FIRE HYDRANTS - 600' O.C.	EACH	680.00	1.13

Table 13

UTILITY COSTS

LIGHTING OR UTILITY	UNIT	MAXIMUM UNIT COST	TYPICAL 40' STREET (MAX. PER LINEAL FOOT)
STREET LIGHTS, UNDERGROUND WIRING 200' O.C.	EACH	$830.00	$ 4.15
WATER MAIN, 6" CAST IRON	LIN. FT.	8.65	8.65
WATER LATERAL, 1"	LIN. FT.	1.70	1.70
GAS MAIN, 2"	LIN. FT.	3.35	3.35
GAS LATERAL, 3/4"	LIN. FT.	1.50	1.50
ELECTRICITY, UNDERGROUND, IN CONDUIT	LIN. FT.	5.40	5.40

The cost of complete street improvements including lighting and utilities, using the above components is approximately $66.00 to $78.00 per lineal foot of street, assuming 18.3 acres of streets for a residential population of 1,000 at a net residential density of 4.8 dwelling units per acre, 19,000 linear feet of streets would be required. At an average of $72.00 for linear foot total initial development costs for streets and utilities would be $1,368,000. This figure has been used for street costs in Table 11.

Public Utilities

If this energy conscious era, the use of natural resources is of prime concern. Growth will see increased useage of natural gas, electricity and water. In the following information, only water and sewer are calculated as public costs. While some cities generate their own electricity, the far more common situation in Colorado is to have power and gas provided by private or semi-public organizations regulated by the Public Utilities Commission. Major costs for installation and service of these two commodities are therefore not borne by local government. General quantities are set forth for gas and electric and quantities and costs are estimated for water and sewer. While these figures are necessarily general, the intent is to further illustrate that any given population increment generates certain identifiable needs and costs.

In estimating the need for water and sewer facilities, some basic assumptions were made. Growth was assumed to occur in established population centers of 1,000 people or more. Relatively compact growth was assumed rather then growth characterized by strip development along highways and existing road systems.

The size of the increment of growth for which a project is constructed is vitally important for estimating water treatment plant and sewage treatment plant costs. For design of facilities, 5,000 population increments occuring over two to seven years are reasonable. Although growth in some population centers will make planning increments of 10,000+ occasionally possible under intensive development, the fluctuations of growth patterns which are possible under both intensive and moderate oil shale development in the first years and under moderate development over the full 14 years will cause some growth centers to design for a population which may not come or will be there only temporarily. The costs caused by temporary and mispredicted population growth would offset the savings of the

10,000+ population increments for the overall region. It would seem that a policy of directed growth could avoid the problems caused by misprediction or temporary population fluctuations. This problem avoidance would have benefits exceeding the possible cost savings on water and sewer facilities.

The three-county region contains thirteen present population centers which would be impacted by the oil shale development. An even distribution of the population to each center is most unlikely. Factors affecting this distribution include oil shale technology, location of plants, availability of water, local regulation and transportation to name only a few. One assumption which could be made is that the existing population centers would generally grow in proportion to their present size. If the population growth were less intense and related to more geographically dispersed industry, this assumption might be valid. Although oil shale plants may be dispersed over a large area -- the assumption that the dispersement will be uniform or cause growth in proportion to the size of existing centers seems unwarranted.

In viewing the total numbers to be accommodated, however, it should be possible to plan for water and sewer facilities in five year increments of 5,000 population. Some population centers will receive more, and some less, but as an overall estimate, the 5,000 increment seems as reasonable as the data will support. This is the basis on which water and sewer costs were developed and included in Table 11.

Water Supply Development

Water supply requirements can be expected to range between 0.10 and 0.50 acre-feet per year per person including all normal uses in a municipality. An average requirement of 0.2 acre-feet per year per person is proposed as reasonable. Each 1,000 people then will require 200 acre-feet of firm water supply capacity.

Costs of water supply development are the most variable of all costs. They can include:

1. Purchase of existing irrigation direct-flow and storage rights
2. Development of new storage rights

3. Development of new well rights
4. Construction of dams, diversion works, wells, pipelines, canals, etc. to obtain storage and convey raw water to the municipality's treatment facilities.

A frequently used rule-of-thumb for water supply development in Colorado is $1,000 per acre-foot of firm capacity. At this rate, each 1,000 population increment will cost $200,000 for water supply development.

Existing water supplies in the region vary from community to community. Each of the communities has some reserve supplies which, in the past, were believed to be adequate to the growth and expected needs of the towns. These projections and existing water rights need to be reviewed regularly against the projections of need as made in this report and as shown by further data as it develops. This is not a new process to the communities of Western Colorado. Indeed, the towns have historically carried on such a review process every few years.

To the extent that the present ajudicated water rights of the towns may be sufficient for anticipated growth needs, then the estimates of cost would not be applicable. Each of these estimates must be reviewed by each of the communities on a regular basis. It is necessary, however, that there be a starting place on the costs of new water rights, and the estimates contained in this report have been made from the best available data.

In addition to the acquisition of ajudicated rights from existing early irrigation decrees, careful analysis must be made by the communities of the existing decrees held by water conservency districts for municipal and domestic uses; and those decrees presently held by other enities such as the Colorado River Water Conservation District which have been developed over many years of long and difficult struggle to accommodate the development of Western Colorado.

Water Treatment Plant

Water treatment plants are sized to treat maximum day requirements which generally are about 2.5 times the average day of the year. A water treatment plant constructed for a 5,000 population increment would have a capacity of about 2.5 MGD based on the average water supply requirement developed under the previous heading. Estimated costs for 1974 are $250,000 per million gallons of capacity in the western slope area or $625,000 per plant to treat water for 5,000 people.

Based on the preceding paragraph, water treatment plant cost per 1,000 population increment is about $125,000 if the plant were to be built in 1974.

Water Distribution

For water distribution system cost estimating a gross land requirement of .75 acres per housing unit has been assumed (including residential, commercial and industrial other than oil shale industrial). There are about 300 housing units per 1,000 population. Gross area to be served by water systems per 1,000 population is 225 acres.

A water distribution system including storage, main size and fire hydrants to provide fire fighting capability will cost about $2,000 per gross acre at 1974 costs at a density of .75 gross acres per housing unit.

Cost per 1,000 population increment is estimated to be $450,000.

Sewage Treatment Plant

Secondary sewage treatment plant with chlorination built in 5,000 population increments (500,000 gallon per day capacity) if built in 1974 could be expected to cost about $500,000 if mechanical plant construction were used to minimize land area requirements. This plant would produce an effluent meeting 1976 State requirements. If sufficient land were available at reasonable cost to construct aerated lagoons, this cost might be somewhat reduced. Cost per 1,000 population would be $100,000. The cost reported above does not include advanced treatment which would increase the cost by 30% to over 100% depending on type of treatment required. The State of Colorado presently is making waste load allocation studies of the major streams in the State which may result in a requirement for advanced treatment at some localities in the oil shale development area, particularly if growth is concentrated in a few localities.

Sewage Collection

Based on the same acreage determination as for water collection system of .75 gross acres per housing unit (including streets, public, commercial and industrial), sewage collection costs also can be expected to be in the neighborhood of $2,000 per acre or $450,000 per 1,000 population increment. This amount includes feeder lines, trunk lines, moderate main trunk line length to the sewage treatment plant and moderate collection system pumping.

Natural Gas

According to the Public Service Company of Colorado, a typical 3 bedroom home can be expected to consume roughly 6,000 cubic feet of natural gas per month in the summer months and 33,000 cubic feet per month in winter months. This is equivalent to approximately 240,000 cubic feet of natural gas per year per dwelling unit. Assuming 275 dwelling units per 1,000 population, natural gas consumption would approximate 66,000,000 cubic feet per year per 1,000 population.

Electricity

Again, assuming a typical three bedroom home with the average compliment of electrical appliances, Public Service Company of Colorado estimates an average 500 kilowatt hours per month generation of electricity per dwelling unit. A population of 1,000, therefore, would generate roughly 275 times this amount, or 137,500 kilowatt hours.

Although rates of consumption vary locally, the above averages provide a reference for judging the adequacy of current electricity generating capacity and gas reserves in terms of rising demands resulting from a given increment of population growth.

OPERATING EXPENDITURES

The capital costs which have been detailed in the preceding section represent only a portion of the costs of supporting a given increment of population growth. In addition to new physical plant, there will be continual costs incurred in administering to and providing services to the additional population. These are the operating expenditures incurred by local government.

In the long run, operating expenditures may have a more significant financial impact than capital costs. While capital needs will make a tremendous early impact, the cost of the physical plant thus acquired may be spread out over a 10 to 20 year period of time and the facility may have a useful life of a longer period. Operating costs will increase gradually to new levels and will need to be paid

from this point forward. On this basis, capital costs might represent only a fraction of the total expenses of local government.

In 1967, capital outlays by local government in the three county area ranged from 13% to 17% of total general expenditures. In a period of higher than normal growth rates, however, the pressure for additional facilities could generate capital costs which would represent 20 - 30% of direct local government expenditures.

An analysis of 1967 Census of Governments data indicates that, based on the 62 counties (including over 1,200 units of local government) of Colorado, per capita expenditures for all items of local government exhibit a tendency to decrease slightly with population increase (county-size). Total per capita expenditures for individual county governments and school districts have a similar relationship. On the other hand, as population of a municipality increases, per capita costs have a tendency to increase. The increase is slight in municipalities less that 100,000 population, but becomes considerable in municipalities exceeding 100,000 population.

Table 14 summarizes municipal government expenditures per capita for six Western Slope municipalities as compared with average expenditures of all Colorado municipalities within the population range represented. These figures represent municipal functions only and do not include education and services normally performed by counties or the State. The figures vary widely depending on the level and kinds of services performed.

Due to the difficulties involved in an item-by-item comparison of local budgets, Census of Government compilations were used whereever possible to assure some degree of consistency. Since the most recent Census of Government compilation available is based on 1967 data, all data has been converted into current dollars. The factors used for this conversion were checked for their accuracy against 1970 Local Government Financial Compendium data.

Municipal government expenditures represent only a portion of total government expenditures. A true representation of all local government expenditures requires the inclusion of counties, school districts and special districts, as well as municipalities. Table 15 presents a detailed account of total local government expenditures (converted to current dollars). This level of analysis also provides a more detailed breakdown of capital costs and operating costs.

Table 14

ANNUAL PER CAPITA MUNICIPAL GOVERNMENT EXPENDITURES*

	Average of all Colo. municipalities with less than 2,500 pop.	Rangely	Meeker	Fruita	Rifle	Average of all Colo. municipalaties from 5,000-9,999 pop.	Glenwood Springs	Average of all Colo. municipalities w/from 10,000-24,999 pop.	Grand Junction
General expenditures, all functions	71.70	87.10	66.71	73.26	97.66	98.69	96.23	90.67	155.91
Capital outlay	12.50	6.34	-	15.60	.32	22.23	5.92	32.65	5.55
Other	59.20	80.76	66.71	57.66	97.34	52.44	90.31	58.02	150.36
Highways	15.31	18.53	29.86	14.27	17.42	25.63	25.19	22.04	31.26
Public welfare	.06	-	-	-	-	.55	-	-	-
Health and Hospitals	.15	10.94	2.53	2.18	4.98	1.23	2.76	12.47	5.01
Police protection	10.33	15.38	11.60	14.94	15.86	13.75	16.00	6.68	23.87
Fire protection	1.51	2.76	1.50	2.10	1.65	4.48	1.84	10.45	19.64
Sewerage	6.49	-	-	5.36	7.06	7.01	4.21	4.90	9.03
Sanitation other than sewerage	2.16	-	-	-	6.10	3.53	12.65	4.00	13.11
Parks and Recreation	3.34	7.39	13.08	1.44	2.62	7.48	4.72	5.65	19.47
Libraries	1.30	-	1.49	-	.59	2.35	.56	4.00	-
Financial Administration	1.88	-	-	2.45	-	3.01	1.44	3.52	3.86
General control	5.59	.56	-	1.58	14.42	4.83	1.68	5.59	4.92
General public buildings	3.23	-	-	1.56	4.19	4.75	2.48	1.64	3.26
Interest on general debt	1.43	-	-	-	-	-	-	1.62	-
All other	18.89	30.53	6.64	28.64	3.82	2.33	23.68	13.03	20.21
Utility Expenditures	19.45	122.95	57.99	32.68	36.51	17.76	119.37	78.89	31.38

* 1967 data expressed in current dollars. Does not include costs for education or functions performed by other units of government.

Note: Columns may not add due to rounding.

TABLE 15

ANNUAL PER CAPITA LOCAL GOVERNMENT EXPENDITURES*

	Average of all Colo. counties less than 10,000 pop.	Rio Blanco County	Average of all Colo. counties From 10,000 - 24,999 pop.	Garfield County	Average of all Colo. counties From 50,000 - 99,999 pop.	Mesa County
Direct General Expenditures	$608.92	$935.85	$504.80	$462.00	$485.26	$562.50
Capital Outlay	105.10	124.18	77.14	69.22	68.23	96.14
Other than capital outlay	503.82	811.67	427.66	392.78	417.03	466.36
Education	286.66	373.37	261.58	250.72	241.60	344.17
Other than capital outlay	228.14	356.79	219.70	201.52	209.15	281.63
Highways	96.06	190.70	55.02	62.89	35.18	37.10
Other than capital outlay	72.83	94.62	39.23	53.88	28.86	29.87
Public Welfare	85.37	39.54	84.84	53.03	71.58	74.55
Hospitals	23.70	125.39	11.76	-	32.14	-
Other than capital outlay	18.86	124.29	7.58	-	30.51	-
Health	2.16	.11	2.92	1.81	3.45	4.10
Police protection	11.17	19.71	10.34	10.40	10.67	9.90
Fire protection	2.54	.80	3.86	.80	5.85	6.79
Sewerage	7.23	13.23	7.46	9.49	19.12	5.32
Other than capital outlay	3.52	11.59	2.72	2.52	3.37	1.54
Sanitation other than sewerage	1.71	-	3.32	5.56	1.92	4.19
Parks and Recreation	3.77	19.19	4.27	4.49	6.17	6.54
Natural resources	9.55	9.48	5.29	2.65	8.41	11.01
Housing and Urban Renewal	2.32	-	4.18	-	.25	-
Correction	1.02	1.16	1.17	.60	.35	.82
Libraries	1.83	1.69	2.04	2.44	2.39	1.88
Financial administration	10.70	11.89	5.96	5.61	5.28	6.46
General control	20.74	26.66	12.85	15.57	10.92	11.96
General public buildings	6.17	9.77	4.65	17.13	5.26	4.42
Interest on general debt	11.60	54.79	9.42	6.08	10.14	8.34
Other and unallocable	9.63	29.59	3.42	8.69	2.50	2.36
Water supply expenditure	$ 26.09	$ 15.05	$ 17.22	$ 16.57	$ 39.31	$ 28.12
TOTAL PER CAPITA LOCAL GOVERNMENT EXPENDITURES**	$635.01	$950.90	$522.02	$478.57	$524.57	$590.62

* 1967 Data expressed in 1973 dollars

** Does not include general debt outstanding

Table 16

DIRECT GENERAL LOCAL GOVERNMENT EXPENDITURES* OTHER THAN CAPITAL OUTLAY (ANNUAL OPERATING EXPENDITURES)

1,000 Incremental Population

	Rio Blanco County	Garfield County	Mesa County
Direct general expenditures Other than capital outlay	$811,670	$392,780	$466,360
Education	356,790	201,520	281,630
Highways	95,620	53,880	29,870
Public welfare	39,540	53,030	74,550
Hospitals	124,290	-	-
Health	110	1,810	4,100
Police protection	19,710	10,400	9,900
Fire protection	800	800	6,790
Sewerage	11,590	2,520	1,540
Sanitation other than sewerage	-	5,560	4,190
Parks and Recreation	19,190	4,490	6,540
Natural resources	9,480	2,650	11,010
Housing and urban renewal	-	-	-
Correction	1,160	600	820
Libraries	1,690	2,440	1,880
Financial administration	11,890	5,610	6,460
General control	26,660	15,570	11,960
General public buildings	9,770	17,130	4,420
Interest on general debt	54,790	6,080	8,340
Other and unallocable	38,400	12,750	24,930
Water supply expenditure	15,050	16,570	28,120

* 1967 data converted to 1973 dollars.

Note: Columns may not add due to rounding.

Since the relationships of per capita costs to population size are largely a function of base populations, per capita expenditures can best be projected as a constant. Once the incremental increase in population is allocated to a specific area, this constant can be adjusted to reflect relationships discussed earlier which might be applicable to that area.

Table 16 restates only the operating expenditures from Table 15 in terms of an incremental population of 1,000. Again, expenditures are shown for each county to indicate differential operating expenditures. Based on projections from Table 16, total annual operating expenditures (exclusive of water supply expenditure and debt outstanding) for an assumed 1,000 incremental population are as follows:

	Rio Blanco County	Garfield County	Mesa County
Total Direct General Operating Expenditure per 1,000 pop.	$811,670	$392,780	$466,360

The costs shown above for Rio Blanco County are uncommonly high, reflecting the County's small population base and high per capita costs for services. As Rio Blanco County gains population, its per capita costs for services will tend to decline and more nearly reflect the pattern of other Colorado counties of its size. Garfield County, on the other hand, will probably be required to increase services as it grows beyond its present size. Its per capita expenditures will probably rise to bring it more nearly in line with other counties of similar size.

Based on recent Colorado data, it is reasonable to project local government operating expenditures in the three county area in the range of $400 to $500 per capita. This would result in a $400,000 to $500,000 annual cost to service an incremental population of 1,000 persons. This figure assumes that all physical plant is in place and staffed. In actuality, all of the projected 1,000 population would not settle in at one time, nor would all staff and service personnel arrive at once. This level of spending would be reached over a period of time.

The above figures do not include any of the capital costs discussed in Table 11. The addition of direct capital outlays and debt service could raise per capita expenditures to the $600 level or higher depending upon what time period major capital expenses are amortized over.

Personnel Costs as a Part of Operating Expenditures

The major portion of the operating expenditures discussed above is in salaries to administrative and service personnel - at least 85% to 90%. The remainder goes for supplies, tools, small equipment, rent in some cases, mileage on governmental vehicles, parts, contract services and other typical expenses.

Table 17 summarizes the public personnel needs and salary expenditures for a population of 1,000 persons. These figures are a composite of national and state averages with salaries reflecting 1974 rates. Nationally, salaries for government employees are increasing at the rate of about 6% a year. There are higher increases for some special classes while other classes are moving more slowly. This trend will probably continue and will be affected by the Cost of Living Council and the Federal Pay Board. An attempt will be made to hold increases to 5.5% a year per employee unit. These salary figures will need to be adjusted upward by this amount by mid 1974.

The $35,407 monthly salary for all of the government personnel needed to service an additional population of 1,000 persons amounts to an operating cost of $424,884 annually, or $425 per capita.

By refering to Table 16, it is apparent that Garfield County, for example, is not providing this level of service at the present time with per capita expenditures of about $393. This is accounted for by the fact that there are 35 governmental employees per 1,000 population in Garfield County whereas the average suggested here is about 41 employees per 1,000. Also, Garfield County average salaries may be lower than some of the figures here.

This example does point out the pressures which salaries exert on operating budgets. As more people move into the three county area and as government and private industry begins to compete for qualified personnel, salaries in the area will rise to more nearly reflect what is happening elsewhere in the State and the nation. The $424,884 total salary figure suggested here is at 85% of the $500,000 total expenditure mentioned earlier as the total operating cost to serve 1,000 persons. As salaries move up, either supplies and non salary expenses will be squeezed or the ceiling will be raised to a new, higher level.

Table 17

PUBLIC PERSONNEL NEEDS AND SALARIES

(1,000 Incremental Population)

Service	Facility	Personnel Requirements	Average Monthly Salary	Equivalent Monthly Salary
Education	Elementary School	6.78 Teachers 4.6 Administrators & Staff		
	Secondary School	7.69 Teachers 9.9 Administrators & Staff	$ 916	$ 26,536
Recreation	All Facilities	0.65 Personnel	605	393
Libraries	Branch or Main	0.28 Library Staff	576	161
Fire Protection	Fire Station/Department	1.28 Firemen	895	1,145
Police Protection	Police Station/Dept.	2.27 Policemen	850	1,930
General Admin.	Local Government	0.62 Administrators	758	470
Financial Admin.	Local Government	0.40 Administrators	693	277
Public Works	Street Department	0.85 Personnel	653	555
	Water Supply	0.69 Personnel	686	473
	Sanitation	0.88 Personnel	629	554
	Sewerage	0.33	646	213
Variable Function	All	3.60 Personnel	750	2,700
		40.82		$ 35,407

Planning as an Operating Cost

The costs of operating effective planning programs within local government vary with the needs of the area being served and the population served. Since planning is a service, most costs are for the salaries of competent personnel - plus smaller amounts for supplies and space. Table 18 is a representative sampling of planning agencies serving areas of Colorado.

