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The Impact of Oil Shale Development on the Uintah School District

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THE IMPACT OF OIL SHALE DEVELOPMENT ON THE

UINTAH SCHOOL DISTRICT

by

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TABLE OF CONTENTS

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Dominica Onyesonam Alozie

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF TABLES (continued)

ABSTRACT

The Impact of Oil Shale Development on

The Uintah School District

by

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Utah State University, 1976

Major Professor: Dr. B. Delworth Gardner
Department: Economics

The aim of this study is to estimate the future school enrollment in the Uintah School District that results from oil shale development. Future need for classrooms and teachers is also projected, and costs to the school district for providing this need are estimated.

Yearly revenue from the oil shale plant and from new residential buildings due to the plant is also estimated. The annual costs and revenues are compared and it is observed that the costs exceed the revenue during the first five years. The deficit can be reduced, however, if stagger sessions are used to provide needed classrooms and teachers. Also, temporary rather than permanent structures could go a long way towards reducing the cost to the school district.

It is observed that a premature withdrawal of the oil shale company from the county would produce insolvency for the school district. The financial ability of the district in terms of assessed valuation is very closely related to the success of the shale industry. The time needed for industry maturity and eventual withdrawal is a very crucial

factor in determining the needed finances of the school district. Caution must be exercised before any "big" capital expense is undertaken. Stagger sessions in combination with temporary structures may be the most prudent and economical way to provide the needed facilities. Stagger sessions eliminate capital expense, and the temporary structures could be sold or turned to other uses when not needed for classroom use. If stagger sessions are used, there may be no financial adjustments required of the school district in the event of industry withdrawal.

This study should help education planners in the district involved to plan and execute a prudent school program despite the pressures from fast population increases. It should also help the planners to look ahead in securing funds to run the district. Armed with such statistics as are found in this study, the school district, the state government, and the oil shale companies could hopefully work out a method of filling in the gap during the revenue-short period until the industry fully matures.

(99 pages)

CHAPTER I

INTRODUCTION

The United States has billions of barrels of oil locked up in shale deposits in the Green River formation. The oil shale area is approximately 16,000 square miles covering the connecting corners of Colorado, Wyoming, and Utah.

The techniques of taking oil from shale have been known for many years. As early as 1350 in Austria and 1918 in the United States, oil was produced from shale. In shale country approximately 129 billion barrels of this oil are found in currently mineable zones with more than 30 gallons per ton of shale. Although the United States holds a reserve of this shale which far exceeds the huge oil deposits in the Middle East in oil content, it does not now have a commercial shale oil industry of any size. Oil shale operations are already in existence in Brazil, the Union of Soviet Socialist Republic (USSR), and China. For at least 20 years the development of a commercial U.S. industry has seemed imminent, but various factors like cheaper crude oil sources, government indecision, and a tangle of claims and deals have kept the oil in the shale until today.

The so-called energy crisis of the past three years has brought oil shale back into the limelight again. Almost 30 major oil companies are seriously involved in shale oil projects. The incentive for shale oil development has not really changed but rather has taken a new twist. Historically, oil shale production has come to the brim of development when a growing demand for oil has coincided with a diminishing supply of domestic crude sources. Presently national demand cannot be satisfied with domestic supplies at current prices. But foreign suppliers cannot always be depended upon. They have suddenly recognized the amount of political and economic power they could exercise with their oil and do not hesitate to use this weapon.

This power exercised by exporting nations has driven the price of oil to a level where many experts consider shale oil development an economical venture. Moreover, a realization of the implications of energy resources as an economic and political weapon has instilled in the minds of many a desire for national self sufficiency in energy. Oil shale seems to have an important role to play in satisfying the desire for self sufficiency. The United States government has therefore opened up tracts of land via public lease sales to private firms for prototype commercial development projects.

For the people living in these shale areas, energy development will bring many far-reaching social and economic impacts. Because of this energy activity already occuring as well as anticipated oil shale activity, development of the economy of the Uintah County has taken a new turn. Both commercial and residential construction activities are proceeding at alarming rates. There is a boom in housing as well as a big demand for other types of real estate (office space, warehousing, commercial space). Some chain stores are moving into the area and the businesses that are here are real busy.

The establishment of a new industry in a community has both social and economic aspects. The incidence and magnitude of those impacts, however, depend on the kind and size of industries and vary with certain characteristics of the community. The economic effects of a new industry on households and business firms in the region depend on product demand and factor demand characteristics of the industry. With the oil shale industry in mind it is expected that the major economic effects will result from factor demand characteristics of the industry rather than demand characteristics of the products. Energy is rarely consumed at the source of production and so sales of petroleum produced and sold in the country will have only minor impacts on the local economy and the community. However, the magnitude of the effect of the factor demand characteristics of shale oil development depends on the ability of the people in the county to supply the factor inputs demanded by the industry.

Uintah County is expected to house a large proportion of the needed labor. The direct effect of shale oil development in the county would be those changes in household and business income associated with the employment of a household member at the new plant.

The particular interest of this thesis is to ascertain the impact of shale oil development on the Uintah School District. The objectives are:

1. To describe existing primary and secondary school facilities and staff in the Uintah District.
2. To project expected increases in school population resulting from oil exploration and development and the facilities required.
3. To estimate the cost of alternative ways of providing the needed facilities.
4. To study the taxing capacity of the District and its ability to provide these facilities.
5. To estimate the economic consequences of premature shutdown of the oil shale plant.

CHAPTER II

DESCRIPTION OF THE IMPACT AREA

Physical characteristics

The Uintah Basin is a structural depression comprised of the lowland stream bottoms and badlands country tying between the Uintah range and the Tavaput Plateaus. The Uintah Mountains, 150 miles in length, are the largest individual east-west range in the western hemisphere and contain the highest elevations in Utah. To a naturalist, the region is a marvel. The stranger, however, sees it as a strange land, a chaos of rocks, hills, buttes, badlands, valleys, canyons, benches, foothills, and mountains. However, the practical man sees the billions in money value in its gilsonite, asphalt, and other hydrocarbons, in its prospects of great oil wealth in the forests and minerals of its mountains, and its great engineering possibilities to provide water for the desert and other sources of wealth and progress. (Cook, 1914)

Development of these sources of wealth has been very slow because of lack of power and water that would support large industrial concerns--a situation now partially remedied by the Upper Colorado River Storage Project. Up to this point in time the Basin can be characterized as an agricultural region with cattle, sheep, and dairy products augmented by lumbering, mining, and oil industries. Between 1888-1901, mining was chiefly confined to gilsonite until the development of vast phosphate deposits began early in 1961, 13 miles east of Vernal.

With the energy crunch, large deposits of hydrocarbons are distinct development possibilities. There is now a call to review the profitability of shale oil extraction. The largest deposit by far is in the Green River formation of Colorado, Utah, and Wyoming. It is the greatest known concentration of hydrocarbons in the world, dwarfing even the huge oil pools of the Middle East.