It should be noted that planning is variously defined. Some agencies may include the zoning function while others are "pure" planning agencies. Budgets are also variously spent. Some go entirely for staff salaries while other programs are a combination of staff and consultant services.

In determining a pattern for Region 11, the unique circumstances facing the region must be kept in mind. Western Colorado is facing unprecedented growth. Therefore, its initial planning activity should be above State averages. Efforts should be geared to meet perceived needs rather than be based on an arbitrary expenditure level.

REVENUES

While new growth in the three-county area will require land for housing and money for public facilities and governmental services, it will also produce revenues to local government in the form of ad valorem and sales taxes, fees, and intergovernmental transfers. These revenues will at least partially offset costs for services. Of importance, however, is the fact that real estate taxes will lag in their collection from one to two years behind the demand for services. Sales taxes and point-of-employment collection of income taxes, on the other hand, are collected more quickly and are therefore more responsive to the need for services.

It is possible to generalize on the amount of revenue which might be generated by an incremental population increase of 1,000 persons for some unspecified location in Western Colorado. This estimate is shown in Table 19. The table accounts for only the commercial and industrial expansion that would normally accompany population growth.

Table 18

EXPENDITURES FOR PLANNING IN COLORADO*

County and Agency	1970 Population	Planning and Zoning Expenditures	COG Contribution	Totals	Per Capita
Pueblo County	118,238	$ 39,001	-	$ 39,001	
Pueblo Regional	-	211,000		211,001	
Pueblo	97,453	25,724	-	25,724	
Totals		$275,725		$275,725	$ 2.33
Adams County	185,789	$ 89,500	$ 41,600	$131,100	
Commerce City	17,407	40,167	-	40,167	
Northglenn	27,937	21,709	3,900	25,609	
Thornton	13,326	48,000	-	48,000	
Westminster	19,432	17,432	-	17,432	
Totals		$216,808	45,500	$262,308	$ 1.41
Arapahoe County	162,142	$117,364	-	$117,364	
Aurora	74,974	280,105	$ 11,000	291,105	
Englewood	33,695	79,597	5,400	84,997	
Littleton	26,466	152,625	4,400	157,025	
Totals		$629,691	$ 20,800	$650,491	$ 4.01
Boulder County	131,889	$101,825	$ -	$101,825	
Boulder	66,870	145,825	-	145,825	
Broomfield	7,261	14,000	1,100	15,100	
Longmont	23,209	69,870	4,000	73,870	
Totals		$331,520	$ 5,100	$336,620	$ 2,55
El Paso County	235,972	$154,133	$ -	$154,133	
Colorado Springs	135,060	179,000	63,000	242,000	
Totals		$333,133	$ 63,000	$396,133	$ 1.68
Delta County	15,404	$ 27,000	$ 2,000	$ 29,000	
Delta	3,694	-	-	-	
Totals		$ 27,000	$ 2,000	$ 29,000	$ 1.88
Garfield County	14,821	$ 25,125	$ 6,000	$ 31,125	
Totals		$ 25,125	$ 6,000	$ 31,125	$ 2.10
Jefferson County	233,141	$280,495	$ -	$280,495	
Arvada	46,814	188,246	7,200	195,446	
Golden	9,817	3,100	1,600	4,700	
Lakewood	92,787	740,524	15,000	755,524	
Wheat Ridge	29,795	50,085	4,700	54,785	
Totals		$1,262,450	$ 28,500	$1,290,950	$ 5.54
Larimer County	89,000	$206,597	-	$206,597	
Estes Park	1,616	23,330	-	23,330	
Ft. Collins	43,337	126,829	-	126,829	
Loveland	16,220	14,139	-	14,139	
Totals		$370,895		$370,895	$ 4.17
Mesa County	54,374	$ 36,843	-	$ 36,843	
Grand Junction	20,170	36,843	-	36,843	
Totals		$ 73,686		$ 73,686	$ 1.36
Montrose County	18,366	$ 13,772	$ 5,000	$ 18,772	
Montrose	6,496	19,300	-	19,300	
Totals		$ 33,072	$ 5,000	$ 38,072	$ 2.07
Pitkin County	6,185	$ 30,823	-	$ 30,823	
Aspen	2,404	30,823		30,823	
Totals		$ 61,646		$ 61,646	$ 9.97
Summit County	2,665	$ 58,650	$ 5,000	$ 63,650	
Totals		$ 58,650	$ 5,000	$ 63,650	$23.88

* Source: Western Colorado Regional Planning Commission
Prepared for selected Colorado Counties Sept. 18, 1973

The establishment of an oil shale industry is not considered. Revenues from such an industry would be in addition to the figures shown.

The general estimate of revenues in Table 19 is not intended as a substitute for a more sophisticated and more accurate public finance model. Such a model is not possible for an unspecified location given the varying fee, structures, tax rates, income levels, and growth rates which exist. To avoid the impression that the table represents anything more than a statement of possibilities, it is footnoted extensively with assumptions and clarifying statements. These notes provide multiplier methods and/or simple projection assumptions which might be used by local government to arrive at more specific estimates for a particular jurisdiction. Assumptions, such as those concerning the per capita incomes of the incoming population, the average value of new homes, the mil levy, and present revenues from fees can be adjusted to reflect existing situations and then the methodology used to arrive at some still rough, but hopefully useful estimates.

Table 19
INCREASES IN ANNUAL REVENUES
PER 1,000 INCREASE IN POPULATION

Property taxes		
Residential[1]	$162,250	
Commercial[2]	19,590	
Industrial[3]	5,000	
Total		$186,840
Sales Taxes[4]		$ 18,420
Intergovernmental transfers[5]		168,868
Charges for current services and other revenues[6]		54,482
Total		$428,610

Notes on Revenue Increases

1. 216 on site homes × $22,000 average value per home (both single and multi-family)
   × .3 ratio of assessed value to value
   × .075 average mil levy
   plus 84 mobile homes × $7,000 average value
   × .80 ratio of assessed value to value
   × .075 average mil levy
   × adjustment for inflation since 1970

Notes on Revenue Increases (cont.)

2. $3,800 per capita incomes X 1,000 persons
   X .86 (converting to disposable income)
   X .52 percent spent on retail purchases
   X .95 (allowing for leakage)
   X 1/55 ratio of square feet of floor space to dollars of sales
   X $26 average value of retail space per square foot
   X .3 ratio of assessed value to value
   X .075 average mil levy
   X adjustment for inflation since 1970

3. It is not realy feasible to estimate what the industrial valuation for some non-specific jurisdiction will be. The figure used here is based on the needs for additional warehousing, distribution, and other facilities for a population increment. Each government unit should evaluate its individual potential for attracting industry. In jurisdictions where oil shale production will be located, this figure is grossly understated.

4. 3,800 per capita income X 1,000 persons
   X .86 (converting to disposable income)
   X .52 percent spent on taxable retail purchases
   X .95 (allowing for leakage)
   X .01 city sales tax rate
   X adjustment for inflation since 1970

5. Intergovernmental transfers include federal revenue sharing, state aid to school districts, state highway users tax revenues, special motor vehicle registration fees, welfare grants, etc. In general, it can be said that total intergovernmental transfers increase slightly less proportionately than increases in the population.

   a. Federal revenue sharing local shares depend on the area's population, its local tax effort, and its relative income level. Since the new residents will probably have a higher average income than present residents, the region's share should increase slightly more slowly than its population for a while.
   b. State contributions to school districts are $25 per pupil per mil levied for school operating expenses for all school districts whose assessed value of less than $17,000 per pupil. For these districts, a 30% increase in school enrollments will result in a 30% increase in state aid.

Notes on Revenue Increases (cont.)

c. City and county shares of the highway users fund are based on mileage of roadways and number of vehicle registrations. County shares are based 80% on mileage and 20% on vehicle registrations. City shares are based 80% on vehicle registration and 20% on mileage. Although vehicle registrations will rise proportionately with population increases, highway miles will increase at a much slower rate.

6. Charges for current services and "other revenues" received vary greatly for different counties and cities within the oil shale area. Different services and rates and different miscellaneous revenue sources are primarily responsible for the variations. Each government unit would be advised to use its own present receipts in these categories to calculate future revenues. In general, it is reasonable to assume that these revenues will rise proportionately with population increases. A rough projection might be obtained as follows:

   Present revenues ÷ Present population X Future population = Estimated future revenues.

A comparison of estimated revenues and costs outlined in this chapter indicates that potential revenues are not as large as possible expenditures. Revenues may cover annual operating expenses, but the large outlays needed for capital improvements tip the balance unfavorably. This is a typical pattern for rapidly growing areas.

There are some mitigating factors. These "normal" revenues do not include any revenues from an oil shale industry, nor do they assume any extraordinary commercial or industrial development related to oil shale. Ad valorem taxes on an oil shale plant; increased industry, state or federal contributions; unforeseen secondary industry development as a result of oil shale; or new taxes would all improve the revenue picture. Taxing units with an oil shale industry and very little population may have a very favorable revenue picture. Over the entire region, however, the major problem will be the financing of capital improvements at the time they are needed.

Table 20 shows the range of costs and revenues which might be generated over the next 15 years for the three different rates of growth based on the figures developed in this chapter. Assumming

Table 20

COSTS AND REVENUES*
15 YEAR PERIOD

Growth Condition	Capital Costs	Operating Costs	Revenues
Normal Growth (70,000 population increase)	$210 Million	$208 Million	$178 Million
Moderate Oil Shale Development (131,000 population increase)	$393 Million	$435 Million	$372 Million
Intensive Oil Shale Development (231,000 population increase)	$693 Million	$611 Million	$524 Million

* Costs and revenues are for local governments and school districts only. Figures do not include costs to service oil shale plants or the revenues from those plants.

that local governments can adjust revenues to cover the major part of operating expenses, the magnitude of the capital costs are very important.

Expenditure and revenue comparisons preclude the consideration of some of the more qualitative aspects of growth. An expenditure/ revenue analysis needs to be placed in the perspective of overall community goals. Revenues generated by new growth should not necessarily be narrowly construed as "benefits" nor can all expenditures be coldly dismissed as "costs". In a qualitative sense, some costs will be necessary to maintain and improve the quality of life in the region. The difference between revenues and expenditures is, therefore, only one measure of different courses of action.

AREAS FOR GROWTH

The first two chapters of this report have dealt with possible numbers of people and dwelling units which might result from different growth rate assumptions and the land area and service requirements which this growth might generate. This chapter applies the problem directly to the oil shale region by scrutinizing the three counties for areas which might suitably accept new or additional development.

CRITERIA

In determining the suitability of land for urban development, four principal factors have been considered. They are:

1. The degree of slope
2. Soil characteristics
3. Competing uses for the land
4. Logistical limitations such as access problems, availability of services, effect of development on air and water quality.

Slope

Slopes of less than 15% are considered optimum for urban development. They permit maximum flexibility in planning and developing residential and supporting uses such as streets, drainage and utility systems. In areas of 15% to 20% slope, development should be limited to small scale, low density development. Slopes greater than 20% are generally undesirable due to limitations on planning and development, relatively high development costs, and higher incidence of unusable or marginally usable land.

Soil Characteristics

Soil is derived from bedrock as a result of chemical, physical, and biological processes. Either in place as a residual soil or transported by natural processes from the place in which it formed, soil lies on and is distinct from bedrock. Through appropriate analysis, factors such as permeability, shrink - swell potential, corrosivity, water table conditions, natural runoff, flood hazards, and subsidence due to withdrawal of fluids can be determined. Each of these is important in determining development suitability. The significance of several of these factors is discussed in the following paragraphs.

Bedrock

Bedrock is the solid, undisturbed rock in place either at the ground surface or beneath a surficial layer of gravel, sand, or loam. Bedrock is the parent material from which the soil is derived and it imparts its geologic characteristics to the soil, (permeability, salinity, shrink-swell potential, frost action potential, susceptibility to erosion, etc.). These distinct physical and chemical characteristics vary from a resistant granite to weak shales or mudstones that are comprised of a large percentage of clay. The shale of mudstone will not provide as secure foundations or as stable conditions as will granite or resistant sedimentary rock. The type of clay mineral in shale may also be critical. If it is swelling clay, special precaution must be taken to ensure foundation and roadway stability and to prevent slope failure. The location of bedrock, depth to bedrock from the land surface and hardness of bedrock are important planning considerations because they determine methods of excavation for building foundations, basements, streats, and underground utility lines.

Permeability

Soil permeability is that quality of soil which enables it to transmit water and air. The degree of permeability depends upon the size and shape of the pores, the size and shape of their interconnections, and the extent of the latter. Slow rates of permeability, as in clays, indicate possible problems of surface runoff and excessive surface erosion. Very high rates of permeability, on the other hand, can result in pollution of underground water. In each case, the rate has implications regarding developable areas, types of foundations, and underground sewer and storm facilities.

Shrink-swell Potential

Shrink-swell behavior is that quality of the soil which produces a volume change with change in moisture content. The volume change of soil is influenced by the amount of moisture and the amount and kind of clay. When the clays get wet, they swell, and when they dry and give up their water, they shrink and develop deep cracks. On a natural slope, this repeated change in volume of the clay often results in a downslope movement. Structures whose foundations do not penetrate below the zone of volume change will move about. Stresses and strains will be set up in walls, floors will change levels, and separations between structure and foundation occur. As a result, knowing the shrink-swell potential of the soil helps to predict its effect on building foundations, roads, and underground utility lines.

Corrosion

In the study area, the potential of a slow wearing-away or decomposition of materials that proceeds from the surface and moves inward must be evaluated. Useful parameters for such an evaluation can be provided by pH tests measuring acidity or alkalnity, chemical analysis, and soil resistivity (electrical) tests.

Most effected by such corrosion are pipes and cables or other metallic substances in the ground and other structures partly or wholly entombed such as fence posts, pilings, caisons, etc. In this area where there are high levels of gypsum, annihydrite, and sodium salts, the shortest pipe-line may not be the cheapest if it is located in a highly corrosive environment.

Ground Water

Groundwater is that type of water which exists below the land surface in the interstices between the soil grains. This water comprises what is commonly known as the watertable. Normally, this is a sloping, flowing surface, which roughly follows the ground levels above and slopes down to ponds, lakes, streams, seeps, or springs, where it intersects the ground surface.

The quality of this water is extremely important for water supply and vegetation. The quality is determined by the concentration of dissolved solids which may vary with stream discharge, salt input, evaporation and other chemical factors. Such concentrations are relatively stable and constant under virgin conditions but can vary significantly with the advent of development. For that reason,

careful thought must be given to the location of future development in order to avoid water pollution and low ground water recharge conditions. High groundwater levels can cause difficulties in excavation work, flooded basements, flooded utilities and unstable foundation. Adequate groundwater recharge conditions must be retained at all times. Low conditions not only cause problems with chemical pollution of the water but also create problems of inadequate supply for residential, commercial, and agricultural uses. Therefore, it is imperative that structures should not be located where groundwater recharge is substantial, and the filling over and blocking of existing surface drainage courses be avoided.

Natural Runoff

Urbanization induces major hydrologic change - increases in natural runoff, modification of the river channels and floodplain areas, and increases in flood peaks. Such changes are due to the reworking of the soil and replacement of the natural vegetation with structures and paved areas.

Natural runoff flows on the surface and collects in the streams as a result of precipitation. The amount of surface flow is dependent upon soil moisture conditions, vegetation cover, topographic features rainfall intensities, and snowmelt rates. The more water that is absorbed, the less surface runoff, and consequently, the less erosion. As vegetative cover is removed and replaced by foundations and roads - urbanization - the chances and hazards of overland runoff and erosion increase.

The downstream effect of this urbanization is more frequent flooding and modification of the river channels. Such modification tends to change the channel shape and pattern. As a result, the river's future course becomes highly variable and unpredictable, and development anywhere on the floodplain becomes dangerous to life and property.

The same modification also alters the river's capacity to transport and erode sediment. Deep extensive gullying and destructive bank cutting increase the sediment load which in turn, causes further changes in the river's course and channel (i.e. larger sediment loads often cause the river to meander along the floodplain). In steeper terrain, these destructive eroding forces often result in even steeper slopes and consequently, valley-side instability is often induced. In other areas, the entire drainage network may be extended headward. New gullies form and a fine textured drainage system evolves. These changes also effect the river's course, often causing further encroachments on the already unpredictable and

unsuitable floodplain.

Floodplains

In this three-county area, flooding from rivers is primarily due to late spring snowmelt runoff, and flooding from creeks is mainly due to summer cloudburst runoff. These floods have the potential of carrying vast amounts of sand, silt, rock and floatable debris which is ultimately deposited on the inundated areas.

Urbanization has a marked effect in increasing the frequency and intensity of such flooding. Obstructions either natural or man-made, restrict the flood flows and cause overbank flows. The natural obstructions include brush, vegetation, and transported sediment. During floods, each is washed out and carried downstream. As a result, a damming effect is created and subsequently the bank overflows. The man-made obstructions include bridges, culverts, and irrigation diversion structures. During a flood, the collecting debris concentrates downstream on these obstructions, exceeds their capability, and eventually destroys them.

The amount and extent of damage is dependent upon numerous factors - on the topography of the flooded area, on the depth and duration of the flood, on the velocity of flow and the rate of rise, and on the developments and obstructions on the floodplain. Floodwaters greater than 3 feet in depth and with a velocity of at least 3 feet per second can easily sweep a person off his feet and, therefore, creates a definite danger of injury or drowning. Rapidly rising and swiftly flowing floodwaters can trap persons in homes or vehicles which are ultimately destroyed. Sewage, garbage, and organic material can be scattered in disarray creating health hazards. Finally, floods have the potential of isolating areas from emergency assistance.

Subsidence

Significant changes in land level can result from changes in the water content of sediments, whether through subtraction or addition of water. Withdrawing water from clays and silts removes part of the volume of mass, thereby causing a decrease in the buoyant pressure of compaction of the mass. Damage to structures can be extensive; i.e., slow subsidence or sinking of a building so that part of first floor is below present ground level. Therefore, it is important that stabilizing through precollapsing of sites prior to construction be done to eliminate the damage to roads, underground utilities, and foundations. The stabilization can be achieved through

the injection of fluids and repressurization to achieve equilibrium.

Alternate and Competing Uses for Land

In determining the suitability of new land for urban growth, significant uses already on the land must be considered. In this three-county area, presently existing significant competing uses include irrigated and dry agricultural land, Bureau of Land Management (BLM) land, National Forest land, floodplain areas, and areas of groundwater recharge.

The productive agricultural land plays an extremely important part in the economy of the Western Slope. The agricultural areas around Grand Junction and Meeker are very productive. In these areas, agriculture contributes significantly to the economy as well as to the social and cultural patterns of the region. Disruption of these areas might result in undesirable modifications to the existing economy and living patterns.

BLM and National Forest land also constitute a significant competing use. These areas are used primarily for grazing and recreation. They are generally located in higher and steeper areas, which contain scenic views, wilderness, unique features, and unique flora and fauna. With the advent of more residential and industrial development in this three-county area, maintenance of these protected open spaces is of vital importance to the social and cultural being of the existing and new residents.

Floodplain areas and areas of groundwater recharge are the most significant competing uses for otherwise developable areas. The floodplain is subjected to hazardous floods and any man-made obstructions on the floodplain can be partially or totally destroyed. The low, flat areas along the Colorado and White Rivers are particularly vulnerable to urban development since these two valleys also contain major transportation routes. Urbanization would increase the rate of runoff from urbanized land and increase the exposure of persons and structures to the heightened hazard.

Areas of groundwater recharge are also significant competing uses. These areas are the original sources of the water supply for all uses. An development on these areas will reduce and possibly pollute this important source - an undesirable situation which must be prevented.

Logistical Problems

Although slope, soil, and land use characteristics of an area may make it suitable for urban development, other constraints related to the area's general location and siting must be considered. Specific logistical problems associated with development might include high elevations, difficulty of access, air pollution, wind erosion, and difficulty of excavation.

Areas of high elevation - greater than 7,000 feet - suffer from numerous problems. In the winter months, the amount of snow and the period of time the ground is covered becomes a major constraint. This in turn affects temperatures, soil erosion and spring runoff.

Access to high areas is a problem in the winter due to the snow and may remain a limitation during the hotter months because of terrain. Establishing major access requires cutting and filling, particularly along the steeper escarpments leading to the high lying mesas. In addition to inducing slope instability, the road cuts will have to be of a special nature to compensate for the adverse effects of the underlying clayey soils - the extreme stickiness and high shrink-swell potential when wet. Additional problems of induced landsliding and wind and water erosion also place tight constraints on establishing major access.