About 77 percent of the known commercially exploitable Green River oil shale (Ritzma and Seeley, 1969) is on federally owned land. The other 23 percent is owned by the states or is owned or leased by oil companies. Since 1930, the federal oil shale lands have been closed to mineral leasing by executive order. The technological advances of the past few years have stimulated increased interest in these lands and strong pressure is being put on the Department of Interior to open them up to leasing.

The principal oil shale beds in the Uintah Basin are found in the Parachute Creek member of the Green River, the formation which underlies virtually the whole Uintah Basin. The richest is called the Mahogany bed estimated to contain 31 billion barrels of recoverable oil in the Dragon Bonanza area alone. (Cashion, 1967). Estimate of oil yield is about 120 billion barrels. (Donnell, 1954).

Climate

Uintah County occupies most of the eastern portion of the Uintah Basin. The richest oil fields in Utah are in Uintah County and all the leases are within the county. Uintah County comprises an area of 4,476 square miles with an average altitude of about 5,500 feet. The climate of the Uintah County is classified as semi-arid to arid because of limited precipitation and high evaporation. The average annual precipitation is 8 inches per year. About one-half of the precipitation which falls in the valley is in the form of snow. The average annual temperature is 46^{o} F. The mid-summer maximum is in the region of 90^{o} F. while the mid-winter maximums are in the neighborhood of 0^{o} F. The daily temperature range is about 30^{o} and constant during the year. (Pruit, Jr., 1961)

The average length of the growing season is 119 days. Because of the shortness of the growing season, the variety of crops which may be grown is very limited. Lands in the county are classified as thin and poorly developed, low in organic matter, and high in minerals. In light of these poor characteristics--topographic extremes, poor quality soil, and climatic conditions, the county is restricted to the grazing of livestock and wildlife, irrigated agriculture, outdoor recreation, and minerals development.

Population characteristics

Based on data collected by the U.S. Bureau of Census, the population of Uintah County has increased continuously since settlement in the 1880's. This increase continued through 1963 when a high of 13,000 was reached. Since then, however, the population fluctuated around 12,500 until 1971 when a noticeable upward trend began. (Vernal City Planning Commission, 1970)

A closer look at the census figures indicates that since 1950 the population of Uintah County has had an increase of about 1,200 people. Vital statistics, however, show that over this same period the county has had a net "natural" increase of about 5,500. The amount of growth in the county has not been equal to the natural increase until 1970. The county was therefore an outmigration region (Table 2). Of course, the heavy population growth since 1970 has reversed this trend and Uintah County is now an immigration region.

Table 1. Population of Uintah County (1960-1974).

Year	County Population	Percent Change
1960[a]	11,582	1.2
1961	11,900	2.7
1962	12,700	6.7
1963	13,000	2.3
1964	12,500	3.8
1965	12,700	1.6
1966	12,300	-3.1
1967	12,500	1.6
1968	12,300	-1.6
1969	11,800	-4.1
1970[a]	12,684	6.8
1971	13,200	4.1
1972	14,200	7.5
1973	15,200	7.0
1974	16,000	5.3

[a]Census figures.

Source: Statistical Review of governments in Utah 1960-1974.

Table 2. Natural and actual population change in Uintah County, 1950-1970.

	Population		Natural Increase			
	Number of people	Actual average anl. inc.	Avg. births per yr.	Avg. deaths per yr.	Avg. annual nat. inc.	Avg. net migration
1950	11,300	40	328	76	252	-212
1960	11,582	128	395	85	310	-182
1970	12,477	89	327	245	92	-3

Source: Comprehensive Plan-Uintah County, Vernal City Planning Commission, July 1970.

The age distribution of Uintah County's population was and probably is now slightly younger than that of Utah and the U.S. According to the 1960 U.S. census of population, slightly more than 55 percent of the county's population was under 25 years compared to a Utah figure of 53 percent and a U.S. average of 45 percent. This young age can be a result of a combination of the outmigration of the working age groups and high birth rates.

Table 3 shows a decrease in the population of the age groups 15-24 from 1960 to 1970. In 1950 this age group was 16.1 percent of the total, was 14.5 percent in 1960 and was only 10.4 percent in 1970 which indicates heavy outmigration of this age group apparently after high school.

In 1970, the Uintah Basin planning district (Uintah, Duchesne, and Daggett Counties) accounted for only 2 percent of Utah's population. from 1960-1970, the population increased about 750, but total employment actually decreased by 200 jobs. Nonagricultural jobs grew at about 2.1 percent per year (100 jobs), but this was more than offset by the

Table 3. Population under 25, Uintah County, 1950-1970.[b]

Age Group	1950	Percent of Population	1960	Percent of Population	1970	Percent of Population
Under 5	1,460	14.2	1,758	15.2	1,378	10.8
5-14	2,542	24.7	2,957	25.5	3.314	26.1
15-24	1,654	16.1	1,677	14.5	1,318	10.4
TOTAL	5,656	55.0	6,392	55.2	6,010	46.3

[b]Characteristics of the Population, Utah 1960-1970.

declining agricultural employment. Prior to 1960, agriculture accounted for about 1,000 jobs annually, the greatest number contributed by any individual industry. In the following ten years, agriculture declined both absolutely and relatively and was surpassed by mining in 1960. With a relatively high level of education attainment and job skills that tend to be a concomitant of education, the people of Uintah County did not seem to be able to find employment in the local economy and so have moved away.

Average numbers of persons per household has always been higher for Uintah County than for the state. However, average family size is declining, following the trend in the nation as well as in the state, a situation that has contributed to the low forecasts in school enrollment throughout the nation. This decline in persons per household is shown in Table 4.

Population projections including school enrollment projections have been made for Uintah County by many population experts. It is clear that Uintah County was regarded by all the experts as an out-migration region. Examples of such forecasts are those made by the sociology department at Utah State University contained in Table 5. Other forecasts for Uintah County project a downward trend in school enrollment. (Tables 6 and 7).

Table 4. Persons per household - Utah, Uintah County, and the U.S., 1930-1970.

Year	Person per Household[b]		
	Uintah[a]	Utah	U.S.
1930	4.5	4.1	4.1
1940	4.4	4.0	3.8
1950	4.1	3.6	3.4
1960	4.1	3.16	3.3
1970[b]	3.1	3.19	2.40

[a]Comprehensive Plan-Uintah County, Vernal City Planning Commission, July 1970.

[b]Characteristics of Population, U.S. Census of Population, Utah 1950, 1960, 1970.

Table 5. Population estimates for Uintah County. (1960-2000)[a]

Year	Projected Population
1960	13,000
1970	20,000
1975	15,000
1980	16,000
2000	25,000

[a]Black, T. R., J. J. Rasmussen and Frank Hackman. 1967.

Table 6. School age projection, Unitah County, 1970-2000.[b]

Year	1960	1970	1975	1980	2000
Number	3,933	5,520	4,700	5,120	5,240

[b]Black, Therel R., et. al., 1967.

Table 7. Projected school enrollment for Uintah School District, 1970-1980.[a]

Year	Projected School Population
1970	4,130
1971	4,065
1972	4,000
1973	3,935
1974	3,870
1975	3,803
1976	3,709
1977	3,615
1978	3,521
1979	3,427
1980	3,335

[a]Kim, Yum and M. MacFarlene, 1975.

Description of schools

In doing their study, Black and his associates had anticipated oil shale development in the Uintah County about the year 2000. In contrast to Table 7, Table 6 anticipates a slightly growing school enrollment in the district after 1975. However, with the anticipated decline in birth rates, school enrollment was not projected to grow as fast as population. The continued decline in enrollment shown in Table 7 is a result of county outmigration trends and the national trend in the decline of births. Compared to present school enrollment in the Uintah School District, both projections have underestimated the growth in school enrollment.

Utah ranks high in the country in educational attainment. The people of Utah have carried a heavy educational burden in terms of the percentage of family income spent for education. For the past 20 years, the population of Uintah County has become better educated. In 1940, 27 percent of the population had completed four years or more of high school. By 1950, this number had increased to 38 percent, rising to 47 percent in 1960. By 1970 the median number of school years completed was 10.6 in the county and 12.00 in the city of Vernal.

In terms of public investment schools are probably the county's most important public facility. Eight public schools are operated in Uintah County: five elementary, two junior high schools, and one high school. Following the trend of growth in school building to 1971, it was estimated that with a capacity for 4,800 students, Uintah School District would have enough facilities to provide for the county's educational needs for the next 15 years. This estimate was made on the expectation that the Uintah School District would continue to be an outmigration region. It is very clear now, however, that since 1970, Uintah County has become an immigration region as a result of the many energy development projects going on in the county. Already, the 4,800 projected school capacity need is below existing requirements.

School enrollment has grown from 3,765 in 1960 to 4,781 in 1974. (Table 8). For the first ten years after 1960, there was an average increase of 56 pupils per year. After 1971, growth in Uintah County that is energy related has produced an increase of about 87 pupils per year.

The school district owns a total of 155 acres of land. The oldest school was built in 1940 and the newest in 1967. The size, age, and capacity of the school facilities are as shown in Table 9.

At the moment, 133 of the 155 acres of school district land are being used. The Whiterocks and LaPoint elementary schools are presently not being used. All the county schools are within a 28 mile radius.

Quality of education is hard to define, but judged by some general criteria, the Uintah County School District seems to provide about an average quality education for the state. Quality of education is related to the costs of operation, program breadth, teacher preparation, efficiency of operation, tax levies, and assessed valuation for school support. Since 1960, the costs of operating the district have increased. In 1960, the total real cost per pupil was $359, rising to 873 in 1973 (see Table 11) even though program breadth has not changed much. (Boren, 1974) The district offers just the minimum for high school graduation, since there are not enough students to justify the facilities required for broader programs. The average number of courses offered by the district is 98--33 per grade. The high for Utah is 171 and the low is 35.

All the teachers in the county have had four or more years of university education, and none is required to teach out of his field of specialization. Assessed valuation in the school district continues to increase with the increase in enrollment. In 1960, the assessed valuation in the district was $23,296,607, but had risen to $41,810,862 in 1973. Average valuation per student, therefore, has risen from $6,026 in 1960 to $9,042 in 1973.

After a rise in tax levies between 1960 and 1965, the mill levies since have fluctuated between 43 and 45. Trends in the average property mill levies and assessed valuations are presented in Table 10 and the expenditure per pupil in Table 11.

Although the assessed valuation of property in the school district has continually grown, the faster growth between 1970 and 1973 is due to the growth of the oil industry. The other significant thing about the data in Table 10 is the apparent reversal in the trend of the mill levy. The direction was up until 1972, but it came down in 1973. Whether this decrease continues would seem to depend on the timing of changes in school enrollment vis-a-vis changes in the assessed valuation of property.

Table 11 shows some of the characteristics used in judging efficiency of operation of school districts. The table indicates a continuous increase in expenditure partly due to inflation and partly due to higher real costs and more expensive programming. Except for a few years (e.g. 1969) capital expense is not nearly as important as current operating cost in the total district budget.

The important question for the district is to project school enrollment and make sure that the facilities can be secured when they are needed. It appears that another question for the district is, can the curricula of the schools be altered to better prepare the young population for jobs which will be offered by the energy industry? The district officials and the citizens have to recognize that the available jobs in an oil shale operation will require skills which their young people do not have and skills which are not easily acquired. The great challenge including those of providing funds for increased school enrollment, public services, and a host of other things, is for educational institutions to work closely with the oil people and leaders in the district to determine when workers with various skills will be needed and to determine what can be done locally to help insure that the supply of labor to the oil companies will be available when needed. Unless careful planning is undertaken by the district in curriculum development, the jobs arising from Uintah County's shale oil development will be taken by people from other counties.

Table 12 shows total expenditures and per student costs for the Uintah School District for the period 1960-1970. Instructional salaries constitute 60 percent of educational expenses over the entire period and are relatively stable from year to year. The next highest figures are for operation of the school plant, pupil transportation, and fixed charges. The ranks of these categories change somewhat over the period, but they are not nearly so important as instructional salaries.

Table 8. School enrollment, Uintah County District, 1960-1974.[a]

Year	Enrollment	Elementary	High School
1960-61	3,765	2,887	878
1961-62	3,899	3,057	842
1962-63	4,230	3,241	989
1963-64	4,432	3,372	1,060
1964-65	4,407	3,256	1,151
1965-66	4,453	3,266	1,187
1966-67	4,453	3,272	1,181
1967-68	4,455	3,274	1,147
1968-69	4,328	3,149	1,179
1969-70	4,326	3,119	1,207
1970-71	4,433	3,225	1,208
1971-72	4,528	3,276	1,252
1972-73	4,588	3,442	1,146
1973-74	4,781	3,442	1,339

[a]Utah State Board of Education, "Reports and Recommendations for the Utah Public School System." 1960-1974

Table 9. Size and capacity of school facilities, Uintah County, 1972-73.[a]

Name	Site Size	Suggested Standard	Year Constructed	Enrollment	Existing Capacity
Todd	25 acres	8	1957	525	360
Maeser	10 acres	6	1910	397	360
Central	4 acres	11	1940	452	510
Ashley	25 acres	11	1957	694	600
Naples	20 acres	8	1969	467	300
Vernal J.H.	27 acres	27	1967	933	960
West J.H.	25 acres	22	1963	249	360
Uintah H.S.	32 acres	37	1954 1965	690	900

Source: Uintah School District.