Air pollution within narrow valleys is another logistical problem in the study area. Development within these narrow valleys will change the present quality of the air by introducing chemical pollution and particulate matter. Due to the adjacent steeply rising mountains, this pollution will be unable to disperse. Rather, it will settle in the narrow confines of the valley resulting in adverse conditions of air pollution, possible temperature inversions, and aesthetic pollution.

Should bedrock occur too close to the surface of the land and should the bedrock be of a very hard nature, blasting may be required for development. Such a method of excavation, however, is extremely expensive and thus becomes a significant development constraint.

In addition to the above mentioned physical limitations, social and cultural limitations must also be considered. New urban communities should be located in areas having enough suitable land to permit the establishment of a reasonable sized community. There are no universally accepted standards for optimum city size. A figure

often quoted is 50,000 to 100,000 people. Of prime planning importance in determining the size of new communities are those attributes of urban areas generally considered to be desirable such as (1) a functional local government capable of economically providing necessary services (including effective growth control) and utilities, (2) commercial areas offering comparison shopping and quality selection, (3) a school system providing a broad range of academic pursuits, (4) a balanced and sound tax base, (5) civic and cultural facilities such as libraries and museums, and (6) cohesive and identifiable neighborhoods within the community. Consideration also needs to be given to the possible expansion of existing communities providing that they are capable and desirous of growth.

Urban development areas must be located in reasonable proximity to basic employment generators to avoid excessive home to work travel - particularly where such travel must occur in or through areas subject to air pollution.

LAND AREA ANALYSIS

The three county area was analyzed for development possibilities based on the criteria outlined above - slope, soils, competing demands and logistics. The maps and charts which are a part of this section reflect the results of that analysis.

Based on the first stated criteria, only areas of 20% slope or less were considered. All other areas were eliminated. While, with the proper construction techniques, it is possible to place structures on more severe slopes, extensive urbanization is not likely to occur there. Recreation homes and low density mountain subdivisions may indeed find buildable areas which do not meet this criteria. In the study area, locations with slopes of 20% or less include the significant valleys, terraces and mesas. Assuming no other inhibiting limitations, it is these lands that should be further examined for suitability for future urban development.

As a method of approach these lands were divided into logical analysis area and were further analyzed in regard to soils, competing demands and the logistical problems of access, pollution,

erosion, and ease of excavation. Figure 3 shows the results of the soils analysis. These relatively flat areas are further categorized into developable and undevelopable soils. It should be noted that even the so-called undevelopable soils can be developed. Indeed, development already exists or is occuring in several of these locations. However, the map should point out that there are special problems to be overcome in these areas that are not present in the developable soils.

A further analysis involved competing uses for the land. By far, the most significant competing use for these level lands with good soils was agriculture. Figure 4 shows the developable soils further categorized into areas devoted to irrigated and dry land farming.

Finally each area was again considered for any other special problems. Isolated high mesa locations, for example, might prove almost impossible to get to. Pleasant, flat little valleys which have all of the other attributes for development might become air pollution traps and their development might displace agricultural uses to the detriment of a diversified economy and life style. Roads which would be required to support urbanization in some areas might be subject to extensive erosion or impossible winter maintenance conditions. While it is impossible in a short space of time to be aware of the implications of all of the variables, an attempt was made to rate the developable areas against suspected problems. This rating system is shown in Table 21 and summarized in Figure 5. The rating system is explained in Table 22.

Figure 5 makes two major development problems immediately apparent. Expansion of existing communities - particularly those in the Colorado River Valley - will 1) occur largely on land suitable for agriculture, and 2) increase the potential for serious air pollution problems since most of these communities are located in natural basins of varying size. These communities probably cannot freeze their population and area at the present level in favor of diverting all new growth to a new area not yet selected, nor perhaps is such a course of action even desirable. An awareness of the problem can, however, be reflected in the communities' approach to development patterns and growth policies. This will be discussed further in the following chapters dealing with growth patterns and recommendations.

A remaining question concerns the relationship between the possible demands for land for additional urban development as outlined in Chapter 2 and the amount of land available which will support that type of development. Table 23 summarizes the amount of developable land by analysis category.

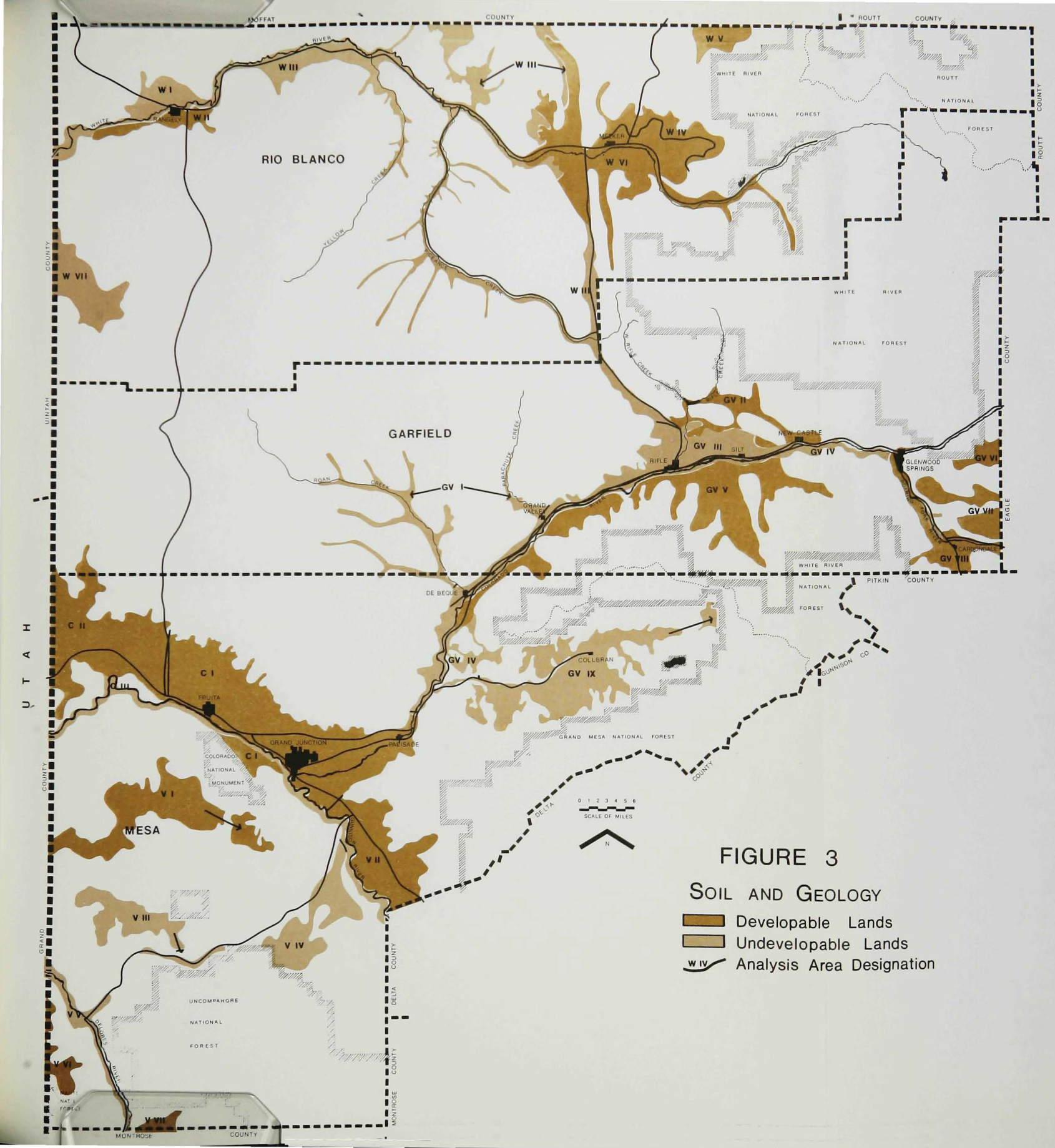

FIGURE 3

SOIL AND GEOLOGY

- Developable Lands
- Undevelopable Lands
- W IV Analysis Area Designation

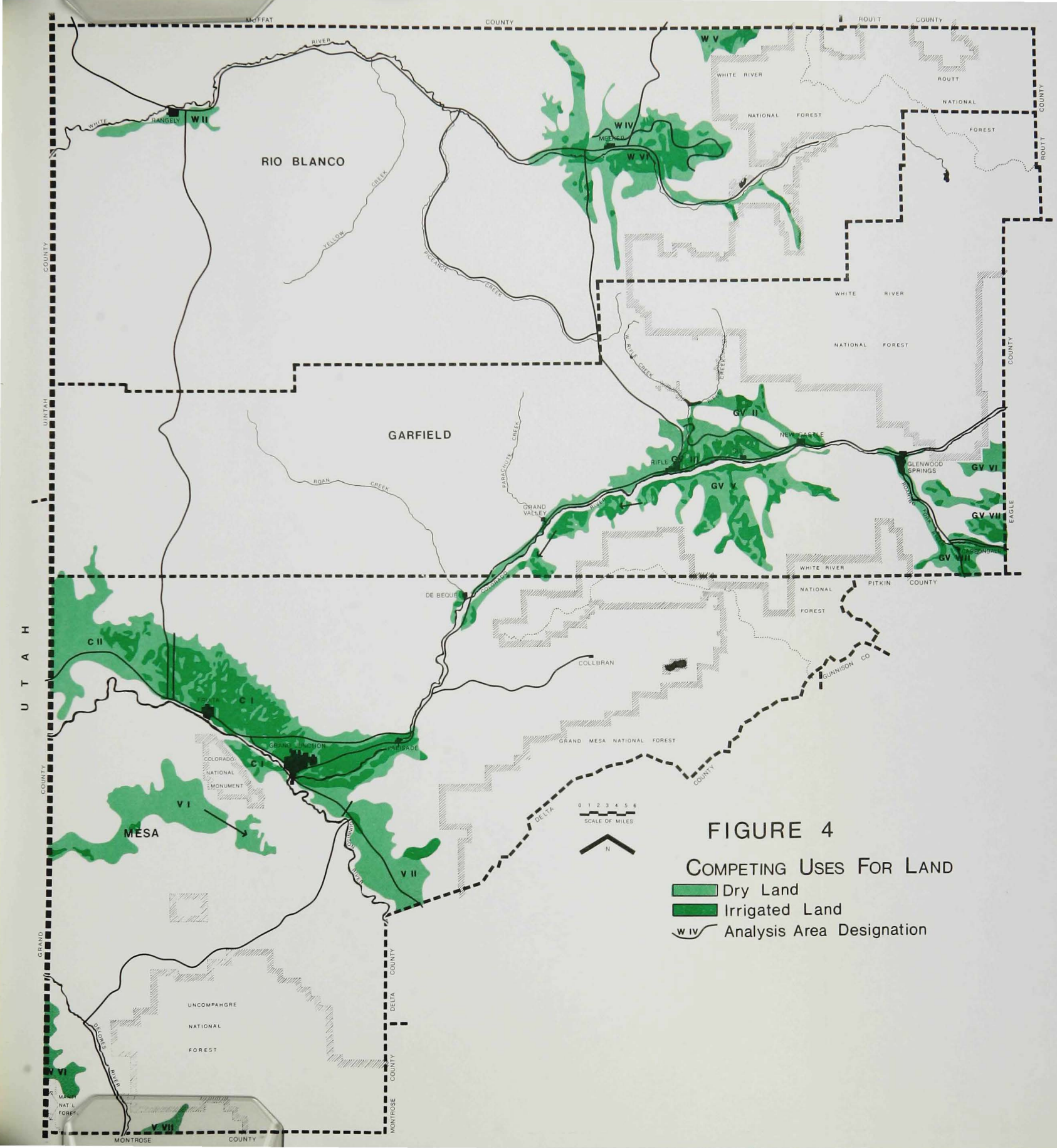

FIGURE 4

COMPETING USES FOR LAND

- Dry Land
- Irrigated Land
- W IV Analysis Area Designation

TABLE 21

RATING OF LAND SUITABILITY
for
POTENTIAL URBAN DEVELOPMENT

General Location	Analysis Area	Soils Remarks	Soils Rating	Competing Uses Remarks	Competing Uses Rating	Logistics Remarks	Logistics Rating	Final Rating
Rangely	W I	1,3,5,7,8	X		c	1,2,4	X	V
Rangely	W II	1,3,6,8,13	b		c		d	I
White River & Piceance Creek	W III	1,3,5,7,8,9, 10,11,12	X	4,5	X	2,3,4,5	X	V
N.E. of Meeker	W IV	2,4,13,14	b	2	c		d	I
Meeker	W V	2,4,13,14	b	2	c	2	X	II
Meeker	W VI	2,4,9,10,11,13	b	1	X		d	III
S.W. of Rangely	W VII	1,3;5,8	X	3	X	1,2,4	X	V
Roan & Parachute Creeks	GV I	1,3,5,7,8,10, 11, 12	X	3,4,5	X	3,5	X	V
N.E. of Rifle	GV II	2,4,6,12,14	b		c	2	d	I
Rifle Vicinity	GV III	1,3,6,8,9,10,11,13	X	1,2,4	c	3	d	V
Colorado River Valley	GV IV	1,3,8,9,10,11	X	4	X		d	V
S. of Rifle	GV V	2,4,6,14	b	2	c	1,2	d	I
N.E. of Carbondale	GV VI	2,4,6,14	b		c	1,2,4,5	X	II
Glenwood & Carbondale	GV VII	2,4,6,14	b	2	c	1,2,4,5	X	II
E. of Carbondale	GV VIII	2,4,6,14	b	1,2	c		d	I
Collbran Vicinity	GV IX	1,3,5,7,8,12	X	2,4	c		X	V
The Grand Valley	C I	1,3,6,8,9,11,13	b	1	X	2	d	III
Mack Vicinity	C II	2,4,6,11,13	b	1	c	2	d	I
Colorado River Floodplain	C III	2,4,6,9,10,11	X	4	X	2,3,4	X	V
Glade Park	V I	2,4,5,13,14	b		c	1,2,4	X	II
Whitewater Vicinity	V II	1,3,5,7,8,13	b		c		d	I
S.W. of Whitewater	V III	2,4,5,6,12,13,14	b		c	1,2,4	X	III
S. of Whitewater	V IV	2,4,5,7,12,13,14	b		c	1,2,4	X	III
Gateway Vicinity	V V	2,4,6,9,10,11,12	X	4,6	X	2,3,4	X	V
S. of Gateway	V VI	2,4,5,13,14	b	6	X	1,2,4,5	X	IV
Blue Creek	V VII	2,4,5,13,14	b	6	X	1,2,4,5	X	IV

SOILS

Remarks

1) Slow permeability
2) Moderate permeability
3) High shrink-swell (high clay content)
4) Moderate shrink-swell (sandier, less clayey soils)
5) High erodibility, runoff
6) Moderate erodibility, runoff
7) Excessive gullying
8) High corrosivity
9) High water table (possible pollution, flooding)
10) Flood Hazard
11) Subsidence due to withdrawal of liquids
12) Narrow bottom of steep escarpment
13) Special foundations (larger footings, foundation to bedrock, changing floors and walls)
14) Interspersed terraces, finger-ridges, and gravelly outwash

Rating

b) developable soils
X) undevelopable soils

COMPETING DEMANDS

Remarks

1) Agriculture (Irrigation)
2) Agriculture (Dry)
3) BLM Land
4) Floodplain
5) Areas of groundwater recharge
6) National Forest

Rating

c) No significant competing demands
X) Significant competing demands

LOGISTICAL PROBLEMS

Remarks

1) High elevation
2) Access
3) Air Pollution
4) Wind erosion
5) Excavation via blasting

Rating

d) No significant logistical problems
X) Significant logistical problems

FINAL RATING*

I - a,b,c,d
II - a,b,c
III - a,b,d
IV - a,b
V - a

* a) denotes a slope rating of less than or equal to 20%. Slopes of greater than 20% were not considered.

Table 22

FINAL RATING CRITERIA

(For Table 21)

I. Most suitable
   a. Slope less than or equal to 20%
   b. Generally suitable soils
   c. No significant competing uses
   d. No significant logistical problems

II. Alternately suitable
   a. Slope less than or equal to 20%
   b. Generally suitable soils
   c. No significant competing uses
   d. Significant logistical problems

III. Marginally suitable
   a. Slope less than or equal to 20%
   b. Generally suitable soils
   c. Significant competing uses
   d. No significant logistical problems

IV. Least suitable
   a. Slope less than or equal to 20%
   b. Generally suitable soils
   c. Significant competing problems
   d. Significant logistical problems

V. Not suitable
   a. Slope less than or equal to 20%
   b. Generally unsuitable soils
   c. Significant or no significant competing uses
   d. Significant or no significant logistical problems

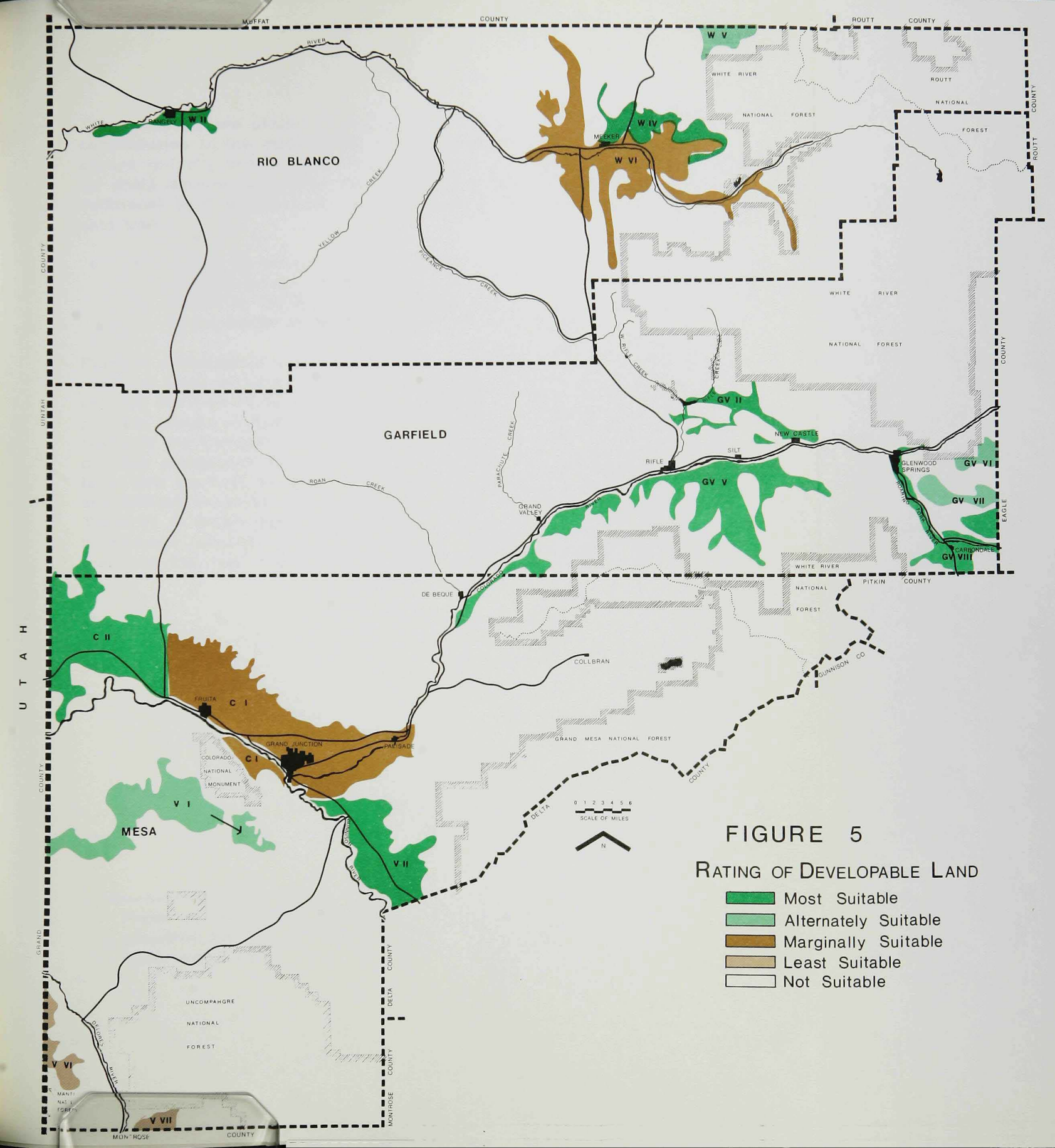

FIGURE 5

RATING OF DEVELOPABLE LAND

- Most Suitable
- Alternately Suitable
- Marginally Suitable
- Least Suitable
- Not Suitable

These figures are placed in proper perspective by noting that the communities in the three county region presently occupy only 14.4 square miles[5], and to accommodate normal increases plus intensive oil shale development, this report has projected the need for an additional 26.0 square miles. Most importantly, these figures indicate that:

1. There is indeed suitable land to support a substantial growth in population, and
2. There is lattitude for carefully considered choices to be made on where that growth will occur.