Table 10. Assessed valuation and mill levy, Uintah County, 1960, 1970-1973.

Year	Mill Levy	Assessed Valuation (dollars)
1960	36.77	23,296,607
1970	43.85	34,579,574
1971	44.97	35,182,665
1972	45.22	36,103,128
1973	43.98	41,810,862

Source: Statistical Review of Government in Utah. Utah Foundation Report 1960-1973.

Table 11. Expenditure per pupil, number of teachers and pupil-teacher ratios in Uintah School District, 1960-1973.

Year	Number of Teachers	Pupil-Teacher Ratio	Expenditure per Pupil (dollars)			
			Capital	Current	Total	Real Cost[a]
1960	120	27.4	15	336	352	352
1961	123	28.4	141	318	459	454
1962	136	27.8	74	345	419	410
1963	152	26.4	126	382	508	492
1964	164	24.4	95	427	522	499
1965	166	24.2	114	431	545	511
1966	177	24.4	150	567	606	553
1967	172	23.3	168	499	666	591
1968	173	22.9	191	549	740	630
1969	168	23.7	417	575	991	801
1970	162	24.8	208	631	839	640
1971	161	25.1	73	651	727	531
1972	161	25.6	53	692	745	528
1973	172	24.4	155	763	919	613

Source: Statistical Review of Government in Utah. Utah Foundation Report 1960-1973.

[a]Based on value of U.S. dollar 1960 = 100.

Table 12. Utah State Board of Education Ten Year Summary of Expenditures.
Total Expenditures, Percentages, and Per Student Cost: UINTAH 1960-1965

Expenditures for	1960-61	1961-62	1962-63	1963-64	1964-65
Administration	$ 42,132	$ 43,842	$ 49,404	$ 50,040	$ 48,183
% of Current Expense	3.85%	3.41%	3.25%	2.93%	2.77%
Per Student Cost: ADA	12.03	11.59	12.33	12.46	11.97
Instructional Salaries	704,211	821,509	958,073	1,129,992	1,112,830
% of Current Expense	64.32	63.88	63.12	66.19	64.09
Per Student Cost: ADA	201.09	217.22	239.10	281.44	276.48
Other than Salaries: Instr.	57,647	74,872	87,746	71,564	115,173
% of Current Expense	5.28	5.82	5.78	4.19	6.63
Per Student Cost: ADA	16.4[illegible]	19.80	21.9[illegible]	17.82	28.61
Attendance Services	--	--	--	--	--
% of Current Expense					
Per Student Cost: ADA					
Health Services	4,1[illegible]	5,189	5,745	7,237	7,149
% of Current Expense	.37	.40	.38	.42	.41
Per Student Cost: ADA	1.17	1.37	1.43	1.80	1.78
Pupil Transportation	77,469	87,818	99,078	99,615	118,516
% of Current Expense	7.08	6.83	6.53	5.83	6.83
Per Student Cost: ADA	22.12	23.22	24.73	24.81	29.44
Operation of School Plant	96,205	110,526	123,815	139,444	144,039
% of Current Expense	8.77	8.60	8.16	8.18	8.30
Per Student Cost: ADA	27.47	29.22	30.90	34.73	35.79
Maint. of School Plant	38,546	52,265	62,794	61,986	45,505
% of Current Expense	3.52	4.06	4.14	3.63	2.62
Per Student Cost: ADA	11.01	13.82	15.67	15.43	11.31
Fixed Charges	74,544	90,007	131,203	147,398	145,049
% of Current Expense	6.81	7.00	8.64	8.63	8.35
Per Student Cost: ADA	21.29	23.80	32.74	36.71	36.04
TOTAL CURRENT EXPENSE	1,094,853	1,286,030	1,517,855	1,707,274	1,736,445
% of Current Expense	100.00%	100.00%	100.00%	100.00%	100.00%
Per Student Cost: ADA	312.64	340.04	378.80	425.20	431.42
Other Programs (900-1400)	13,319	22,016	26,582	24,854	23,563
Per Student Cost: ADA	3.80	5.82	6.63	6.19	5.85
TOTAL EXPENDS. M&O FUND	$ 1,108,172	$ 1,308,046	$ 1,544,437	$ 1,732,129	$ 1,760,008
Per Student Cost: ADA	316.44	345.86	385.43	431.39	437.27
Average Daily Attendance (Students, not money)	3,502	3,782	4,007	4,015	4,025

Utah State Board of Education Auxiliary Services.

Table 12 (continued). Utah State Board of Education Ten Year Summary of Expenditures. Total Expenditures, Percentages, and Per Student Cost: Uintah 1965-1970.

Expenditures for	1965-66	1966-67	1967-68	1968-69	1969-70 (est.)
Administration	$ 56,356	$ 57,959	$ 71,864	$ 66,906	$ 67,685
% of Current Expense	3.03%	2.91%	3.32%	2.97%	2.91%
Per Student Cost: ADA	13.83	14.47	18.18	16.80	16.64
Instructional Salaries	1,195,478	1,297,201	1,368,300	1,420,492	1,445,370
% of Current Expense	64.29	65.16	63.25	63.15	62.09
Per Student Cost: ADA	293.44	323.90	346.23	356.64	355.39
Other than Salaries: Inst.	128,952	119,436	112,978	108,063	128,317
% of Current Expense	6.93	6.00	5.22	4.80	5.51
Per Student Cost: ADA	31.65	29.82	28.59	27.13	31.55
Attendance Services	--	--	--	--	--
% of Current Expense					
Per Student Cost: ADA					
Health Services	8,235	8,171	8,535	10,490	9,468
% of Current Expense	.44	.40	.40	.47	.41
Per Student Cost: ADA	2.02	2.04	2.16	2.63	2.33
Pupil Transportation	108,193	110,994	119,244	130,969	139,928
% of Current Expense	5.82	5.58	5.51	5.82	6.01
Per Student Cost: ADA	26.56	27.71	30.17	32.88	34.41
Operation of School Plant	158,852	169,760	183,775	193,163	192,812
% of Current Expense	8.55	8.53	8.49	8.59	8.28
Per Student Cost: ADA	38.99	42.39	46.50	48.50	47.41
Maint. of School Plant	40,872	52,868	73,664	53,175	68,524
% of Current Expense	2.20	2.66	3.41	2.36	2.95
Per Student Cost: ADA	10.03	13.20	18.64	13.35	16.85
Fixed Charges	162,552	174,294	225,042	265,992	275,600
% of Current Expense	8.74	8.76	10.40	11.84	11.84
Per Student Cost: ADA	39.91	43.52	56.93	66.78	67.76
TOTAL CURRENT EXPENSE	1,859,491	1,990,682	2,163,401	2,249,249	2,327,704
% of Current Expense	100.00%	100.00%	100.00%	100.00%	100.00%
Per Student Cost: ADA	456.43	497.05	547.42	564.71	572.34
Other Programs (900-1400)	35,691	33,543	43,841	60,317	141,976
Per Student Cost: ADA	8.76	8.38	11.09	15.14	34.91
TOTAL EXPENDS. M&O FUND	$ 1,895,182	$ 2,024,225	$ 2,207,215	$ 2,309,566	$ 2,469,681
Per Student Cost: ADA	465.19	505.43	558.51	579.85	607.25
Average Daily Attendance (Students, not money)	4,074	4,005	3,952	3,983	4,067

Utah State Board of Education Auxiliary Services.