Further urbanization will require that many value judgements be made by local decision makers. Local policies will need to be developed and tied closely to regional and State policies. These policies should address the issue of which lands should be developed. Some of the Category I lands, for instance, are now used for moderately productive dry land farming and grazing. Category II lands are the best irrigated agricultural lands. Category IV lands are difficult to develop. So, while all of the land area shown in Table 21 is developable - 916.3 square miles - this amount should be reduced substantially by policies and decisions designed to insure that only the most appropriate land is developed for urban use.

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5 From the discussion on land use, Physical Planning Elements, prepared for OSRPC and CWACOG by THK Associates, Inc., November, 1973.

Table 23

AREA OF DEVELOPABLE LANDS

(in square miles)

ANALYSIS AREA	RATING I (most suitable)	RATING II (Alternately suitable)	RATING III (Marginally suitable)	RATING IV (Least suitable)	RATING V (Not suitable)
W I					W I
W II	17.1				
W III					W III
W IV	36.0				
W V		16.2			
W VI			142.2		
W VII					W VII
GV I					GV I
GV II	24.3				
GV III					GV III
GV IV					GV IV
GV V	113.4				
GV VI		9.9			
GV VII		16.3			
GV VIII	44.1				
GV IX					GV IX
C I			195.3		
C II	116.1				
C III					C III
V I		91.8			
V II	69.3				
V III					V III
V IV					V IV
V V					V V
V VI				17.1	
V VII				7.2	
	420.3	134.2	337.5	24.3	

ALTERNATE URBAN PATTERNS

Faced with the prospect of growth as described in Chapter 2 and limited to areas which are suitable for that growth as outlined in Chapter 3, the three counties collectively and the communities within the three counties individually must determine the direction that new growth will take. There is sufficient available land that some deliberate choices can still be made. Existing growth in the three county area has not passed the point where no further modifications are possible. At this stage of its development, the region is in an excellent position to shape future growth along desired lines.

In discussing growth, one should not overlook the possibility of no growth at all. In that event, the regional urban pattern would remain as it presently is with whatever minor modifications time may bring. In view of the forces at work in the State in general and western Colorado in particular, that choice does not appear to be available. Nor perhaps is it even desirable. If the impetus of growth is used in a positive way, a Grand Junction of 50,000 population can be more attractive and efficient than the present community, and a Rifle of 10,000 population can offer more urban services and amenities than a town of 2,000. However, considerable effort will be required to capitalize on the positive aspects of growth.

POPULATION DISTRIBUTION

The uncertainties of oil shale development and land use legislation at the national and State levels make it very difficult to project population growth with any degree of accuracy for specific areas within the three county region. However, it is possible to speculate on development patterns which might occur under certain circumstances.

Assuming <u>normal</u> economic trends, i.e.: no oil shale production,

the towns along the Colorado River Valley can be expected to bear the brunt of the approximately 70,000 person increase in population projected for the next 15 years. Grand Junction as the transportation and economic hub of the region will receive a major share of that growth. Rifle, Glenwood Springs and Meeker, all at the intersection of major routes will be second in rate of growth. Rangely, Fruita, Palisade, Collbran, Debeque, Grand Valley, Silt and Newcastle will share in the growth to a lesser extent. However, assuming adequate potable water supplies, the growth in even these smaller communities will be significant enough to demand that considerable attention be given to the formulation of adequate policies and regulations.

With oil shale development, plant location will have a direct influence on community growth. If there are moderately successful oil shale industries in Parachute Creek and lower Piceance Creek, then the major focus of growth will shift from the Grand Junction area to eastern Garfield County. Rifle will feel the major impact and Meeker to a lesser extent. New population, seeking urban amenities as close as possible to work, will look first to the existing towns from Grand Valley to Glenwood Springs. It should be noted that this oil shale growth will be in addition to the normal growth described in the paragraph above.

If intensive oil shale development takes place in the Piceance Basin and on the Utah sites, then the distribution of new growth will again change. Under this new condition, Meeker and Rangely would feel a significant impact of growth. The Rifle area would still be important as a growth center but Glenwood Springs and Grand Junction would be relatively less important because of the location of the oil shale plants. They still would receive growth however.

Numbers can be assigned which reflect a given set of circumstances. Table 24 represents a possible population distribution for the region. This distribution pattern might occur under the following assumptions:

1. Legislation and policies will be adopted and followed which will allow growth to be more precisely directed than at present.
2. All existing communities will receive some growth but not in equal amounts.
3. Smaller, isolated communities will remain small because of locational considerations.
4. Population growth will be directly related to the geographic pattern of industry.
5. Shale industries will be evenly distributed in the Piceance Basin.

Table 24

SPECULATIVE ASSIGNMENT OF PROJECTED POPULATIONS

Community	1970 Population	Projected Population - 1987		
		Normal Growth (70,000 increase)	Moderate Oil Shale (131,000 increase)	Intensive Oil Shale (231,000 increase)
Loma	--	500	600	600
Fruita	1,822	5,000	6,000	6,500
Grand Junction & environs	33,994	72,000	84,000	92,000
Redlands				
Clifton				
Orchard Mesa				
Palisade	874	2,500	3,000	3,500
Whitewater	--	500	600	600
Gateway	--	--	--	--
Mesa	--	500	800	800
Collbran	225	350	800	850
DeBeque	155	1,000	1,500	7,500
Grand Valley	270	1,000	1,500	1,500
Rifle	2,150	10,000	15,200	20,000
Silt	434	1,000	1,500	1,500
New Castle	499	1,000	1,500	1,700
Glenwood Springs	4,106	12,000	16,000	18,000
Carbondale	726	2,000	2,500	2,500
Meeker	1,597	5,000	8,000	12,000
Rangely	1,591	4,500	6,000	10,000
New Town #1	--	--	30,000	50,000
New Town #2	--	--	--	50,000

6. Communities, where population growth is logical, are willing to and capable of accepting the additional growth.
7. The potential air pollution problem in the Colorado River Valley will lend itself to solution by the development of public transit and better control of emissions.
8. Growth will be directed to existing, incorporated areas and kept compact rather than allowed to scatter throughout the region.
9. There will be no increase in the farm and ranch population.
10. Second homes will not account for a significant portion of the new population.
11. Two new town sites will be readied in time to absorb substantial numbers of people.

In spite of the shortcomings of the projections in Table 24, this attempt to assign projected population throughout the region serves a useful purpose. First, the magnitude of the problem is more apparent when it is related to individual communities, and second, it points up the issues which must be addressed in providing for population growth.

THE FORM OF GROWTH

Three general growth patterns are possible for the region. The policies and the growth philosophies of the governing bodies will determine which pattern new growth will take. Broadly described, the three possibilities are 1) laissez-faire (little or no control of growth), 2) controlled expansion of existing communities, or 3) development of new communities. Each approach is discussed in more detail below and depicted on maps in this section. The land mass shown as new urban development is approximately that which would be required to accommodate normal economic growth for 15 years (to 1987) plus intensive development of an oil shale industry or about 231,000 new citizens.

Laissez-faire

Evidence of this type of urban growth is seen in many parts of the country. It is applied graphically to the three county area in Figure 6. This pattern is the result when urban development, reacting to economic demand, follows the path of least resistance. The location of flat developable land and transportation routes shape this growth. In this type of growth, the public accepts the responsibility only to administer the minimum regulations for the purpose of protecting the public health, safety and welfare and to process the necessary plats and plans which allows development to proceed.

Land values play an important role in shaping this growth. Development of any given area will probably raise the value of adjacent land to the point where it is cheaper for the next developer to acquire land further out along the major access routes and develop there, thus bypassing the higher priced land. This process is repeated over and over again as long as there is available land and good access.

Densities are typically low in this type of development, both because areas without municipal water and sewer may be forced to develop on larger lots and because the bypassed vacant land keeps overall densities down. This approach takes more land to house a given number of persons than a different development approach at a higher density. Low densities and scattered development causes heavy reliance on the automobile as the method of transportation. This could be a source of additional problems in an era of increasing concern over fuel conservation and air pollution control.

Application of this philosophy to the three county area would result in considerable urban development along Interstate 70 on suitable lands between Grand Junction and Glenwood Springs. West Glenwood would intensify, New Castle and Silt would stretch east and west away from the existing communities, and vacant lands between Silt and Rifle would develop first with isolated business uses along the road to be backed up later with clusters of housing. Beyond Rifle, development of this nature would continue on flat land wherever water could be made available.

New growth near Grand Valley and DeBeque would resemble a T with some development following the road up Parachute Creek and Roan Creek respectively while other uses sought out favorable locations along I-70. The flat valley floor from Palisade to Grand Junction and from Grand Junction to Loma will accept urban development readily and the network of two lane county roads is such that small

subdivisions or even isolated houses can tap onto this access system at almost any point. Evidences of such a future pattern already exists here in the non-farm houses among the orchards and farmlands of the Grand Valley. This pattern could continue as new urban dwellers seek to avoid higher housing costs in Grand Junction by buying cheaper rural land to place a mobile home or erect a small house.

In the Roaring Fork Valley south of Glenwood Springs, new subdivisions could dot level land in the area along Route 82 from Glenwood to Carbondale and beyond. Carbondale itself could expand southward on flat land on both sides of the Crystal River, served by Route 133, until ridges in the vicinity of Thompson Creek pinch off suitable buildable areas.

Assuming extensive oil shale development in the Piceance Basin, the area around the Rio Blanco store might become the location for a mobile home community or perhaps even a permanent settlement with direct access up the Piceance Creek road to employment. Other buildable areas along Route 13 from Meeker to Rifle might offer similar possibilities.

In the Meeker area, the tendency would be for growth to stretch along Route 64 and Route 13 toward oil shale employment. Development could also occur at the confluence of Piceance Creek and the White River. The Rangely business district would extend eastward along Route 64 toward Meeker, followed by residential development. While not explored as a part of this study, intensive development of the Utah oil shale sites west of Rangely and increased traffic on Route 64 could tug some business elements of the City westward to intercept customers coming into town from that direction.

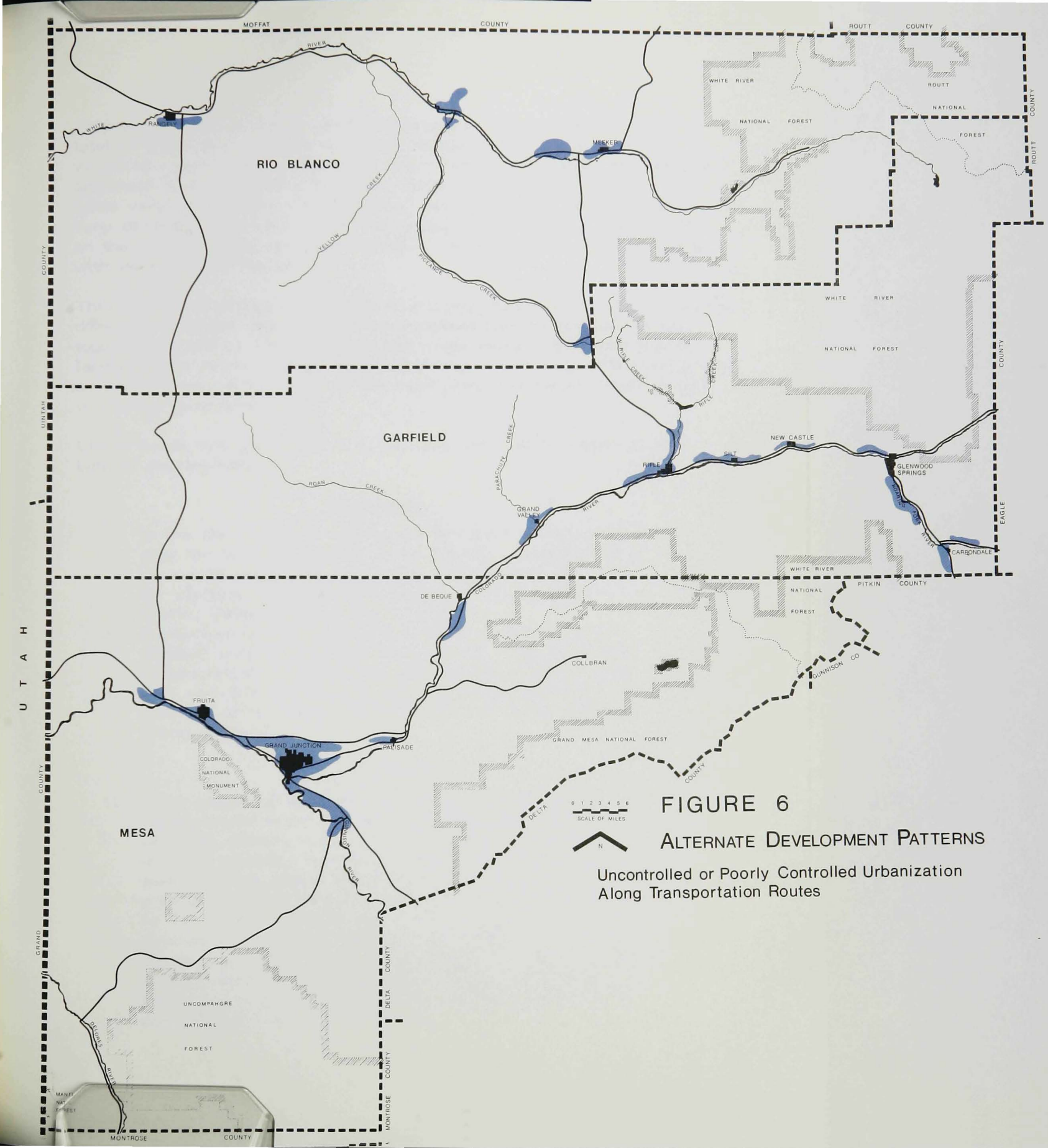

FIGURE 6

ALTERNATE DEVELOPMENT PATTERNS

Uncontrolled or Poorly Controlled Urbanization
Along Transportation Routes

This sketch of a possible development pattern represents the sum total of many private individual actions and choices with each individual or organization responding according to their own self-interest and their interpretation of market conditions. This pattern represents very little effort on the part of public decision makers, yet a very definite urban form would be produced. A decision not to act on the part of local decision makers is nevertheless a positive action with recognizable results.

This pattern of elongated development along major transportation corridors and drainage basins would be inhibited only by market forces, topography, and perhaps air pollution regulations. The vast public land holdings in the three county area would have little effect on shaping an urban form, since much of the land along the major roads is still in private ownership.

Listed below are some of the advantages and disadvantages of this type of development:

Advantages

1. In the short run, it represents the least administrative cost for the responsible public agency. Government need only determine that legal requirements are met for platting and that basic protection of the public health, safety and welfare is achieved.
2. It represents the maximum freedom of action for individual land owners and developers. They need only be responsive to market conditions and available water.
3. Few new transportation routes would be needed into developing areas since growth would take place along existing routes.

Disadvantages

1. Even scattered development, as it became more intense, would begin to require a full range of urban services (water, sewer, fire protection, police protection, schools, libraries). Because of the development pattern, these would be difficult and expensive to provide. At the time any particular service were demanded by an already existing population, the start up costs to provide that service would be prohibitive. To provide the needed services, there would likely evolve a plethora of competing and overlapping special service districts which are a poor substitute for a responsive, all purpose, local unit of government.

2. The total costs for services provided by many special districts is likely to be higher to the individual homeowner than if provided by a local government.
3. A "sense of community" would be difficult to maintain in this type of development pattern, making it difficult for local government to function.
4. Much of this development would take place on irrigated agricultural lands to the detriment of the region's economy. An individual owner or developer whose attention is focused on a specific property is the least qualified person to make broad value judgements about the city wide, county wide or regional impact of changing land from one use to another.
5. Frequent access points would be required on major transportation routes to serve adjacent development. This would increase congestion and traffic friction along these routes.

Controlled Expansion of Existing Communities

Another possible development pattern would require that all new growth take place within the framework of existing communities. For most communities this would mean the acceptance of slightly higher densities, the filling in of vacant land within existing town boundaries, and the annexation of suitable new lands for additional growth. The amount of growth which would take place in any given community would directly relate to the future of an oil shale industry.

Figure 7 shows a settlement pattern that might come about assuming an intensive oil shale development program in a framework of controlled growth of existing communities. The pattern shows all of the communities sharing in the growth, although not necessarily equally. The pattern also assumes that all of the existing communities are capable of and willing to accept additional growth. Because of access to transportation routes, the Colorado River Valley again is the focus for the major share of the new development. The advantages and disadvantages of such a development pattern are listed below:

Advantages

1. Urban services that will be needed for new population can be provided more efficiently and at less expense if growth is concentrated. Long runs of utilities to reach

scattered urban development can be avoided. Community facilities can be provided within or easily accessible to the areas they serve.

2. New growth areas can more readily be incorporated into an existing municipal governmental structure rather then remaining unincorporated or incorporating as a new, inexperienced municipality.
3. Planned major access points can be provided from I-70 and other important routes to areas of population concentration rather than creating a multiplicity of minor access points for scattered population.
4. Compact growth centers lend themselves more readily to efficient service by public transportation, an important consideration in an area of rapid population growth and potential auto induced air pollution.
5. Control of growth also affords an opportunity for providing a diversity of housing types to meet a wide range of demands.
6. Concentrated growth reduces the amount of land which would be taken out of productive agricultural use.
7. Communities would develop and maintain a true community identity which would not be possible with scattered development.

Disadvantages

1. Existing units of local government would need to "tool up" both administratively and in terms of physical plant to accommodate new growth. This will be reflected in increased capital and operating costs. In the absence of any federal or State programs which would off-set these costs, this "front end" expenditure to get ready to receive new growth would have to be borne by existing units of local government at a time when they are ill prepared to do so.
2. Increased populations which may double or triple the size of existing small towns will also alter the existing social fabric.
3. Owners of vacant land near existing towns may be in a location to benefit financially from the contiguous, outward growth of the community while land owners in more remote locations will not have that opportunity.

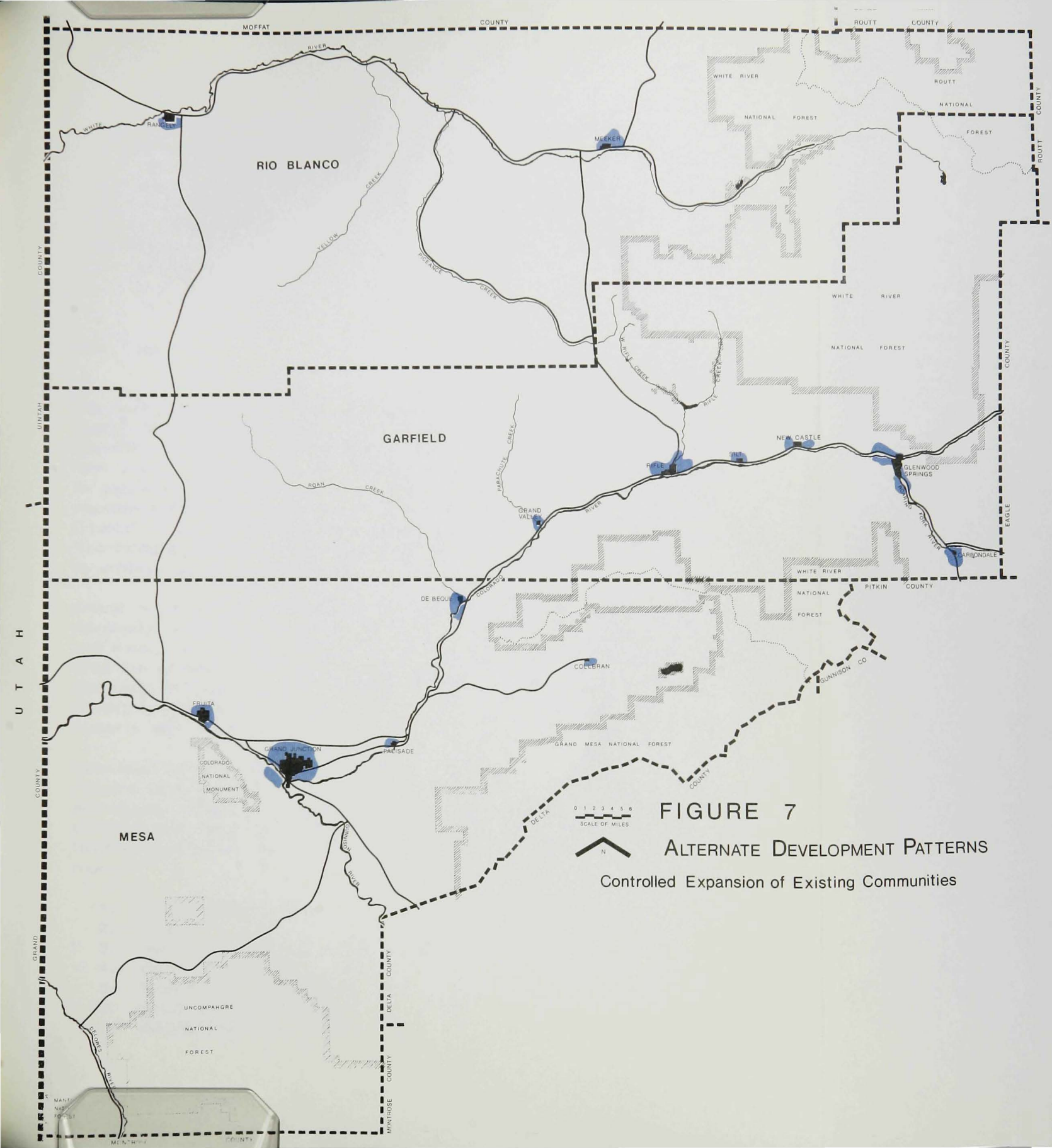

FIGURE 7

ALTERNATE DEVELOPMENT PATTERNS

Controlled Expansion of Existing Communities

4. This growth pattern requires a conscious, continuing cooperative effort on the part of both county and municipal government to bring about. It also implies the existence of and adherance to a regional plan with well developed and agreed to regional growth policies. To achieve this will mean that each participating unit of government will need to forego a certain amount of independent action.