CHAPTER III

LITERATURE REVIEW

Education is a very significant sector of the national economy. A high percentage of national and state public funds go into education every year. For example, of the $80 million increase in state funds approved by the legislature in Utah for 1975-76, 63 percent will go into education. (Utah Foundation Report No. 344) This has made the topic of allocative efficiency in resource use a fertile ground for many economists. In times of expansion, many local communities have found themselves unable to provide adequate educational facilities at the right time. Due to delays involved in raising revenues for such services, some districts may even find that the facilities provided are still inadequate by the time they are completed. Overbuilding, which may be even costlier than underbuilding, may result when projections of enrollments are inadequate or when school officials engage in wasteful programming.

Because education is such an important sector, economists have done considerable work in estimating the efficiency of resource allocation in the provision of educational services. Many problems are involved in appraising efficiency in education because schools are heterogeneous in curricula, programs, size, and structure; and because efficiency norms are difficult to apply, schools are probably as different as there are districts in the nation.

For example, the statistics of the forty school districts in Utah are highly variable. There are great differences in equipment, facilities, course offerings, auxiliary services, economy of operation, and efficiency of operation. However, in rapidly expanding communities, a pattern of problems does develop and impact studies on these communities are needed far in advance of actual growth to help these communities accommodate to their growing population.

Hirsch's study, entitled "Fiscal Impact of Industrialization on Local Schools," attempted to determine if a given local industrialization development increased or decreased the net fiscal resources available to schools in a region. (Hirsch, 1964). He used the "net fiscal resources status" concept. This concept makes an understanding of the fiscal position of a region possible without reference to identifying the individuals who bear the burden or who receive the benefits.

His model consists of two components--a regional input-output analysis and fiscal calculations applied to the St. Louis Standard Metropolitan area. He learned that in terms of employment the less capital intensive industries made more population impacts than those more capital intensive. Petroleum and coal industries, known for their capital intensive production methods, made the least population impacts. These two industries which had the least employment impact, however, had the greatest income impact per family employed.

As would be expected the industries with the greatest employment impacts also had the greatest residential impacts. Increases in industrial and commercial property values varied relatively little among industries. If full employment and full plant utilization are assumed, a given increase in final demand tends to bring about a greater variation in newly generated residential than industrial and commercial property tax receipts. The increased revenue from new residential property values exceeded that from industrial and commercial property by a substantial margin except for the petroleum and coal industries. Considering the effects on annual costs, Hirsch found that while the high employment impact industries stimulated large expenditures, the petroleum and coal industries generated very minimal costs to school districts.

Concluding, he asserts that this case study confirms the claim that industrialization on the average improves the fiscal health of a school district, but only if state aid is included as a revenue source. He further calls for a rejection of the hypothesis that local industrialization always improves the net fiscal resource status of the district.

It thus appears that oil shale projects will produce a net positive effect on the fiscal health of the Uintah School District. Being a capital intensive industry and requiring skilled labor, average salary per worker is high. But it is also true that the value of industrial and residential property can be expected to increase, driving up the assessed valuation in the district.

Smith, Hogg, and Reagan (1971) in their analysis of the impact of a multiple purpose water resource development project in Sweet Home, Oregon studied the problems faced by developing communities. They argued that economic development is regarded by many as desirable. It is particularly regarded as a panacea for underdeveloped areas. Spurred by the hope of a growing economy, many development projects are begun without a careful balance of local expenditures and benefits. Rather, most of the projects are justified on national or regional basis without enough consideration of the counties and districts who have to bear the cost of development. They disclose that in the West where population is scattered, most economic developments bring in large numbers of construction workers. The construction phase of the projects often brings significant but short-lived expansion which declines as construction wanes. The local residents usually have to pay the cost of providing additional services for these migrants.

The Smith et al. (1971) study attempted to determine the effects of the construction project. The time profile of the costs of school and municipal services was correlated with the profile of the construction project itself. The results indicate that the people of Sweet Home bore most of the cost of providing school services for the children of the construction workers. The expectation of many that the post-construction economic growth would help with these costs did not materialize. For one reason, many of the construction workers came from other areas--an immigration which started as soon as the knowledge of the prospective construction project spread (as early as three years before the work got underway). Many of these migrants did not get a job but still stayed in the area. The direct effect of the project on the school system was an increase in population and then a decline to preconstruction population. There was an increase in educational quality as measured by student-teacher ratio and per pupil expenditure, but most of the added tax burden was borne by local residents through increased property taxes. Using the effective tax rate $\frac{\text{Property tax}}{\text{Value of property}}$ as an index of tax burden, they found that there was a slightly increasing tax burden for the residents of Sweet Home.

Leholm, et. al. (1975, p. 1) did a study on the fiscal impact of a new industry in rural areas, a case analysis of a coal gasification plant in North Dakota. They asserted that "Industrialization may be a fiscal detriment to local government if the revenues it produces are not as large as the additional service costs created by the industry and its employees." The aim of their study was to report on the development model for ex ante evaluation of the effect of a new industry on public-sector costs and revenues. The model employs an input-output interdependence coefficient matrix to trace interrelationships. The model has a cost and revenue timing feature built into it to reflect a situation in many communities where the need for increased expenditures arises long before the increased revenues for the same project become available. The model has two major components, regional input-output analysis and a set of cost and revenue estimates.

During the construction phase, state revenues were estimated to exceed state costs by more than $12 million. During the operation phase, annual state revenues were estimated to exceed costs by $45 million. However, local costs were found to be much more than local revenues during the period of plant construction even though local tax revenues were expected to increase due to the expanded tax base provided by new residents and businesses. Local revenues fell far short of the added expenses for schools, fire protection, and other public services, including capital improvements. During the construction phase, therefore, the net fiscal impact on the local government was found to be negative, running as high as a $1 million deficit annually. The position improves over the operation period, but does not become positive until the repayment of capital improvement bonds has been completed--a period of about 18 years. Over the long run, the net fiscal impact was estimated to be positive. The authors believe that their model could be adapted for potential impacts of an industry in a rural area.

A study entitled the Potential, Future Role of Oil Shale: Prospects and Constraints, was done by the Federal Energy Administration. (1974)

In order to assess the impact on school districts, the project was divided into three sections corresponding to mild, average, and intensive developments. From total population forecasts based on these classifications, the assumption of 1.2 school age children per family and 25 children per classroom were made.

A study of the impacts of the Kaiparowits project in southern Utah was done by the Center for Business and Economic Research at Brigham Young University. (1973) The aim of this study was to identify the economic benefits and costs of the proposed Kaiparowits generating station to be located in Kane County, Utah. In order to quantify the public and private facilities and services which would be required to support the construction and operation of the plant and mine, basic data on changes in population, employment, income, and other economic indicators were collected from government agencies and private research groups. For the school district, an inventory of existing educational facilities in the school districts of the area was taken.

The method used to project population was the cohort survival method which enabled the researchers to obtain a final age distribution of total population in each year examined. The final forecast and age distribution served as the basis for the determination of school facilities. In order to estimate building requirements, guidelines suggested by Mr. Harold J. Boyack, Assistant Superintendent of the Provo City School District were used. The figures used were 105 sq. ft. per elementary school pupil, 115 sq. ft. per junior high, and 120 sq. ft. per senior high student. Teacher requirements were estimated on the basis of 25:1 pupil-teacher ratio.

A study by the Colony Development Operation entitled, "The Environmental Impact Analysis for a Shale Oil Complex at Parachute Creek, Colorado," (1974) analyzes the impact in two phases of growth on the school districts. Phase I corresponds to the construction period when most of the workers are regarded as transient population, while during the Phase II or operational period the population is more permanent. In Phase I, a factor of one school age child per family was used to estimate the number of dependent children from kindergarten through 12th grade. The factor was arrived at on the assumption that the average household with 3.5 people has 2 adults and 0.5 children who are not yet in school or who have completed their high school education. This assumption was made after looking through the regional census of population, 1960-1970. This same factor is used to estimate the increase in enrollment during Phase II. However, in the projections for Phase I they assumed that a large percentage of the workers will not have families with school age children. Since the impact is going to be distributed between six school districts, different assumptions were made on the concentration of population.

Impact Analysis and Development Patterns related to an oil shale industry was the subject of a study done by THK Associates, Inc. (1974) Their assumption for the estimation of elementary school children was 175/1000 or roughly 17.6% of the population. They also assumed an average-sized elementary school to be 800 pupils and an average site size of 13 acres. For the total impact on school facilities, they had four assumptions:

(a) 1.5 school-age children per family.

(b) Construction employees: up to 20 percent would bring families in the first 6 years, up to 40 percent in years 7-10 and 60 percent in later years.

(c) Plant employees: 50 percent would bring families in the first 4 years and up to 80 percent later.

(d) Local service employees: 33 percent would bring families.

Using these assumptions, it was estimated that the total number of school children would grow from 161 in year 1 to 13,779 in year 14 in the three-county region. Incremental school rooms needed would increase from 5 in year 2 to 120 in year 14. To estimate the cost of providing these facilities, it was assumed a per pupil capital cost of about $2,000-$2,500 or $60,000-$75,000 per incremental 30 pupil classroom and $15,000 operating cost per classroom. No estimate was made of the revenues since the site of the oil shale development may well be in a district different from the greatest population impact. The study argued, moreover, that the lag in the revenue yield was more crucial than the revenue itself.

A tax lead time study of the oil shale region was done by the Regional Development and Land Use Planning Subcommittee of the Governor's Committee on Oil Shale Environmental Problems (1974) captioned "Fiscal Alternatives for Rapidly Growing Communities in Colorado." This group relied heavily on the information supplied by the development companies planning the first plants for cost data, plant size, number of employees, and construction workers and timing of completion. Based on these data, an estimated number of permanent and temporary employees and expenditure patterns and revenue needs were all projected. Estimates of population and fiscal impacts were also made for the school district using the same method as the THK Associates report. (1974)

It was concluded that counties with oil shale plants will eventually have revenues sufficient to pay for a reasonable level of urban services, but that there will be a time lag between expenditures necessary to service the increased population and the amount of revenues the local governments are able to collect from their present taxing procedures. After about 5-8 years, excess revenue will be collected but during the deficit years, increase in expenditures will have to be undertaken. The population increase was distributed among the school districts on the site of the proposed plant, and it was found that some districts which will not gain additional revenue from the shale project may be called upon to bear some of the burden in providing facilities for growth. This study suggested a form of combined regional planning so that revenues are distributed equally to affected areas. A case like this is an example of what could apply in the Uintah Basin. While there is every evidence that the oil industry revenue impact will be felt directly by Uintah County, Duchesne County particularly and Daggett County to a lesser extent are already bearing some of the cost of population pressures. Perhaps a reorganization or a consolidation of the three school districts could reduce costs and increase the efficiency of revenue use.

Monachi and Rahe (1974) in their study of The Social and Economic Needs Created by the Proposed Craig Power Installation in Colorado noted that the school district will have to bear the largest costs of the expanding population because revenues will be very low early in the project when much of the capital is needed for expansion. However, the annual property tax due just to the plant and plant-related housing and commercial activity in 1979 is expected to be greater than the total operation and capital cost needs in the slow periods when much capital investment is being made and little revenue is coming in. Monachi and Rahe suggest that what is needed is a temporary source of funds for a 3 or 4 year period while school construction and operating costs rise rapidly. The number of school-age population was derived from a total population projection of the study area using the cohort model.

In forcasting population associated with shale oil development, it is difficult to estimate the exact rate of population buildup in local service employment. This depends on the size of the population multiplier. The estimates are also subject to changes in plans by the oil companies due to changes in the economics of oil production and changes in mining and processing technology. Also, changes in the other competing sources of energy will affect these plans and projections. The chain of causation is a shift in basic employment, which causes a change in local service employment, to a change in population, and consequently to a shift in school enrollment.

Once school enrollment is estimated there must be an estimate made of needed school facilities. Schools come in various sizes and vary also in construction materials. This raises the issue of costs per pupil and the size of the school. Another issue is whether existing school facilities can be added more cheaply than building a new school from scratch. There are many studies on the economic efficiency of public education use cost functions and average daily attendance. A review of these studies will be made next.

When school size is measured, it should be measured in terms of the adequacy of desired programs and services. In measuring scale, the aim should be to find the size that would provide a quality educational opportunity for all school children. The economic problem then becomes one of supplying a given educational program at minimum cost or improved programs for the same cost.

Utah has been in the forefront in the nation in using school consolidation as a means of capturing economies of scale in the provision of educational facilities. For example, as early as 1915, Utah had reduced its number of school districts from 380 to 39. The United States reduced its district numbers from 100,000 to 18,000 by 1945. (Boren, 1974)

Whether or not these consolidation programs have been a success is a matter of opinion. The level of local school expenditures depends to some extent on local taxation. Since the expenditure on local public schools is responsive to the preferences of individual citizens, a voter's reaction to a spending proposal very likely depends on the amount of extra taxes he is asked to pay. There are many districts where the citizens have been willing to pay higher taxes in order to maintain and improve the level of their educational offerings.