New Towns

The accomplishment of this development pattern also implies a great degree of land use control. It calls for directing growth into certain specified areas which would include selected existing communities and new towns. Conceivably the consensus on which existing towns might be expanded and the location for new town sites would come only after appropriate investigations and deliberation by the Colorado West Area Council of Governments as the responsible regional planning agency. The findings of such investigations should be dissemminated widely to achieve public understanding and acceptance.

Grand Junction, Rifle, Glenwood Springs, Meeker and Rangely are obviously candidates for expanded centers. Investigations by COG and these communities should center on suitable and sufficient land area for growth, provision of adequate utilities and services, and adequacy of local government organizations to accommodate growth. A willingness on the part of the townspeople and governmental officials to deal adequately with growth is also important.

New town locations would need to be selected with care and would require considerable cooperation between the sponsoring organization and county officials who would ultimately be responsible for zoning the land and securing access to the new town site. Investigations leading to the selection of a new town site should include at a minimum:

1. Soil characteristics
2. Slope
3. Access for the entire new population
4. Water availability
5. Sewer discharge areas
6. Solid waste disposal
7. Microclimate of possible areas

8. Adaptability to different kinds of urban land use
9. Location in respect to other communities and employment.

Development of entire new communities to accommodate future population growth is probably most feasible if oil shale development is successful. Growth projected to occur as a result of normal economic trends, while significant, is still manageable and can probably be accommodated by existing communities. Substantial growth occuring as a result of oil shale development, particularly if it comes about rapidly, will severely strain the capability of existing areas to handle it. One or two new towns might then become a necessary safety value.

Development of a new town after a site is selected also becomes a problem. It is not enough to set aside a suitable land area and direct all new growth to it. The new town site must be carefully planned to provide for a full range of urban land uses. Support systems such as water sewer, fire protection, police protection and overall management must be created to begin operating with the arrival of the first inhabitants. This type of effort requires a sponsoring agency or organization and the expenditure of a considerable amount of "front end" money before there is any return on the investment.

In the investigation of soils and slope reported in the previous chapter, two general areas appear appropriate for new town development. These are the mesas lying generally south of the Colorado River between Silt and DeBeque and an area lying east of Meeker along the White River. More detailed future investigations may pin-point additional locations.

The possible new town site lying east of Meeker presents a problem from the standpoint of good geographic distribution of population. It lies too close to an existing community. A better choice might be to expand existing Meeker to considerable size rather than establish a new community a few miles away. It is shown there because of favorable slope and soil conditions. Better geographic distribution of population and traffic patterns could be obtained if a new town were located somewhere near the confluence of Piceance Creek and the White River. Preliminary investigations indicate poor soil conditions for urbanization. More definitive investigations should be undertaken to determine the seriousness of the problem. A new town site here, expansion of existing communities and a possible new town on the mesas south of Grand Valley would result in excellent regional population distribution.

New communities should be planned for at least 50,000 people. This size will support a full range of urban services and is large enough to create its own identity in the region. A new community of this size or larger may be required to absorb its share of the projected future population. Considering the amount of organization and lead time required to bring a new community into being, it appears obvious that the existing communities will need to absorb the first several years of incremental growth.

A regional pattern showing the growth of selected existing communities and the establishment of two new towns is shown on Figure 8. Advantages and disadvantages of this regional development pattern are listed below:

Advantages

1. As in the previous alternate pattern, urban services are more cheaply and efficiently provided to concentrated populations.
2. Controlled expansion of selected existing communities and careful selection of new town locations would guarantee the best use of land for the region. Agricultural land would be preserved from urban sprawl and urban expansion would take place around existing centers.
3. This pattern of planned and concentrated population, like the expansion of existing communities, could be serviced more easily by public transportation than scattered growth.
4. A community identity would be maintained in the existing towns and an identity would likely be established in the new towns.
5. The development of two new communities would allow the testing and utilization of new materials and concepts which might serve as examples for the further development of existing towns.
6. Having new communities as a part of the development pattern would relieve pressure on existing areas to accommodate all of the projected growth.

Disadvantages

1. The deliberate allocation of population to selected areas will be controversial and will require a strong regional planning body and excellent cooperation between separate units of local government.
2. Guiding the rapid development of an existing community

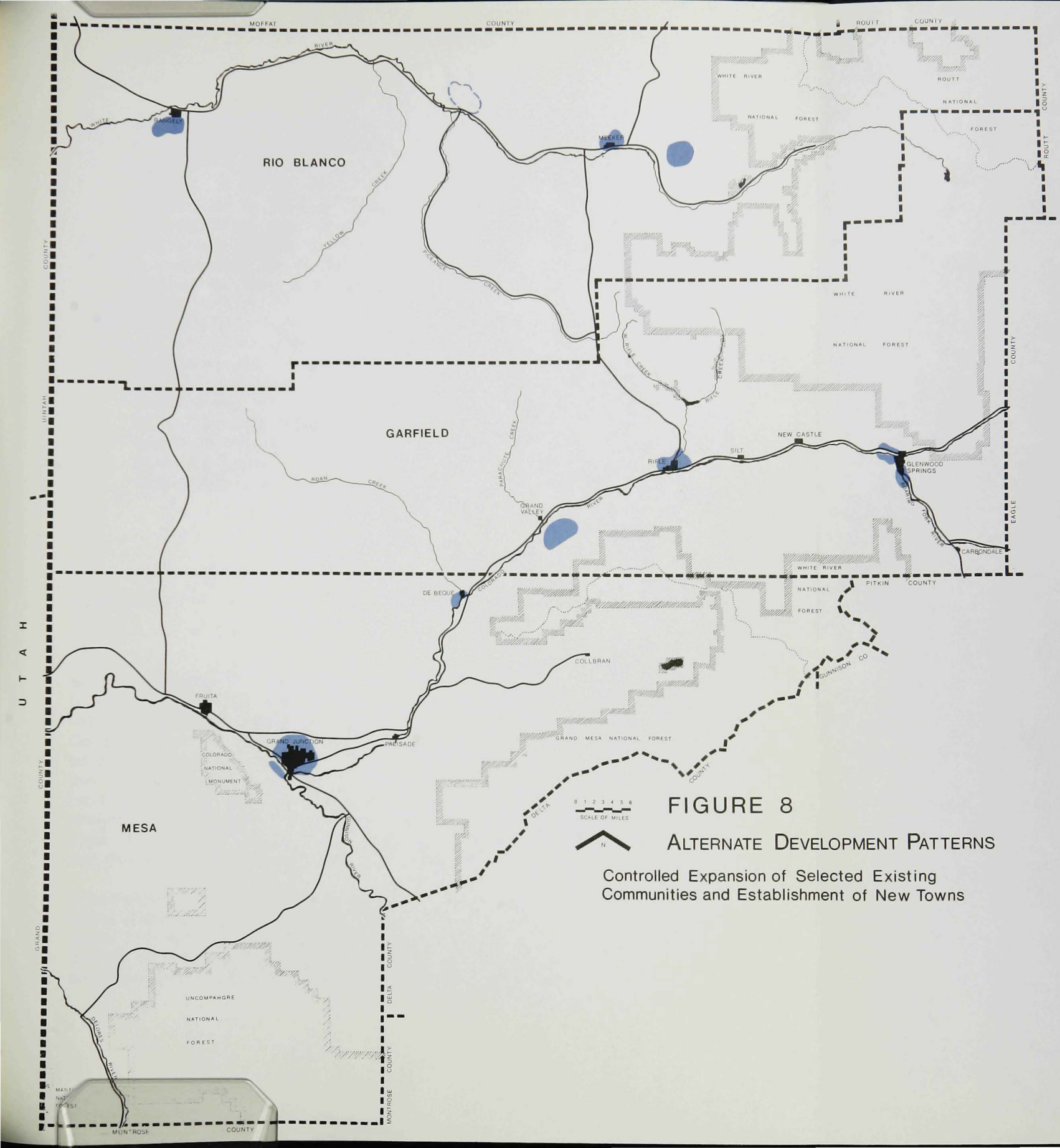

FIGURE 8

ALTERNATE DEVELOPMENT PATTERNS

Controlled Expansion of Selected Existing Communities and Establishment of New Towns

or judging the merits of a major new town proposal requires a level of knowledge and experience not now available in most of the units of government in the region. A danger exists that an effort to control growth can be handled badly with a result not too different from that of uncontrolled growth. Communities where growth is likely to occur will need to make a tremendous effort to provide for administrative capability in advance of growth and capital needs as growth occurs.

3. Substantial growth could drastically change the character of the selected existing communities.
4. Deliberate selection of growth areas requires an adequate information base on which decisions can be based. That information base is of dubious quality now and may not yet be adequate for pinpoint decision making when growth begins to occur.
5. Directing growth in this fashion would require the sustained effort of all concerned.

OVERVIEW

Substantial growth is coming to western Colorado at a time when there is still a vacuum in growth policies at both the national and state level. Considerable interest in the subject has been shown both by Congress and the State legislature. To date,however, little has been adopted which can serve as a specific guide to local government. In the foreseeable future, Region 11 including the three counties which have been the subject of this study, will need to make choices on growth without clear cut State or federal guidelines. While taking these preliminary steps, the Region will need to be attuned to developing State and national policies which will affect its decisions.

A combination of the last two development patterns discussed is probably the right choice for the three county area. This approach would mean that all of the existing communities would share in the future growth of the area, and that, in addition a new town or towns would be necessary to accommodate the projected population.

This does not mean that all of the existing communities should share equally in this growth. Circumstances of location, public facilities, climatic conditions, water and soils make some communities better candidates for growth than others. These factors should guide decisions.

A settlement pattern for the region is already well established. With the exception of the possible establishment of one or two new communities and the controlled growth of existing towns, there is probably little that can be done to rearrange the present historic urban and transportation pattern. New concepts and knowledge will be compromised by existing fact. For example, the communities in the Colorado River Valley are subject to serious potential air pollution problems, yet they will need to expand to accommodate new growth. The air pollution problem will need to be attacked and solved on the technical level since it will not be possible to completely relocate existing populations.

The three county area probably cannot afford, either esthetically or financially, to adopt the laissez-faire approach to new growth. The obvious short run advantages of allowing personal freedom and being the growth pattern easiest to accomplish are clouded by the long run disadvantages for future public officials as they grapple with the higher costs of providing administration and urban services to these scattered areas. This pattern represents a substantial loss to the present open character of the three county area and to the convenience and enjoyment of future inhabitants. It is a possible development pattern, however - one to be avoided.

One housing type has not been considered in this section on urban form. That is the second or recreation home. These will occur outside of the urban growth areas we have described, and respond to entirely different locational criteria. They may or may not cluster in "typical" subdivisions. Densities will be low. Since they are likely to occur outside of the major growth areas, they are mentioned only briefly here. Their effect in the three counties may be to fill the "voids" between urban settlements. These proposals too will need to be carefully scrutinized for their appropriatness and impact.

GOALS, ISSUES & RECOMMENDATIONS

GOALS

During the course of this study, the Oil Shale Regional Planning Commission established a process for developing goals for the region. The Commission did this through a citizen's organization known as Task Force 76. The Task Force was made up of ten committees each pursuing a special area of interest such as land use, education, transportation, housing, finance, water and sewer, recreation, health and welfare, public safety and utilities. Each committee arrived at issues and goals related to their particular area of interest. These goals were published in area newspapers for reaction from interested persons in the region.

Building on this effort, the Council of Governments should discuss and eventually adopt a set of goals for the region. The adopted goals should receive widespread distribution and constant discussion as to their applicability and appropriateness.

The presently stated goals relate specifically to the subject area addressed. Many are narrowly conceived and are more in the nature of short term objectives than regional goals. The discussion process on the goals should, among other things, result in a set of goals with a consistent level of generality. Without presuming to duplicate the efforts of the committees, we believe that some broader goals can be stated here which apply to the growth and development of the entire region. While these goals have not been locally developed, the consultant team suggests they are valid regional goals based on our interpretation of area attitudes and conditions. These are:

1. To develop a capability at all levels of government to deal with growth - and perhaps temporary decline - in the region.
2. To achieve a manageable rate of growth sufficient to counter economic decline.
3. To foster a diversified growth which is economically and socially balanced.

4. To control the rate and type of growth so that adverse public and social costs are minimized and a suitable regional pattern is achieved.
5. To preserve a choice of life styles in the region, including the maintenance of the existing rural and small town way of life.

These goals will be difficult to achieve. The magnitude of growth and the rate of growth, particularly for the intensive profile of an oil shale industry, threaten the likelihood of reaching any of them. This does not lessen the value of stating these goals and beginning to evolve institutions and methods for addressing them.

In addition to goals developed at the regional level, individual communities will need to develop specific objectives for growth before they can identify long and short range solutions for achieving those objectives. These objectives should serve as a continuing guide for planning, policy, and action. These objectives, will mean little, however, unless the public is first acquainted with the threats and opportunities in oil shale development and then involved in determining the growth objectives. Information and advice may be sought from outsiders, but objectives can only be established by the community.

ISSUES

In developing goals for the region, Task Force 76 also listed what they perceived to be the issues in each of the subject areas investigated. Again, without intending to duplicate the efforts of the Task Force, we would suggest that several broader issues must be addressed because of the rapid growth which may come as a result of oil shale development.

To summarize the problem:

In the period 1975-1987, the development of an oil shale industry in Garfield, Mesa and Rio Blanco Counties may bring up to 13,000 oil shale production and processing employees and 8,000 plant construction employees into the area; these would in turn support up to 42,000 local service employees. The total employment in the region in 1970 was 30,000. This threatens extreme specialization of a presently

diversified regional economy, involuntary changes in the present life style, and growth at a faster rate than existing tax and institutional structures can accommodate. The eastern end of the three county area (Glenwood Springs and Carbondale) is already on the verge of such a growth rate, caused by tourism in Garfield County, in Eagle and Pitkin Counties, and - potentially - in Gunnison County (Marble).

Significant issues demanding the attention of the citizens of the area and their elected officials, therefore, are:

1. The rate of growth and the resulting regional settlement pattern.

   To date, the existing communities and counties in the region have dealt independently with growth problems resulting from a moderate rate of growth. To date, growth in the region has been manageable. The potential magnitude and rate of growth facing the region will force a more coordinated approach to dealing with growth, for decisions in one area may seriously affect adjacent areas. At issue is the ability to collectively control growth and predetermine the most appropriate development patterns.

2. The adequacy of local government and community facilities to accept new growth.

   Inventories conducted by Task Force 76 indicate that most of the region's systems are operating at about capacity. In the past, programmed additions to these systems have been geared to the prevailing rather moderate rate of growth. Sudden population increases will place severe demands on existing systems. Volunteer Fire Departments may need to be staffed with full time personnel. Urban park systems will need to replace the present reliance on the surrounding country side in many cases, and water and sewer systems will need to be expanded.

   In addition to the demand on facilities, local governments and institutions will feel the pressure for change. There is a general lack of sophistication in the communities of the region for dealing with rapid urbanization. As growth occurs, local officials will be dealing with outside interests who have developed approaches and techniques in other major

metropolitan areas. To understand the problems and opportunities, local officials will need to be as knowledgeable as the citizen they are dealing with. This will mean the addition of qualified people to many local staffs.

3. The preservation of a way of life.

A survey[6] of residents of Garfield, Mesa and Rio Blanco Counties revealed a high degree of satisfaction with the present life style in western Colorado. Cited as reasons were the lack of congestion and the casual atmosphere of the small communities. Most respondents were willing to accept a "little" growth but were unaware of the magnitude of the growth which could occur. There was an expressed fear over the potential negative effects of rapid growth. It will require heightened awareness and a concerted effort to control probable growth so that some semblance of the present life style is maintained.

4. The use of land and the preservation of agricultural lands.

To accommodate projected increases in population, existing vacant lands will be developed and some presently developed lands will be redeveloped to higher intensities. Of major concern in the three county area should be the effect of additional urbanization on agriculture. Good agricultural land is in limited supply on the Western Slope, and yet, as previous chapters of this report have pointed out, it is these agricultural lands that are most tempting for development.

A cursory appraisal of the present situation might result in the conclusion that the land resources of the area are unlimited, that farming and ranching are hard and thankless occupations, that agricultural products could more easily be imported from richer

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6 See Attitudes and Opinions Related to the Development of an Oil Shale Industry; by Carl Von E. Bickert; Bickert, Browne & Coddington & Associates, July, 1973.

agricultural areas of the country, and that urban development would be a more profitable use of the land. This view does not take into account either present national and international conditions or the impact such reasoning might produce in the three county area.

Land use in the three county area will continue to be a major issue.

5. The use of available water and other environmental considerations.

   Water for oil shale development and the impact of oil shale development on the environment of the Piceance Basin are the subject of two special studies which ran concurrently with this study on Regional Development and Land Use. Upon completion of those studies, the results will be available for review. Of additional concern is the quantity and quality of domestic water supplies and secondary environmental impacts in the region as it grows to accommodate oil shale development.

6. The maintenance and continued development of a diversified economy.

   The present regional economy does not revolve around oil production. Can intensive oil shale production occur over a period of time without warping the regional economy to the point where it is dependent upon this single industry?

These broad issues will be continually before the region as growth occurs over the next several years.

RECOMMENDATIONS

Organization for Growth

Most American communities react to growth by beginning to plan for it after the impacts of growth have begun to be felt. By taking appropriate action now, the three county area has an opportunity to reverse this all too normal approach. There will be a recognized effect on operating budgets but a coordinated look into the future now may save considerable money and effort later on.

While the entire structure of local government deserves examination (i.e., at what point will Rifle need a full time Traffic Engineer? When should Meeker establish a separate Parks Department?) our major concern at this time is with the planning function. There are almost daily evidences of growth and change in the three county area that need to be dealt with. A planning structure should be developed which can deal with change on a continuing basis. This will mean additional qualified personnel whose function will be to perceive and analyze the problems facing the region and to outline courses of action for decision makers.

A basic planning framework exists. County planners are already at work in Rio Blanco and Garfield Counties and Mesa County has a joint City - County planning staff. The recently formed Colorado West Area Council of Governments provides a vehicle to develop planning expertise at the regional level. Even in a normal growth situation, this level of staffing is minimal. It is completely inadequate if predicted rates and levels of growth begin to occur.

There is a legitimate planning function at all three levels: 1) regional 2) county and 3) city. In viewing the present situation, immediate emphasis should be given to expanding the planning function at the regional and county levels. Staffs at these higher levels should lend assistance to the towns and cities until a local planning staff is warranted by either the size of the community or the complexity of its problems. Staff expansion should occur in conjunction with an effort to define as clearly as possible the roles of the various planning agencies.

The Colorado West Area Council of Governments is in an excellent position immediately sponsor this type of discussion. A clear definition of functions would eliminate costly duplication of effort and would insure that planning programs at the three levels compliment each other and not compete. We would suggest the following division of responsibility:

1. Council of Governments: Formulate regional growth and development policies, distribute them widely for citizen reaction and education, adopt consensus po-

licies as guide for future planning. Develop, interpret, distribute and maintain a regional comprehensive plan. Assist local governments in their planning programs. Coordinate Federal and State programs for the region. Analyze the need for and develop State legislation which would help the region. Serve as the repository for regional information and make pertinent material available to local governments. Monitor and comment on regional growth and development. Develop a public information program to explain area problems and opportunities. Serve as the translator of State policies to the region and local needs to the State.