In his study of School District Reorganization in Utah, Boren (1974) listed many reasons why people resist reorganization and consolidation: 1) in addition to the fear of parents that the youth will leave the supervision of parents too early and come back too late because of long distance bus travelling; 2) there is a mistaken idea that the rural or small village school is "the last bulwark of democracy" and that to preserve it, each existing school must be independent. All in all, Boren argues that most of the reasons given against consolidation are traditional and emotional and do not take account of the potential advantages.

The problem in providing quality education at reasonable cost is to identify that point or that range in the average cost curve of providing educational services which minimizes the limitations of both smallness or bigness, one which maximizes the returns to investment of human and material resources in the achievement of identified educational goals. This search for efficiency has been going on in Utah as early as the organization of the state in 1896. The first reorganization of districts to provide better schools occurred in 1878 when Territorial Governor Emery recommended that School Districts within city boundaries by reorganized into one. (Boren, 1974) Further, in 1898, Superintendent Park suggested that small districts be abolished, that responsibility be more clearly defined, and that schools be set up on an economic basis because there was "the tendency for many school trustees to be parsimonious where they should be liberal, and lavish to wasteful where the strictest economy should be exercised. . ." (Boren, 1974. P. 5)

Since the provision of public education has been an important segment of the Utah economy, a review of some economic studies of allocative efficiency in education follows.

W. L. Hirsch's (1960) study of "Determinants of Public Education Expenditures" in St. Louis city area concluded that the most significant single determinant of the level of current expenditures in a school district is the average assessed valuation per student in average daily attendance. Another finding of this study is the absence of significant economies of scale in the school districts tested. While a better understanding of the determinants of public school expenditure is necessary, Hirsch suggests that state payments to support school districts which mainly rely on per pupil subsidy payments, should be based on payments which are inversely related to the district's fiscal ability.

Another study by White and Tweeten (1960) on the "Optimal Size of School Districts in Rural Areas" estimated the long-run average cost of elementary and secondary education for various student densities. The statewide survey of the Oklahoma State Department of Education measured school programs, student backgrounds, and student attainment. Variables tested were:

(a) Instructional expenses holding quality constant.

(b) Overhead administration, plant operation, and maintenance.

(c) Educational facilities: expenditure for general construction, installation of fixtures, furniture and furnishings.

(d) Transportation (no student can be in transit for more than one hour).

White and Tweeten (1960) concluded from this study that differences in school curriculum and student density cause significant differences in optimal size and minimum attainable costs.

Another study by Wales (1974) on public schools in British Columbia estimated the extent that school size affects the cost of providing some "standard" program at the elementary and secondary schools. He was able to conclude that, in absolute terms, reduction in salary costs per pupil arising from differences in the student/teacher ratio is the major factor contributing to declining average operating costs as school size increases. On the district level enrollment affects per pupil operating costs of the district administration. Average costs decrease with district size but at a sharply decreasing rate for all except the largest school district which showed an upturn in its average costs.

A study by Williams (1973) tried to find transportation and public service costs for rural communities of various sizes. The services considered are fire and police protection, sewage and garbage disposal, recreation, education in public schools, highways and streets and health and hospitals.

Stepwise regression analysis was utilized using total expenditures per student as the dependent variable and average daily attendance as the independent variable. The district size at which cost of education was minimized was calculated. Also the size of city that would support that size of school district was also estimated. According to this study, the size of school district that will minimize the cost of education per student was 35,680 students while the size of a city that would support that size of district was approximately 130,000. The study also found that the size of an individual school which could function at the least cost per student was 560 students.

There are many factors that affect educational needs and costs of public schools:

(a) Growing vs. Declining Population

The needs of a growing population are different from those of a declining population in any given area. In a declining population area, the gross per capita cost of education will not increase as sharply as in rapidly growing areas since those areas tend to have few special programs and services compared to the broad programs of fast growing school districts. The Uintah School District, for example, does not offer programs of as much scope and variety as do the larger districts in the state.

(b) The age characteristics of the population.

The age characteristics, along with trends in birth rates, have a direct impact on whether schools are a financial burden. In communities with comparatively more old people of about 50 or over, there may be an increasing demand for various adult education programs that compete with education for the available tax money. Besides, these older residents may not have as much interest in schools and school support as they did in their younger child-bearing ages.

These two and other factors like mobility of population, socio-economic characteristics of the population all affect the need and cost of education in special ways.

In order to provide "equal" education for all youth, the economic structure on which taxation depends needs to be reexamined and consolidation of inefficient school districts and school centers stepped up. In order to equalize educational funding, a few points need to be considered:

(a) Differences in the ability and capacity to raise educational fund.

(b) Needs of youngsters and expenditures to meet these needs.

While some districts have an adequate tax base to support schools, the tax base in some districts is inadequate to meet educational needs. The Uintah School District presently seems to fare between these two extremes.

As Hirsch (1960) noted in his study, an equalization plan should have an inverse relationship with ability of the school districts to pay rather than on per pupil subsidy payments. This can be done by providing more state funds per pupil for those districts of less wealth. Actually, full state funding comes the closest to achieving complete equalization. There are plans to approach this method of equalization in Utah. State funds are to be allocated to districts to fill the gap between locally raised funds and the support the state deems necessary for each pupil.

Three types of equalization plans are: those with complete state support; those with joint state/local support; and those with complete local support. The model of school support that is being used in Utah is the type with state/local support. The most commonly used method for apportioning state school funds is the Strayer-Haig formula. Under this formula, the cost of the foundation which the legislature desires to guarantee for each district is computed and from that cost is deducted the amount of funds which each district can raise locally through a minimum required local tax effort and the difference is allocated to the district from state funds. The most critical element of this model is the degree of required local effort and the amount of local leeway permitted. As there is no leeway in Utah in levying taxes, the Strayer-Haig formula is used on the basis for state allocations which brings each district up to the accepted state level of school finance.

In the Uintah District, allocation of funds based on the state/local effort will definitely help in the provision of facilities for the growing population. With increase in school enrollment, the school district can now afford to offer special new programs without necessarily incurring additional costs to the school district. With the coming of the oil industry, courses like welding, fitting, and other shop courses will likely be in demand, so the district can afford to offer these programs. Also, college oriented courses like languages and advanced mathematics and career oriented courses can also be offered to the students at normal costs.

The state of Utah uses the joint state and local method to provide "equal" education opportunities for her youth. However, if a district grows faster than its property valuation, the result is often inadequate tax collection and consequently a financially starved educational community. It is important therefore that estimates of Uintah District growth be made as closely as possible and financial possibilities due to the shale oil project be well evaluated. The remainder of this thesis is an estimation of school enrollment increases, the costs of education requirements, the growth in property valuation and consequently the increase in school revenues for the district.