2. County Planning Function: Formulate county growth objectives and policies as input to the development of regional policies. Develop a county Comprehensive Plan compatible with regional growth policies and in cooperation with the communities of the county. Develop and administer county land use and development regulations for the unincorporated areas of the county. Upon request, develop and assist in the administration of adequate regulations for the communities. Devise and administer the county capital improvements program directed at meeting the demands of growth. Coordinate planning efforts with regional and local units of government.

3. City Planning Function (Where appropriate in growing communities): Formulate development policies for the community for public discussion and eventual adoption. Prepare and maintain the City Comprehensive Plan, recognizing both regional and county growth, policies and plans. Develop and administer city land use regulations. Collect and interpret information which will lead to better local decision making on development. Develop and adminster the city capital improvement program including an examination of ways to pay for growth. Carry on a public information program designed to make the public aware of current development problems. Coordinate city programs with county and regional planning agencies.

The separation of roles described above can be achieved only if adequate staffing exists at all three levels. In the immediate future this will probably not be the case in the three counties. While adequate capability is developing, expertise should be sought wherever it exists. Small communities should logically turn to the county planning staff for assistance and advice. As COG develops expertise in certain areas, this staff too should render assistance to the region's counties and communities. Communities that are destined to remain small may need to rely entirely for policy guidance and technical help on the county or regional staff. In these instances, the local city council and planning commission will be performing the local planning function with the assistance of county or regional staff.

During these initial efforts, it is important that the developing planning process be closely tied to the legislative and political process. City councils and county commissions alike will need to recognize that action on individual zoning, subdivision,annexation, or utility extension matters are basic development decisions which shape the form and nature of the community and should be considered in that context. These individual decisions are relatively easy. The difficult problem which should be addressed by legislative bodies is the early determination of the goals of the community and the shaping of a planning process which will help them achieve those goals.

Initial statements of policies and early comprehensive plans may be quite sketchy, either because of the pressure of growth or lack of information. However, they should be attempted as an effort to focus the communitie's and countie's attention on problems and opportunities and as preliminary statements which can be refined after community discussion.

Council of Governments

The Council of Governments should consider establishing a minimum staff of eight persons within six months to one year. The positions and duties of this initial staff would be:

Director	Secretary to the Council. Overall direction of program. Contact with public officials Public education about program.
Assistant Director	Acting director in Director's absence. Preparation and

	supervision of work program and budget with Director's concurrence. Daily supervision of personnel. Serve as regional grantsman for Federal and State assistance programs. Monitor status and effectiveness of such programs.
Urban Affairs Planner	Monitor development problems and serve as the Council's liason with the region's towns and cities. Be capable of offering assistance in the solution of basic problems. Advise on municipal planning procedures and techniques. Undertake special studies as directed.
Rural Affairs Planner	Monitor problems of rural areas. Serve as Council liason with other governmental agencies offering rural assistance (BLM, SCS, RC & D's, State, Game & Fish). Undertake special studies as directed.
Industrial Planner	Monitor the activities of oil, coal, gas and electric industries. Explain industrial methods and problems to the Council. Serve as the Council's liason to industry in the region. Conduct special studies on industrial growth.
Research Planner	Coordinate the collection of information and statistics necessary for planning decision making and interpret and make those statistics available to the staff, the council, other public agencies and the public. Undertake special investigations as requested.

Draftsman	Prepare and maintain base maps and aerial photos. Maintain educational, material such as slides and drawings. Prepare report graphics and otherwise assist in report preparation.
Secretary	Serve as receptionist for Council. Prepare agendas and reports. Handle correspondance and routine contacts with public.

Because the major areas of concern in the region are increasing urbanization, the preservation of agricultural lands and industrialization utilizing natural resources, it seems appropriate to shape the staff along these lines. The Urban Affairs Planner should have knowledge and experience in municipal problems and be capable, if called upon, to help small communities develop regulations and establish a planning process. The Rural Affairs Planner should have a geology, landscape architecture or engineering background and should be familiar with water resources and rural problems. The Industrial Planner should have a background in engineering and economics and should be familiar with mining processes and industrial location problems. Each of these staff members will develop their own constituencies from the people they deal with on a day to day basis and should be able to interpret the concerns of these constituencies to the Council.

There are many other backgrounds that will from time to time be useful in the Work of the Council. They include public administrators, attorneys, environmentalists engineers, architects, etc. A full time Council staff will be able to pinpoint the need for additional expertise at an appropriate time and so inform the Council.

The task forces which were set up by the Oil Shale Regional Planning Commission should continue to have a function with COG but in a slightly different role. The persons on each committee should be reduced to a workable number who have a direct responsibility in that particular function in the region. These committees would then become Technical Advisory Committees in that subject to COG. COG should appoint these members. These technical advisory committees should make no pretense of being broadly based citizens committees. Citizen input to COG recommendations will come through different channels, although the members of the committees should certainly be sensitive to the broader implications of their

recommendations. The deliberations of these committees should be open to public scrutiny as should the actions of COG.

There are at least three possible scenarios which can describe the future of the present Colorado West Area Council of Governments. For one possibility the organization can continue to exist under the present setup. That has been the assumption in this report in recommendations on staffing and function.

An often cited weakness of such an arrangement is that Councils of Government, unlike planning agencies for counties and cities, do not have the ear and the backing of any single political unit and therefore the fragmentation of authority dooms its efforts to failure. Across the country, COG's have met with mixed success. Since the Colorado West Area Council of Governments is composed of elected officials from the four county region, its success depends on the spirit of cooperation of these officials meeting at the regional level and the effectiveness with which they can implement regional policies within their own jurisdictions. Assuming a high level of cooperation and understanding among the participants in the Council, their effect could be considerable.

In order to make the Council work effectively in the future, some expansion of membership may be necessary. As the region grows, the burgeoning cities will need better representation. If several of the existing small communities become cities of 10,000 to 20,000 population, they will want a more direct voice in Council activities. Since they would represent substantial populations, their addition to the Council would mean a more effective Council. With these kinds of adjustments, the Council could continue to function into the future.

A second possibility for the future is to allow the present Council to develop a political framework. The vehicle for this in Colorado is the Regional Service Authority. The voters of the four county region could authorize an RSA and assign it certain regional functions such as planning, sanitary land fill, water conservation, transportation or others. With this responsibility would come taxing authority to carry out the assigned duties. Council staff would become the staff of the new RSA operating under an elected RSA Board representing various areas of the region. Additional functions could be added to the RSA by the voters over the years.

This truly could become a regional layer of government. However, as such it might be difficult to sell to the voters of the four county region. Its power to address regional problems would also be limited to whatever authority regional voters cared to give it.

A third possible scenario is to have the Council and its staff become an arm of State government. This would maintain the traditional separation between State and local government but would provide a regional outpost for the State and a direct voice in State affairs for local government. The staff would be State employees located in Region 11 to provide assistance to local government and to translate between local problems and State policy. The regional staff could be advised by a regional policy board with composition much like the membership of the present Council of Governments. The chairman, or a delegate, from each of the 12 regional policy boards would serve as a State Planning Commission or similar advisory board.

This State office would still be responsible for carrying out the duties of a regional planning agency in cooperation with the cities and counties. A recognition of the importance of a State planning function by the Governor and the legislature might also insure the better coordination of State programs in the regions. Of the three possibilities advanced, this third approach has the most promise.

Counties and Cities

The involved counties, too, are understaffed for anticipated growth. This is particularly true if it is assumed that the small communities of each county will not be able to afford separate professional advice but will turn to the county staffs for assistance. Mesa County, with its joint city - county staff is in better shape to handle initial growth problems than Rio Blanco and Garfield Counties. These latter two counties should immediately have at least three full time people involved in the planning process. Typically this would be a county planner, a planning technician and a secretary. This does not include the zoning administration or building code enforcement function.

For a division of labor, the county planner would provide the primary professional expertise and direction for the office, serve as staff advisor to the planning commission and county commission, coordinate any special studies being carried on and be responsible for public contact and public education. The planning technician would conduct special investigations at the direction of the county planner. The secretary would keep the records of the office and would record the minutes of the County Planning Commission. As the level of development activity increases, additional staff should be added as needed.

The immediate needs of individual communities are more difficult

to assess. Fruita, Rifle, Glenwood Springs, Meeker and Rangely have reached a size where there needs to be at least one person in city government whose primary concern is city development policies. This could be an assistant city administrator or some other existing official who can give his attention to these matters. In facing imminent growth, it is not sufficient, however, to add the planning responsibility to an existing official who is already burdened with a different full time responsibility.

The other smaller communities can probably find planning assistance at the county and regional level, assuming those agencies are adequately staffed. If and when growth occurs in their vicinity, they too might consider securing professional assistance for themselves.

What is an adequate level of planning? Staffing and budgeting should be directly related to the problems the community (county, region) faces. Western Colorado is facing abnormal growth. The planning effort should be sufficient to anticipate problems and prepare for them. The recommendations in this section constitute an immediate level to accomplish that purpose.

Development Patterns

We would recommend that future growth in the three county area be immediately accommodated by controlled expansion of existing communities, to be augmented at a later date by the possible development of a new town site or sites. The resulting pattern is preferable to one formed by approving individual requests for scattered development throughout the region. This approach will require the arresting and reversal of an urbanization process which already appears to be underway in the Grand Valley from Fruita to Palisade and, to some extent, in the Glenwood Springs area.

Existing communities already have a substantial investment in physical plant and provide amenities which give them an advantage over a new town site in attracting and servicing the initial influx of new residents. New towns sites are made ready for residents only after the expenditure of considerable time and effort. The first residents to arrive at a new town must immediately have access, housing, community facilities and urban services. It therefore, appears that initial growth must be accommodated in existing towns.

Assuming only normal growth (no oil shale development), no new

town site may be necessary. Existing communities could conceivably gear up to accommodate the projected population increases. However, assuming either level of oil shale development, and assuming that existing communities have not provided for growth, new inhabitants might be arriving faster than they can be accommodated. In that event, an appropriately planned and located new town site coming on stream in five to seven years could provide a needed safety valve.

A distinction must be made between a new town and a major subdivision. The definition of a new town as used in this section does not include a large residential subdivision with space allotted for an elementary school and a shopping center. To take its legitimate place among the region's communities and to fully assist in accommodating projected growth, a new town must be a self contained political, social and physical entity. It should be planned for from 25,000 to 50,000 persons. It must provide for a range of housing types, public and commercial services and should eventually have its own system of government. Expensive public facilities will be required prior to the need for their full capacity and before there is an appreciable positive cash flow to the developer. Counties reviewing new town proposals must evaluate the capitalization of the project and the thoroughness with which the proposal has been prepared in order to avoid becoming the caretaker of an aborted effort. This will require considerable expertise at the county planning level to judge such proposals.

Suggesting the growth of existing communities does not imply that all existing communities should share equally in this growth. Investigations should be undertaken immediately by the Council of Governments to ascertain which of the existing communities have conditions most favorable for urbanization. Possible unacceptable levels of air pollution which might accompany the growth of Grand Valley, for example, is only one of the factors that should be looked into. Suitable land area for development is another important consideration. These and other factors may dictate that some areas grow faster, or to the exclusion, of others.

While it is recognized that the Council of Governments has no veto power of its own over growth in any given area, the results of its investigations should be widely distributed as soon as they are known. The information on unfavorable conditions or regional land use policies could serve as a guide to the jurisdiction making the final decision. The same information could also influence Council decisions relating to the allocation of State or federal funds to meet growth needs. Based on the examinations conducted during this study, the

most appropriate centers for major or new growth appear to be Rangely, Meeker, Glenwood Springs, Rifle, DeBeque and Grand Junction plus appropriately located new communities.

We would strongly recommend that county government respect and reenforce the cities' role as the focus of growth and adopt regulations and follow policies which will help accomplish the recommended pattern of growth. For example, a county zoning decision which would allow a major development to occur at the edge of a community in contradiction to the community's Comprehensive Plan or its ability to serve would seriously jeopardize any effort to control development. Colorado's Front Range is replete with examples of counties competing with cities in the race to urbanize and the resulting conflicts. To avoid this, Region 11 should at the outset adopt a policy that proclaims that all that is urban should be municipal.

Cities, too, will need to exercise restraint by refraining from illogical and wandering annexation and development patterns. Cities should first look inward at present land use. An increase of existing densities should be considered before expansion. This will involve the filling in of vacant land and the redevelopment of older, low density, structures near the center of the community into commercial uses or multiple units. This will not happen automatically. Cities will need to bring their many powers to bear to help these changes occur and, in fact, act as a change agent in many cases.

In summary, future urban growth to accommodate projected population increases should:

1. Occur either as desirable extensions or existing communities or as new communities.
2. Preserve land necessary to maintain the existing economic base and encourage a future diversified economy.
3. Utilize land having soil characteristics suitable for urban development.
4. Relate locationally to major transportation corridors and future basic employment generators.
5. Locate in environmentally suitable areas.
6. Be provided with urban services, particularly local government, water and sewerage.
7. Occur at densities consistent with accepted planning principles and with characteristics endemic to the area.

Intercounty and Interregional Planning and Coordination

In addition to formalizing the planning process within Region 11, cooperation is essential with other regions and between units of government within the region. The economics of the various districts, counties, and regions are intimately interwoven. Therefore, a high degree of integration will be necessary.

The near term future of the Garfield County economy is quite dependent on events in Pitkin, Eagle, and Gunnison Counties. Mesa County is economically linked with Montrose and Delta Counties; while Rio Blanco and Moffat Counties are associated with Uintah County,Utah and Sweetwater County, Wyoming as far as oil shale development is concerned.

All three Colorado counties will need to cooperate in presenting a unified voice to the State legislature and the federal government for State and federal aid and for legislation permitting the sharing of certain public revenues generated by oil shale development. Similarly, they may need to cooperate on the provision of services in the form of multi-county districts or authorities and on the control of fragmented efforts to set up new water and sewer districts which will interfere with the planning for and provision of services.

A major area of intergovernmental cooperation should involve the school districts. Faced with the probability that the impact on each of the districts may vary in intensity, districts less impacted may need to share capital plant and services with more seriously affected districts. If mobile classrooms are used, this may entail switching the classrooms from district to district to meet changing need. Since school planning is an important part of providing for the needs of incoming population, the school district superintendents should comprise one of the major Technical Advisory Committees to the Council of Governments. In this position they could keep the Council aware of developing problems in education and suggest solutions to be acted upon by the Council.

The Council of Governments will also need to establish a working relationship with the State and federal government. The Council's function should be to establish regional priorities and translate regional needs to the higher levels of government. Current action by the State legislature and the tentative approaches by the federal government appear promising, however, a more effective continuing relationship will need to be established.

Both the State and the Federal government will need to rethink their traditional assistance programs to local government. The categorical matching grant program is only partially helpful because of the inability of some units of local government to raise the local share and because of problems in securring the grant in a timely manner to meet the need. Revenue sharing, on the other hand, offers a little bit for everyone and does not focus the money on any single area of need. It is also generally inadequate to meet the problems facing Western Colorado.

A hope for revenue sharing would be that the States receive increasing amounts of monies to be used as discretionary funds for meeting the critical needs of the regions. Grants of 75%, 90% or even 100% should be given to the regions to help with a specific planning problem or to construct needed improvements which will further the region's stated goals and objectives and which comply with the region's comprehensive plan. For those federal programs which still require local matching funds, the State should share in the local matching fund requirements so that the available federal funds can be effectively used. This approach, added to funds paid to the State for oil shale development, might be considerable help to Western Colorado. The Council of Governments should pursue this with State government.

Transportation

Under the direction of the Council of Governments, a regional transportation study should be undertaken for Region 11 with mass transit as a major area of investigation. The study should recommend a transportation system based on anticipated growth and settlement patterns. Major participants in such a study will need to be the cities and counties, the Colorado Department of Highways, Denver and Rio Grande Western Railroad, the airlines serving Walker Field, buslines and independent airport operators.

Because of the relationship between land use and transportation, development of such a system will force decisions relating to land use. An efficient transportation system cannot be devised to accommodate a whimsical regional settlement pattern. It is imperative therefore, that the development of land use policies and the preparation of a land use plan go hand in hand. This transportation system will need to deal not only with new and expanded communities but also the scattered oil shale industries.

The study should be geared for completion within two years - sooner if possible for the benefit of decision makers faced with immediate problems. It should address:

1. The future of existing or already programmed improvements.
2. The need and location of new facilities - mass transit, highways, airports.
3. Advance acquisition of right-of-way for new facilities.
4. Interfacing of the various modes of the system.
5. Costs and scheduling of a proposed system.
6. Administration of a regional transportation system.

Several immediate problems are already being discussed. They will need to be fitted into the regional framework. High in priority is the completion of Interstate 70 from Silt to Plateau Creek. This will improve east-west communication in the area. With the advent of oil shale development in the Piceance Basin, Route 13 from Meeker to Rifle assumes regional importance. Its relocation in Rifle has already been proposed in the 1968 Garfield County Comprehensive Plan. As has been recommended, it should become a four lane highway with limited access by-passing the Rifle CBD on the west. Adequate right-of-way should be secured. The region cannot afford to allow a new highway to be choked with commercial development and Rifle cannot afford to channel increased regional traffic down Railroad Avenue.

Recommendations on the future of Walker Field in Grand Junction have been included in the Colorado Airport System Plan completed in 1973 for the Division of Planning, State of Colorado. It has been recommended that Walker Field be expanded as a "gateway" airport for Western Colorado. The concept is that this and other "gateway" airports in the State will be able to distribute visitors to outstate Colorado without the necessity of their having to funnel through an already crowded Stapleton International Airport in Denver. The proposed transportation study will need to build on this airport recommendation by linking an efficient ground transportation system to the expanded air facility.

Convenient north-south transportation is at a premium in the region. Development of the Utah shale beds and the subsequent growth of Vernal and Rangely might put added pressure on further improvements to the Douglas Pass route linking SH 64 to Interstate 70. Substantial population growth to the Grand Junction area and to

Rangely would increase the possibility that some form of mass transportation would succeed along this route.

The major transportation corridor for the region will remain the Colorado River Valley from Grand Junction to Glenwood Springs. This area offers the most promise for the phasing in of some form of mass transportation. Increased frequencies of existing buses on a newly completed Interstate 70 might be the first phase followed by rail transportation on the existing D & RG railroad tracks if demand warranted. Such a system could connect downtown Grand Junction with downtown Glenwood Springs with an intermediate connection to the Rifle CBD. This would allow considerable flexibility in living and working relationships in the Valley and could establish a pattern which would tie many additional communities together by a rail commute.

In addition to the demand for such a service there are many additional problems which a transportation study will need to investigate. A major one is the availability and suitability of existing trackage for such a service. Scheduling between freight and passenger traffic will be a consideration. What type of rolling stock is desirable and how will it be financed? If a demand is apparent but an operational profit cannot be realized, is the potential for fast and pleasant service so attractive that it will be subsidized? Will the scheduling of such a service allow local systems to tie in effectively?

Transportation to and from oil shale plants will be a problem, first for the construction workers and later for plant personnel. Since an oil shale plant is a single destination for a number of people and the routes leading to potential plant sites are relatively few, an ideal situation for the use of some form mass transportation is created. Bus is probably the most suitable. Collection points and parking areas at DeBeque, Grand Valley, Rio Blanco and the confluence of the White River and Piceance Creek could gather workers arriving by car and transfer them to buses for the final trip into oil shale plant sites. This would substantially reduce the number of private automobiles entering Roan Creek, Parachute Creek and Piceance Creek.

Another facet of the transportation study should consider how a regional transportation system, once conceived, should be implemented and administereed. One approach is to carry on as at present with each existing transportation organization responding to a perceived need and interfacing with each other as best they can. COG could serve in a coordinating role by pointing out problems and opportunities to the agencies and carriers. This course of

action is probably adequate under present circumstances and would probably remain so under slow growth conditions.

A more positive approach may be required under projected growth. A special organization may need to be formed dealing with transportation. There are three possibilities:

1. Formation of a Regional Transportation District composed of the four counties of Region 11.
2. Organize a Regional Service Authority with transportation as an authorized function.
3. Authorize the State to administer regional transportation systems as a function of a new State Department of Transportation.

A regional transportation district would need to be authorized by the voters of the region and could be established with its own bonding and taxing authority to develop an integrated regional transportation system. It might enter into a lease agreement with the D & RGW Railroad for the use of its trackage, buy rolling stock and operate a commuter rail service including making up any operating subsidy. It could schedule and operate a local bus service for communities with adequate connection to the commuter rail service. It could engage in a continuing transportation planning process with the Colorado Division of Highways and public and private airport systems as a means of staying abreast of regional transportation needs.

A regional service authority has already been discussed in the section on Organization. It could perform many of the same functions as a regional transportation district. It might, however, be doing other things as well depending upon the duties conferred upon it by the voters of the region.

A third possibility is for the regional transportation function to be taken on by a new State Department of Transportation created by the Colorado legislature. While a State Department of Transportation has been considered by the legislature in the past it has not been thought of as an agency responsible for the operation and maintenance of complete regional transportation systems. Any of the three approaches suggested would be eligible to receive federal funds under existing programs for capital equipment and improvements.

As a part of the transportation study, the question of costs and how they are to be met should be addressed. An assignment of responsibility for costs for different types of streets could be examined. A prevalent practice concerning local and collector streets in newly developing areas is to assign the total cost of initial construction to

the development. This sometimes includes special facilities such as bikeways and parts of existing major streets which need to be improved because of the new development. An adoption of a policy such as this by the communities in the region would relieve local government to a degree that they could focus more money to transportation elements of importance to the entire community.

Some immediate action could be taken to alleviate transportation problems and gain experience with transportation systems. This would involve buses, buses between communities and buses to oil shale plants. This could be accomplished by cooperation between local communities and existing bus lines in arranging schedules and pick up points. An expanded regional bus system would be the cheapest and most flexible transportation system in the early days of accelerated growth.

Land Use Planning and Regulation

The premise on which all land use regulations proceed is that they are a tool to accomplishing some overall public benefit outlined in a comprehensive plan or a clear statement of growth policies. In Colorado, the relationship between zoning and planning in cities and towns is fairly, clearly stated in legislative language which begins, "Such regulations shall be made in accordance with a comprehensive plan and designed to lessen congestion in the streets, etc." (CRS 139-60-3). The relationship between county planning and zoning is more nebulous in State legislation.

Good planning practice, however, dictates that broad decisions dealing with growth should be made at all levels of government before present land use regulations are revised or new ones developed. Accomplishing a desired regional, county or city growth pattern requires a consensus of opinion on where and how such growth should take place. The Council of Governments should begin this process by beginning a discussion of regional growth policies and developing a tentative sketch plan for the region. This would encourage the same type of discussion to take place at the county and city level.

The planning process is already underway in parts of the region. Comprehensive plans have been prepared for Grand Junction and Central Mesa County, for the town of Rangely, and for Garfield County. A plan for Meeker is underway. The Garfield County plan also discussed the communities of the county in some detail. Each

of the counties also have zoning regulations and subdivision regulations. Table 25 outlines the status of land use regulations at this time in the three county area.

A basic problem exists in the fact that these plans and regulations were independently developed at different times for different jurisdictions. They should now be reevaluated in light of recent events pertaining to oil shale development and necessary revisions made in keeping with developing county and regional policies.

Effective control of development will come about through the enactment of effective regulations at the county and city level. The Council of Governments should support this local effort. An adequately staffed COG might draft model legislation for use in the region or actually prepare specific legislation for a city or a county. Short of this, COG might coordinate the efforts of the various jurisdictions so that regulations throughout the region are similar and complimentary.

At present, different designations and terminology are used in the many regulations of the region. As a result of growth, there will be organizations such as housing developers trying to do business throughout the region. They will be faced with a bewildering variety of local regulations unless there is some attempt made to standardize the approach and terminology used in regulations. This effort should be undertaken immediately before communities have revised or developed their regulations independently. Suggestions are:

1. Common approaches to designating zoning districts. While larger communities will have more districts than smaller ones, why should an HB (Highway business) in one area be an HS (Highway service) or CS (Commercial services) in another when the intent of the district is the same.
2. Common residential densities with larger communities using a greater variety of such districts and smaller communities using fewer.
3. Standard approaches to the zoning and subdivision processes including kinds of applications, time limits, hearing procedures, etc.
4. Similar treatment of mobile homes.

The time during which regional growth policies can be formulated and regulations drafted or revised to reflect those policies is relatively short. Assuming an announcement of the beginning of a successful oil shale operation, substantial numbers of new people

Table 25

STATUS OF LAND USE REGULATIONS

(Garfield, Mesa, Rio Blanco Counties)

Jurisdiction	Planning Commission	Zoning Ordinance	Mobile Home Regs.	Sub. Regs.	Bldg. Code
Rio Blanco Co.	Yes	X	X	X	X
Meeker	Yes	X	X	X	County
Rangely	Yes	X	X	X	County
Garfield Co.	Yes	X	X	X	X
Carbondale	Yes	X		X	X
Glenwood Springs	Yes	X	X	X	X
New Castle	Yes		X		X
Silt	Imminent	X			X
Rifle	Yes	X	X	X	X
Grand Valley	Imminent				
Mesa Co.	Yes	X	X	X	X
Grand Junction	Yes	X	X	X	X
Fruita	Yes	X	X	Developing	X
Palisade	Planning Committee				X
Collbran	Planning Committee				X
DeBeque					Developing

could begin arriving in the region in about three years. The area should be prepared to accept them at this time. At best, regional and local growth policies are difficult to develop. In Region 11 they will need to be forged quickly under the pressure of imminent growth.

The handling of the first major development to take place may set the pattern for those which follow. If it is poorly located, inadequately served by public facilities, and if there are no standards against which it can be judged by public officials during the review process, it may set a poor example which other developments might follow. Such a development might also become the nucleus for further growth simply because it is there, regardless of its locational relationship to employment centers, or availability of public services.

The minimum regulations for implementing a county or a city's comprehensive plan or state growth policies include: 1) a zoning ordinance, 2) subdivision regulations, 3) a building code, and 4) an annexation policy statement. Traditionally, these have been separate ordinances or resolutions. Recent attempts have been made with varying degrees of success to combine some or all of these into a single development code for a given community.

Zoning ordinances should as much as legally possible, reflect the growth policies of the community and promote community identity. They should provide for a range of residential densities and housing types. Higher densities, those of 25 units per acre and above, should be used as redevelopment densities to be applied to older, central parts of existing towns as the market allows. These are higher densities than most of the region is accustomed to, however, they are perfectly appropriate in central locations in growing towns.

Mobile homes should be specifically provided for in community zoning ordinances. Once they are adequately controlled, they should be encouraged to become part of existing communities rather than be located in isolated locations of the surrounding counties. Clear distinctions should be made in zoning ordinances between such terms as "mobile home parks", "mobile home subdivision", "modular home" and "recreation vehicle". Once those distinctions are made and understood, communities should develop criteria for the location of the different housing types.

Zoning ordinances should also address themselves to the use of the planned unit development concept. This can be done either as a separate zone district or as an added process for existing zone districts. It allows flexibility in site design and presents an opportunity for the community and the developer to negotiate over develop-

ment problems. The success of such a negotiating process depends upon the knowledge and expertise of the negotiating parties in such areas as design, construction methods, land planning, drainage, traffic circulation and landscaping. A growing DeBeque and Newcastle, while willing to experiment with PUD, may not have developed the level of experience to judge them. As these situations arise, the communities will need to add expertise locally or seek assistance from county or regional planning agencies.

Subdivision regulations should outline the subdivision process of the community, set general design standards and state required improvements and street cross sections. Counties will need to be aware of the provisions of Senate Bill 35 regarding their subdivision powers. Counties may wish to go beyond the provisions of this bill and require, in critical areas, an environmental impact statement as a condition of the subdivision review process.

Any community that anticipates growth outside of its existing borders should become familiar with State annexation statutes and should formulate for themselves their own annexation procedures and requirements. Typically such community annexation policies deal with city annexation procedures, extension of utilities, public site requirements and land use patterns. It promotes a better understanding between communities and annexors if these policies are stated in writing.

The development of land use regulations implies that they will be consistently used and judiciously administered. This will require the attention of specific public officials and will have an impact on operating budgets. It is important that qualified persons be assigned the task of looking after the community's interest on a regular basis.

While the exercise of the police power (zoning, subdivision regulations, building codes, housing codes) are less than perfect in controlling growth, we recommend that they be used with much more effect than they have been in the past. Lackadaisical adherance to stated goals and comprehensive plans has added to the problems of many cities and promoted urban sprawl in Colorado and elsewhere.

Recent zoning trends and court cases indicate that a legislative body is not obliged to allow any land owner, through zoning, the so-called "highest and best use" or the most economic use for his property. Two cardinal rules are that land shall have some "reasonable" use in relation to surrounding similar land and that it shall not be taken for a public purpose without compensation. Within that legal framework, county commissioners and city councils have more power to direct growth than they have traditionally used.

These police power tools will certainly need to be supplemented. To achieve a governmental structure capable of directing growth, there should be a fiscal structure capable of dealing with increasing demands for public services and for minimizing the social costs of growth.

This or any similar objective will require institutional change - the acceptance of new responsibilities by local government, obtaining new authorization from the legislature to solve local problems and a willingness to generate and commit the resources needed to cope with growth. Lease stipulations, additional revenue sources, assurance of housing, non-highway transportation, multi-county control of utility hookups, and planned diversification of employment are typical of the additional means needed to implement overall development planning and growth management.

Nonetheless, the planning and zoning function is crucial, and will require close cooperation between regional, county, and city commissions. It also appears desirable to obtain legislation permitting regional and/or county control of annexations, new incorporations of towns and districts, and subdivisions.

Agricultural Lands

We are all familiar with the problems of agriculture: the heavy investment to get started, low profit margins, rural young people leaving the farm or ranch for higher paying jobs in the city, dependence on climatic conditions, artificial manipulation of the market for agricultural products, and in Colorado, the need for irrigation water. Yet the retention of lands in agricultural use should be encouraged in Region 11 because:

1. Agriculture is now a significant part of the region's economy. The advent of an oil shale industry and decline of farming could produce over specialization of the economy. Agriculture should continue to provide diversity.
2. Agriculture as a life style will counter an increasingly urban life style for the region and provide a stabilizing social influence.
3. Agricultural lands in this country and in the industrialized world are decreasing in the face of continued urbanization. In the face of growing U.S. and world

populations, the demand will be for more agricultural products, not less.

With the recent passage of a new farm bill by the U.S. Congress, the federal government has entered into a campaign to persuade farmers to utilize every available acre to expand supplies of key crops. The U.S. needs agricultural products both to meet its own growing domestic needs and to export to help with the balance of payments. It has been estimated that overall farm output will need to be increased by 32 per cent by 1985 to meet the nation's demand. By way of contrast, under present programs, 61 million acres of agricultural land were idled in 1972 and 19 million acres were set aside in 1973.

To address these problems in the three county area we recommend:

1. That prime agricultural, orchard, and grazing lands be immediately identified and mapped as a part of the COG information service. Perhaps agricultural lands could be rated according to productivity. If this were possible then policies should be formulated which would allow non-agricultural development of marginally productive lands before those which were highly productive.
2. That local government refrain from "leap frog" development which catches farm land between subdivisions for housing and raises the agricultural land value to the point where farming is no longer feasible. Maintain clearer demarcations between urban uses and agriculture.
3. That counties should develop zone districts specifically for agriculture with farm and ranch housing as an accessory use. This would eliminate the possibility that tract housing (2,5,10 or 20 acre tracts) might occur in an agricultural area. Large tracts, under the pressure of urbanization are frequently broken down into smaller tracts once the foothold has been gained.
4. With specific agricultural zones in place, develop policies with the county assessor for assessing agricultural lands based on their agricultural value rather than their speculative value for urban development.
5. That counties and cities consider the acquisition of development rights for threatened agricultural lands that should be kept open. An earmarked sales tax or small mil levy might be the means for financing such a program.

6. That COG should investigate and suggest changes to state and federal legislation which encourages the conversion of agricultural lands to more economic uses.
7. That the conversion of water rights from agricultural to industrial use should be legally resisted when that conversion would eliminate the use of prime agricultural land.

Some communities, Grand Junction and Fruita among them, have little choice but to expand into existing agricultural lands. In these cases, these communities must be particularly careful to avoid non contiguous growth and urban patterns wasteful of agriculture. This part of Colorado should not repeat the Orange County, California pattern of driving all agriculture out ahead of spreading urbanization.

Information Base

The Colorado West Area Council of Governments is the only existing agency which can develop an adequate regional information system. It should decide with local officials, which types of information will be most useful to it and to local governments and begin now to collect that information on a systematic and continuing basis. In doing this it should become aware of any similar efforts which may be taking place in adjacent regions and should coordinate information gathering with State needs and information systems. Common information for each of the planning regions of the State would also allow better decision making on the State level.

Oil shale, coal, water, and open space are regional resources. Their utilization will have an effect on growth in Western Colorado. Therefore, even the smallest community will need to maintain a regional outllok if it is doing any effective planning. At present, none of the existing counties or communities have the capability of doing the necessary regional studies which would allow their local planning to proceed within a regional framework. COG's role should be to provide information so that regional decisions can proceed from a common base.

There is already a considerable amount of information available about the three counties, however, much of it is not directly applicable to planning. It has not been consistently gathered for diffirent areas, and some, in raw form, must be interpreted before it

is meaningful to public officials and citizens. The technical studies being carried out in the areas which are most directly affected by oil shale development will add to the store of information, but some of this material too, will be fragmented by area or subject matter and will need to be interpreted for local use.

We consider the following information essential to the planning process and would recommend that COG secure, interprete and disseminate such material.

Base Maps

Already available are Colorado Department of Highway maps for individual counties and the four county regional map prepared for this study. Missing are good maps at a suitable scale of each of the communities in the region with sufficient surrounding area included to allow development decisions to be made in the vicinity of existing towns. A scale of 1" = 1000' would be suitable for such maps. Aerial photos of the region at one or two appropriate scales would also be extremely useful.

Census

COG should become the Census "Key Person" for Region 11 prior to the 1980 census. As such, they would have a voice in adjusting census tract boundaries and be the repository of Census information. This wealth of data should be further broken down and interpreted by the COG staff for use by local planning agencies and citizens.

Economic Data

To the extent that they are available, COG should be the repository of regional economic data such as employment, sales tax revenues, and income. These should be available by community, county and region. The test for including any data in this system should be "Is it meaningful for decision making?" and "Can it be consistently collected for a period of time?"

Land Use

Some land use information is already available. It needs to be reduced to a common regional classification system and maintained on a continuing basis. It is vital in a growth situation, that the regional planning agency know in some detail how land is presently used in order to better anticipate changes over the years. It may be possible to have the individual communities report land use changes

to the regional agency with the COG staff lending assistance to smaller communities.

County planning agencies would participate by reporting changes in unincorporated places. The absorption of agricultural land into urban uses will be a continuing concern. Land use policies should be based on accurate information and not result from a reactionary judgement.

Special Studies

As the region proceeds with planning for growth, several additional investigations should be undertaken. These are studies which would explore the problems in a specific subject area. A tentative list includes the following:

1. Soils and Hazard Areas. This study has utilized some general soils information for the region. Day to day decision making will require more specific information. Soils information is already available from the Soil Conservation Service. The planning agencies of the region should develop jointly with the SCS a mapping system that would be meaningful to planners and local officials, and follow that discussion with a formal request to SCS to include the making of regional soils maps conforming to the system a part of an early work program and budget. A similar procedure and request should be followed to secure hazard maps from the State Geologist. Of utmost importance would be a more precise delineation of prime agricultural lands, buildable land and hazard areas.
2. Transportation. The need for a special transportation study for the region has been explained in more detail elsewhere in this report.
3. Recreation & Open Space. The Recreation Task Force has developed the beginnings of a recreation and open space inventory and standards. This should be expanded into a regional recreation and open space study. The study should examine recreational and open space facilities that are of a regional, national and international nature and recommend those steps that will be needed to serve a growing urban population.
4. Public Facilities. The adequacy of and the planning for public facilities will be a continuing concern. The Task Force efforts to inventory public facilities should be expanded to include more precise information,

an effort to judge quality, a scheduling of need and costs. A certain degree of self analysis is already underway within the region. COG's function may be the coordination of the independent efforts.

5. Flood Plains. Since flood plains may affect development patterns, these should be established more accurately for the area's major drainage ways. In addition to the Colorado and White Rivers, flood plain studies should be instituted on significant drainage areas within or adjacent to existing communities. Additional urbanization will mean additional runoff. The effects of this runoff should be anticipated by communities in making development decisions. It might be possible to achieve necessary flood plain studies at relatively little cost to COG. A tentative approach would be to request studies on the major rivers and creeks be undertaken by the Corps of Engineers and suggest that cities and towns conduct similar studies on drainage ways within their borders.

Public Awareness

In addition to the information generated by the Council of Governments for its own use and the use of member jurisdictions, there needs to be a continuing discussion throughout the region on general growth and development problems. COG will stimulate this discussion to a certain extent by its actions and in presentations to public groups by its staff and members. This limited approach may or may not develop an adequately informed citizenry.

We would suggest that as a public service, one of the newspapers in the region - probably the Daily Sentinel - feature a weekly column by a well informed writer on the general subject of growth and development. This would be in addition to regular news articles about oil shale or other newsworthy subjects. Contrary to a regular news item the article would analyze, explain, criticize and otherwise deal with a topic of current interest in the region. It would be written from the point of view of an informed and interested onlooker and would use terms familiar to the average citizen.

It need not dwell on oil shale development. The glamor of oil shale will wear thin. However, the events that are taking place in the region should continue to be of interest. Discussion of development

philosophies, reporting significant zoning actions, commenting on public decisions, explaining the significance of a new law - all could provide interesting columns.

This unique column would require a special reporter. Well done, such a column would be interesting and informative service to the citizens of the region. COG should support such an undertaking by supplying information and contacts to the columnist. Other local governments, too, could supply interesting information. Information availability should not be curtailed as a result of critical articles.

Tax Base and Impact Inequities

In reviewing possible industrial and living patterns for the three county area, it is apparent that industrial tax base, notably oil shale plants, may not be located in the same county or school district as potential employees. Some means must therefore be found to transfer any monies generated to the point of impact. At least the following two possibilities should be explored for feasibility and conformance with state law.

The first of these involves direct contracts between adjacent units of government. Can Rio Blanco County, which might be the focus of a large oil shale industry, collect taxes from the industry and pay Garfield and Mesa Counties, through contract, to provide services for oil shale employees who might live in Rifle or DeBeque? This would require a separate accounting of oil shale funds, and records of services by administering jurisdictions.

A second possibility would involve the collection of taxes generated by oil shale plants at the regional or state level with a pay back to local units of government, including school districts, based on the number of oil shale employees in that jurisdiction. State income tax records would be the basis for determining employment and address.

Other equitable arrangements will need to be explored. At best the process will be cumbersome, but the prospect of large inequities in tax base will require that the problem be confronted.

Lease Stipulations

The U.S. Department of Interior includes stipulations in its land leases which require lessees to accept certain obligations as conditions of leasing. The stipulations proposed for oil shale land leasing are to be set (or revised) "... to make the lessee's activities under the lease as free from environmental damage as practicable."[7]

These early proposed stipulations require lessees to show planning for transportation corridors. The Colorado West Area Council of Governments may wish to ask the Department of Interior to include other stipulations in future leases. For instance, stipulations could be included dealing with housing and the withdrawal of irrigation water from irrigated land. Ignoring these problems could constitute a substantial impact on the life style, the beauty and the environment of the region.

Stipulations requiring the lessees to ameliorate these environmental impacts might be requested by local government. Since ameliorative efforts would cost the lessees money, the lease bidding competition might be modified. Candidate firms seeking leases might compete with their proposed measures to minimize or ameloriate environmental (including social and economic) impacts, instead of merely competing with money bids.

Related to the leases, is the use of the lease bid funds. At the present time, the Mineral Leasing Act of 1920 provides that the State's share of these funds be used for roads and schools. COG should urge the State to seek an amendment to this act so that the funds could be used for broader purposes.

Complex Sources Regulation

Complex sources of air pollution are facilities which may or may not themselves emit pollutants but which attract or concentrate automobiles or other sources of pollutants. Shopping centers, freeways, and high density residential subdivisions are examples.

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[7] U.S. Department of Interior Draft Environmental Statement for the Proposed Prototype Oil Shale Leasing Program, Washington, U.S. Department of Interior, September 1972, p. V-46.

The U.S. Environmental Protection Agency, acting under Federal court order, has recently ordered the states to prepare regulations prohibiting construction or modification of complex sources which will significantly degrade air quality. The Colorado General Assembly has now passed legislation giving this authority to the Colorado Air Pollution Control Commission; the Commission will probably delegate much of this authority to local government.

This will give local (or regional) planners and decision-makers new responsibilities and new authority. They will find it necessary to identify (probably with state assistance) air pollution hazard areas and then to divert growth away from those areas. This suggests that new economic activity, dense traffic, and housing should be located away from the floor of narrow valleys, or other areas subject to temperature inversions. COG and local planners will need to integrate this tool with their other regulations as an additional means of directing growth.

There are a number of large basins in the region. The experience of the past five winters in the Grand Valley and the Uintah Basin lead to the conclusion that temperature inversions and the resulting entrapment of air and pollutants in these basins may be a most troublesome problem.

Housing

A crucial factor in minimizing potential impacts of any substantial oil shale development is the provision of permanent or site housing as it is desired by oil shale-related employees. The housing industry will probably furnish large quantities of housing after demand is apparent, but in the meantime, before it is available, many will have obtained mobile homes. Others, particularly among construction people, will have discarded the idea of bringing their families to the region and will be living singly in the improvised quarters.

Both the industry and the community will benefit from timely availability of permanent housing. Labor recruitment and stability and social stability are generally believed to be fostered by encouraging family residence in permanent housing. Also, it may be very roughly estimated that a permanent housing unit will furnish four times the ad valorem tax base as a mobile home ($7,000 vs. $1,700 in 1971 dollars).

Although a major influx of mobile homes is inevitable, the more housing that is ready at times of large in-migration, the fewer mobile homes. This will require careful planning, advance provision of utilities, and some new means of generating "front end" money.

Companies may furnish front end money to builders or help their employees finance home purchases. A non-profit corporation might be a means for letting several oil companies participate in assuring a housing supply without antitrust problems. The three counties may be able to cooperate on a housing authority venture by concluding a management agreement among individual county housing authorities. Eventually, legislation will probably be needed authorizing multi-county housing authorities.

In any case, the provision of permanent housing on a timely basis will be a major challenge to all concerned -- local government, oil shale employers, and housing manufacturers. A broad mix of housing prices will also be important, since oil shale development will see the arrival of many relatively low income people employed in low-paying trade and services jobs.

Governmental Assistance for Diversification

A specialized economy dependent on one industry, i.e. oil shale, is extremely vulnerable to disruption from change in that industry or in competing industry. Therefore, it may be desirable to minimize the specialized dependence of the region on oil shale (if intensive development takes place) and, even with the burden of accepting additional population, to maintain the present diversity of the regional society and economy. This will call for an active effort by local and regional government, and the Colorado Division of Commerce and Development, and may depend on use of public revenues extracted from the oil shale development tax flow. Taxation to raise such funds has already been disussed; it may also be necessary to seek legislation for a Colorado Development Corporation which is authorized to use public funds for the public purpose of reducing economic vulnerability by maintaining or seeking diversification.[8]

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[8] See John S. Gilmore and Mary K. Duff, Policy Analysis for Rural Development and Growth Management in Colorado, Denver: Research Institute, 1973, p. 19

Tax Revenue

In the United States, extraction of minerals is conventionally taxed by a gross production tax per unit of production or value (a severance tax), by ad valorem tax levied on some part of the value of production, and by income tax on profits from production and other operations. Royalties paid to governmental owners of leased extraction sites also go into public revenues. In other countries, governments impose their participation in ownership or require taxes to be paid in oil.

Colorado oil shale production will generate direct revenues for local government through the ad valorem taxes levied by counties, school districts, and other districts. Some royalty money will flow back to the locality of production. State and Federal income taxes may eventually support spending programs in the production locality.

If and as growth born of oil shale development shows signs of straining local government revenues additional sources of tax or fee revenue should be studied. One such source, readily identifiable from the tax laws of other fuel producing states, is the severence tax. If study shows this tax to be equitable and efficient, authorization for it might be requested of the state legislature by the Council of Governments. Specifically, this could be a tax authorized and levied by the state and returned to the area impacted by development.

An oil shale severence tax levied now might substantially deter development of the industry. However, at such time that the oil shale industry is growing rapidly and the demand elasticity for its end products well established, such a tax should be reevaluated. Its costs could be passed on to the consumer and it would contribute substantially to maintaining or improving the quality of life in the oil shale region.

Other revenues should be investigated. To this end, a study sponsored by the Governor of Colorado is now underway to explore a wide variety of tax and other revenue measures to finance needed improvements prior to the availability of adequate tax revenues. It is hoped that this study will suggest remedies for local government that will provide needed financing with the least impact on the economy

AN AGENDA FOR GROWTH

Growth, as a result of or without, oil shale development, will occur over time. We have estimated such growth over a fourteen year period. Different problems for local government will occur, along that stream of time; most problems will be less massive if they are handled in timely fashion. This part of the report show how some of the problems may be identified in sequence, although the exact timing is uncertain.

The comments in this section are largely directed to the Council of Governments or to the jurisdictions of the region acting collectively. However, in anticipating growth, there are some immediate discussions that can be taking place at town council meetings and at city and county planning commission meetings prior to the time the area is ready to respond to growth as a unified region.

The following check list is intended to serve as a guide in structuring these discussions. In addition to local governing bodies, the discussions should involve the town's citizens. In small communities, the answers to many of the questions will not be arrived at without professional help. We have recommended that this help be provided by expanded,competent staff at the regional and county level. However, even before help arrives, a community that has gone through this type of thinking process will be better able to respond to assistance by having formulated some local opinions.

CHECKLIST FOR GROWTH - Local Government

A. Growth Objectives

1. What do we think about growth as a community?
2. Can we use additional growth to our benefit?

3. Does most of the community feel the same way or are there decided differences of opinion about growth?
4. Is there a consensus on any points on how we should react as a community?

B. Public Facilities

1. How many people or dwelling units can we add before there will be a strain on our existing systems? Particularly water and sewer?
2. How can we coordinate with the local school board to service any new population we might add?
3. Will additional people cause us to provide any additional services that we do not now provide? Trash collection? Recreation programs?
4. Where do we stand now on paying for our existing facilities? Do we have outstanding bonded indebtedness? What is our ability to raise money for new or expanded facilities?
5. In cases where services are provided by special districts, how capable are the districts of responding to the growth of our area?
6. Are there services available to us in cooperation with other units of government? Sanitary land fill? Libraries?

C. Local Government

1. How many full time, paid people do we have now handling the affairs of our town? Are problems being comfortably handled or are many important things being left undone?
2. Do we have an organized planning commission or committee that meets regularly and discusses town development problems? Are their decisions and work well known in the community?
3. When was the last time we looked at our own government organization to see if we are operating as effectively as possible?

4. What changes in organization can we anticipate that we would need to make to accommodate additional growth? What new functions might be added?
5. Do we know of any examples of how organizational problems were solved in other communities that might help us?
6. How would new employees be paid for if needed?
7. Are we making the best use possible of volunteer resources in the community?

D. Growth Patterns

1. In which directions and upon what lands should new growth be added to the community?
2. What do we know about soil conditions in those areas? Can we dig for sewer and water pipes? Will ground water affect foundations?
3. Will the areas we think are suitable for development allow new development to be a part of the existing community?
4. Are we going to have any access problems from the new development to the existing town? Does new development also have access to the regional highway system?
5. Are there places already within town and served by water and sewer that should develop before new land presently outside of town is developed?
6. If someone wants to build apartments that are higher than any existing residential unit in town, would we allow it?
7. What type of character and shape do we want for our community as a result of new growth?

E. Comprehensive Plan

1. Does the town now have an up-to-date map showing the location and dimensions of its streets, lots and blocks?
2. Are there similar records available on utility (sewer and water) locations and sizes?
3. Is there a comprehensive plan for the community? If so is it generally accepted by the community as a guide for growth? Has it gotten out-of-date in light of new occurences?

F. Development Regulations

1. What are the existing regulations the town is used to working with? Building code? Zoning ordinance?
2. Are they administered on a regular basis? Rarely?
3. Is there a full time person responsible for their administration?
4. If they were written for the community at its present size, will they be adequate as the community grows?
5. Are zoning actions and subdivisions routinely considered by the planning commission?
6. If new regulations are needed and developed, how will they be administered locally?

G. General

1. What things do we need to know more about?
2. Where is help available on different subjects?

SEQUENCE OF PROBLEMS AND DECISIONS
A REGIONAL AGENDA

The following pages exemplify an agenda for planning and decision making for the region. The nearer years are treated more specifically, because the timing of events can be better estimated during this period. The later years are treated conceptually or generally with an emphasis on major institutional changes or capital investments. The agenda is not all inclusive. Many additional duties will have to be undertaken at all levels of government. Major benchmarks are, however, included here. Many of the recommendations made in the previous chapter have been carried over and placed in an appropriate time framework.

It is desirable to revise such an agenda annually, as a safeguard against turning one year's expectations into later years' obsolete habitual assumptions. The main purpose of this continual agenda setting is to generate lead time for planning, decisions, and implementation, and thus to reduce crises born of uncertainty or suprise.

In setting forth the following agenda, 1974 becomes Year 1, the first full year of activity after the decision to proceed with the federal leasing program in Colorado. In all of the notations relating to oil shale additions on the following pages, the numbers from the intensive profile are used. Most of the comments would apply equally for either level of oil shale development. It should again be noted that even without oil shale development, the three county area will experience growth and therefore many of the recommendations relatively to growth are still valid.

Year 1 (1974)

Non-oil shale population for three counties: 82,300

Oil Shale Additions	
Population:	None
Plant Assumptions:	None
Total Employees:	None
Total Housing Needs:	None
Total School Room Needs:	None

Comments:

1. Organize for planning at all levels of government by accomplishing recommended staffing of regional and local planning agencies. Collectively decide how the various levels of planning (regional, county, city) are to relate to each other and the division of responsibility. Establish interregional and state to region relationships. Set priorities to be addressed.
2. Adopt regional goals and regional growth policy as the basis for decisions on development at all levels of government. Interpret for general public consumption and dissemminate widely. The handling of the initial influx of people will probably set future settlement and commuting patterns. The policy should address land use decisions such as dispersed versus concentrated housing, location of settlements and subsequent commuting patterns, ease or difficulty of providing services, and acquisition of land for open space and other public uses. It may also include pricing policies for public services and utilities and a water policy for allocation to maintain existing environmental amenities, agriculture and tourism as a part of diversification efforts.

3. Stimulate the review by area governments of the adequacy of their land use regulations and public services. Offer assistance in the drafting of suitable regulations. Establish common approaches from community to community. Specifically provide for mobile homes.
4. Solidify information needs for decision making and begin to develop information systems. Adopt a policy that information gathered should lead to better decisions rather than being gathered for its own sake. Make decisions on scale and types of base maps. Investigate availability of aerial photos for region and its communities. Begin the development of a land use classification and mapping system which shows both urban and rural land uses in some detail. Develop procedures for gathering and quantifying land use.
5. Begin definitive soils mapping and complete as soon as possible. Identify prime agricultural lands and hazard areas. Using this and tentative conclusions from any studies of air pollution potential, determine suitable locations for new growth. Use this as basic information with which to begin the preparation of a regional development, land use, transportation and environmental quality plan based on the adopted regional goals and growth policies.
6. Make preliminary investigation of probable air pollution basins whose location might affect future developmental decisions. Develop an air quality data base to provide information needed later for decisions on plant building permits and subdivision zoning under the complex sources regulation. In year 10 with an oil shale population of 78,975, plants and settlements may be dangerous complex sources unless non-polluting transportation is available by then. This suggests beginning to develop data on non-polluting transportation alternatives.
7. Discuss the adequacy of information on domestic water supplies. There has been considerable discussion of water for oil shale development, little on whether the communities of Western Colorado have sufficient domestic water to accommodate projected populations. Determine extent of USGS coverage of this subject in their hydrological study

of the Piceance Basin and decide if further investigation is needed. If this merits a special study it ought to be done quickly since water availability may determine future settlement patterns.

8. In view of probable development patterns, initiate regional transportation study in conjunction with Colorado Division of Highways. If first plants are announced in Parachute Creek area, initiate immediate study into commuting alternatives between Grand Valley and Parachute Creek to assure compliance with state air quality standards and be compatible with a future transportation system.
9. Given the prospective competition for different uses of this land, planning should begin for the Rifle airport development: capacity, landing fees to cover operating costs, and compatibility with surrounding residential and commercial development. Coordinate with State Airport Study.
10. Make decision on the first oil shale plant building permit under the complex sources regulation (in conjunction with the Colorado Air Pollution Control Commission).
11. Determine institutional means of financing housing in addition to the conventional sources, e.g., a housing authority with revenue sharing or other public funds, oil companies supplying front end money for construction, or a non profit housing corporation with varied industrial and public support, etc.
12. Determine loaction and zone for 2,000 units of housing (both mobile home and permanent) which will be required by Year 3. Communities or areas affected will depend on plant locations.
13. Begin trunk utility construction to planned housing areas.

Year 2

Non-oil shale population for three counties: 85,500

Oil Shale Additions	
Population:	1,250
Plant Assumptions:	One under construction either at Parachute Creek or at the confluence of Piceance Creek and the White River.

Total Employees:	450 construction 50 local service
Total Housing Needs:	19 site housing 456 mobile homes
Total School Room Needs:	5

Comments:

1. Adopt a regional plan. This will be an interim plan since several basic studies (transportation, flood plains, etc.) may still be outstanding. However, all available material should be brought together for the region at this time. Distribute plan widely.
2. Complete review of and adopt new or revised land use regulations in all jurisdictions. These should have been drafted with a view toward the type of growth problems anticipated by each of the governmental entities.
3. Each unit of local government should, during this period, complete an analysis of the adequacy of local services and formulate policies addressed at meeting new growth.
4. Initiate construction of 402 permanent homes and 25 classrooms needed in Year 3. This will require a decision on building permits under the complex sources regulation.
5. 1,218 new mobile home spaces will also be needed by Year 3. Construction should begin on the basic facilities to appropriately provide for mobile home parks or mobile home subdivisions. If some of these mobile home units could be located north of Rifle, it would facilitate meeting construction worker needs in either Parachute Creek or the Piceance Triangle.

Year 3 (1976)

Non-oil shale population for three counties: 88,000

Oil Shale Additions	
Population:	6,250 (includes Year 2)
Plant Assumptions:	Private plant under construction in Parachute Creek.
Total Employees:	1,650 construction 850 local service.

Total Housing Needs:	402 site housing 1,674 mobile home.
Total School Room Needs:	31

Comments:

1. Complete regional land use mapping and quantification. Incorporate use and maintenance of the system into routine COG operation and decision making.
2. Complete regional transportation study and incorporate findings into regional plan.
3. Approve the complex sources permit for the C b site.
4. Prepare for succeeding years' growth by locating and zoning additional areas for housing and mobile homes and by preparing to provide additional school rooms.
5. Prepare to deal with complex sources in the Piceance Triangle (Rio Blanco, Meeker and Rangely) as was done for the Parachute Creek development in Years 0 and 1.
6. Begin implementation of some of the recommendations of the Transportation Study, particularly those relating to Highway 13 between Rifle and Meeker. Improved access to the Piceance Basin should be planned and provided from Highway 13 and 64, and later from Rangely via Douglas Creek. Air pollution control regulations may eventually require alternatives to individual commuter driving.

Year 5 (1978)

Non-oil shale population for three counties: 95,100

Oil Shale Additions	
Population:	13,913 (includes previous years)
Plant Assumptions:	1 private plant operating in Parachute Creek 1 plant under construction on a Federal lease site in Piceance Creek.
Total Employees:	1,650 construction 915 plant 3,000 local service

Total Housing Needs:	1,538 site housing 1,910 mobile home.
Total School Room Needs:	89

Comments:

1. After five years of experience with a growth economy, COG should reassess the regional goals for their validity and to ascertain if they are being met, and both COG and local governments should evaluate adopted growth policies and staffing to determine if they are adequate for the probable growth ahead.
2. With the imminence of major school construction in the Piceance Triangle, it may be necessary to achieve extensive school district consolidation and/or find major new sources of capital and operating revenues for schools until an oil shale production tax base is available.
3. Even with the passage of SB365 bringing "movable structures" (mobile homes over 32 feet) under ad valorem taxation, permanent housing still provides four times the tax revenues of a mobile home This suggests a housing policy stressing development of permanent housing would aid in meeting the capital and operating requirements of education needs.
4. Construction of 1,096 homes should be completed or near completion. Because the majority of this need comes from the local service population, there will be particular need to plan housing in proximity to commercial development, and to assure sufficient low and moderate priced homes.
5. Utilities should be made available for the doubling of oil shale population expected between Years 6 and 7. This suggests the formation of a regional services authority to provide services more efficiently, reduce costs, and integrate tax base.
6. Zoning should provide Year 7 requirements for new homes and mobile home spaces. This will involve a major decision on expanding existing communities or starting a new town(s).

Year 7 (1980)

Non-oil shale population for three counties: 104,900

Oil Shale Additions	
Population:	39,350 (includes previous years).
Plant Assumptions:	2 under construction and 2 operating. Plants on both Federal lease sites and in Parachute Creek and Roan Creek.
Total Employees:	3,450 construction 1,830 plant 10,560 local service.
Total Housing Needs:	5,777 site housing 4,165 mobile homes.
Total School Room Needs:	289

Comments:

1. Oil shale population has more than doubled from the previous year, increasing by 21,500 people. Another 18,000 can be expected next year. 173 more new school rooms will be required for next year. Additional school room requirements will run 100 to 150 rooms per year for the next three years, and will then escalate to a rate of about 200 new rooms per year.
2. If all new permanent housing and mobile homes added for this year are assumed to be in Rio Blanco County, assessed valuation might increase about $30,000,000. This would raise school bonding limits by $6,000,000 if all building were in the same district. Ad valorem tax assessed valuation on oil shale plant and production would reach about $50,000,000 per 50,000 barrel plant. The combination would furnish substantial tax base, after the first surge of growth, and if this tax base were in the same taxing jurisdiction as the need for services. This suggests the urgent need for county-wide or multi-county school districts and service authorities.
3. Oil shale population, 39,350, will double by Year 10 and increase that much again by Year 12. A

new town or settlement should be on stream at this time. This will have involved numerous investigations, including access and transportation, air quality, utilities availability, land and capital availability.

4. With 2 plants operating and 2 - 3 under construction in the Piceance Triangle by Year 10, improved access compatible with the recommendations of the transportation plan should now be available or near completion.
5. At this level of intensive development, a review of the regional growth policies would indicate the need for developing alternative employment opportunities to avoid over dependency on oil shale. This requires bringing new employers to the region and determining how to finance the development. If a state development corporation had been established by this time, it could aid in this effort.

Year 10 (1983)

Non-oil shale population for three counties: 121,400

Oil Shale Additions	
Population:	78,975 (includes previous years).
Plant Assumptions:	3 under construction and 4 operating.
Total Employees:	5,400 construction 5,130 plant 21,060 local service
Total Housing Needs:	11,325 site housing 6,280 mobile homes
Total School Room Needs:	661

Comments:

1. At this point there will be little doubt of the well established nature of the regional oil shale industry, the perception of permanance will be high. On the other hand, growth problems are yet to peak. In the next two years, oil shale population will increase by 43,000. 10,000 houses and 1,600 mobile home spaces must be added in that period. If a new community has not already been constituted in or near to the Piceance Triangle, it will probably now be needed to accommodate this growth.

2. At this level of development, the appearance of the region and the kinds of services demanded from government will begin to take on a decidedly different and more urban character. There will be a demand for open space more highly developed for organized recreation in contrast to the present pattern of taking all recreation in the surrounding countryside. Walker Field will continue to be the regional airport for commercial recreation, however, general aviation may increase at improved facilities at Rifle, Meeker, and Rangely. The region at about 200,000 population may be able to support special facilities such as museums, zoos, junior symphonies a regional parks system and others. Densities of development will increase over what is now apparent.
3. At the 10 year level of development, growth policies for the region should again be assessed and the regional plan revised to reflect new infomation and policies. At this point too, it should be apparent what institutional changes might be necessary to help the region. These should be instituted at once to meet the growth yet to come.
4. A major problem of growth to be faced now, if not sooner, will be air quality. With this degree of growth, present or prospective vehicle densities will probably be beyond those compatible with complex sources air pollution regulation. Some form of non-polluting, high speed ground transportation will be needed. A system of approximately 250 miles would serve Glenwood Springs west to Grand Junction, north to Parachute Creek and Meeker, west to Rangely, and into Piceance Basin. In a non-bus system, this would require investment on the order of a billion dollars. Such an investment could best be managed by an agency responsible for regional transportation service with its own taxing authority. A bond issue of this magnitude might be retired through a mil levy or a direct tax on the oil shale industries.

Such a system would not only help prevent strip city or rural slum-type developments, but may be the only means of preserving air quality and other aes-

thetics in the region. Additional taxes may require enactment of legislation, but this may be the only way to finance the system. It might subsequently be expanded to serve Aspen, Vail, and the Utah lease sites.