CHAPTER IV

POPULATION AND SCHOOL ENROLLMENT PROJECTIONS

Introduction

Estimates of future school population are vital for administrators who have to provide facilities and programs for education. The demographic factors affecting school-age population are fertility, morality and migration. School enrollment at any given time is a function of fertility some six years before and earlier, less the intervening deaths of school-age children and plus or minus the migration of children in the period. (Phillips, 1966)

Population projections

Utah's net migration from 1900 to 1910 was a net 24,000 people inflow while between 1920 and 1930, and 1930 and 1940 Utah lost more than 30,000 people through outmigration. During the last census period (1960-1970), Utah gained 997 people. These fluctuations cause changes in the population structure both in the number of school-age population and in the number of women of child-bearing age.

There are several methods of estimating future population including:

Mathematical method. This method emphasizes the formulation of equations, expressing rates of population growth as functions of time instead of as particular factors which may influence the growth over any specific time period. It presupposes that the trend of total population growth is fairly regular and that economic and social factors in the future will be the same as those of the past. This method provides greater objectivity and is straightforward in calculation. It has the great disadvantage in that unusual significant changes in population may be obscured in mathematical averages. Also birth and migration rates do not follow strict formulae for long periods of time.

The component method. This method usually involves separate projections of numbers of males and females in each age group. Instead of choosing a single variable such as employment from which to project population, this method deals with trends of population components, births, deaths and migration. It assumes that population changes are a result of all social, economic and other cultural factors. The advantage of this method is that actual changes in population components are used in computing future population and, therefore, it is possible to obtain age and sex composition as well as total population. Also, since the components of population growth are projected separately, any change or error in any one of the components can be treated separately. However, large numbers of calculations are necessary in this method and can be used to advantage only with computers. The information necessary for the component method is often missing in small areas. This method hardly fits in times of sudden economic growth differing from normal trends.

The economic method. This method can be used where some major economic variable such as a rise in or a decline of an industry can exert a dominant influence on population growth. The ability of industry to provide and use workers is the primary determinant of population growth. It is the fundamental assumption of this approach that the population size of a given region is principally determined by the employment opportunities in the region. Net migration, therefore, will tend to bring about a balance between employment opportunities and the natural increase.

This method is limited because of the growing interdependence of regions and counties and in some cases a certain amount of integration with contiguous areas. Freeways and other rapid-transit systems increase this aspect of the problem. This method also disregards short-run cyclical fluctuations and is applicable only to periods of time of sufficient duration that the growth factors inherent in a region's economy can work themselves out. For Uintah County, for example, several factors are expected to produce economic growth--outdoor recreation, particularly around the Flaming Gorge area, further development of the basin's minerals, and eventual development of the abundant oil shale deposits.

Varying population projections have been made by various experts for Uintah County. These numbers, both liberal and conservative, are enough to necessitate changes in infrastructure in a county where population growth has historically been very small. The standard technique is to project basic employment. Once basic employment is known, total employment and total population can be predicted. It is the total population projection that determines infrastructure planning needs for schools and other public services. Orderly timing for construction of these requirements is dependent on estimates of population arrival.

Energy is usually not consumed at the source of production but must be exported. Energy development affects two kinds of people--the indigenous population and the mission-oriented migrants brought in to work on the energy project. Industrialization often brings together people with diverse values and life styles and often severe stress and conflicts occur. Some of the migrants will learn to adjust and identify with the indigenous population and the communities where they reside while others find this very difficult. The community, therefore, has to plan to roll with the punches and have ways to settle conflicts. At the very least, it must provide the necessary requirements for minimum living comfort, sewer systems, water and schools.

Before 1970, population trends in Uintah County clearly indicated a declining population. This decline was the result of too few job opportunities. The per-capita income in Uintah County was also low compared to many other counties in the state. Outmigration was therefore about the only alternative open to many youth if they were to achieve standards of living comparable to those elsewhere in the state and nation. However, outmigration of some may be costly for the remaining people in the county. The county looses some of its tax base as well as the investment in the migrating individual, in terms of education and other services provided. Because of this, many declining local areas seek tax-paying industries to offer opportunities for local people to stay and contribute to the economy. Thus, the great growth in population and income caused by growth in population, in turn caused by the developing petroleum industry since 1970 was welcomed by most of the citizens of Uintah County.

Skilled and highly trained labor will be needed for the construction and operation of the shale oil plant next on the horizon. It is difficult to determine what percentage of such labor will be available from Uintah County. Through manpower planning and coordination with the oil companies and the school district, the labor force of the county can upgrade its skills to supply at least some of the jobs such as welding, pipe fitting, iron working and others as might be required by the oil company. This manpower or planning program should be implemented as soon as practicable so that the trained manpower will be ready for employment by 1977, the expected date of first construction.

The construction of a large facility like a shale oil plant will create changes in the economy and society in which it is located. Existing businesses will experience an increase in volume concomitant with the large capital investments of the oil company. Land improvements will broaden the tax base and tax revenues from the shale plant will contribute revenues for providing essential services throughout the county.

There will, however, be certain socio-economic costs associated with the construction and operation of the facility. The population will increase, placing new and long-term demands for local government services. Additional schools will be needed for the children of the oil shale employees, both construction and operation workers. The first set of workers are those involved in construction jobs. From Kakish's unpublished (Kakish, 1975) thesis (Table 13), a total of 800 workers and local service employees numbering 580 will be required to complete the first retort plant of 10,000 barrels capacity per day. Five of these retort units are expected to be completed by the eighth year, requiring a peak construction force of 2,000 and a peak operation force of 2,500.

From Table 13 it can be seen that the total manpower required to build this project ranges from 400 to 2,000 construction workers for the 10-year period and from 300 to 2,500 workers for the operation phase.

School enrollment projections

In general, school population projections are based on total population forecasts. The standard procedure is to project the school-age population by single-year intervals and by age groups. Two principal methods for projecting school population are (a) the "grade cohort method and (b) the enrollment ratio method. The grade cohort method is based primarily on the level of current school enrollment and estimated ratios of intake, retention, and output of the school system. Enrollment is carried forward in succession to the next higher grade, using assumed rates of progression based on past experience. The enrollment ratio method depends more directly on estimates of future school-age population and the proportion of school enrollment or attendance. Ratios of enrollment to population are projected to future dates and applied to population figures for the corresponding dates.

The grade cohort model can be used to advantage when there are fairly complete and detailed school enrollment data by age and grade. The number of years covered by these data should be at least equal to the number of grades at each level of education, and preferably, several years more. In addition, data on promotions, dropouts, and repeaters for each grade, and some current and future estimates of school enrollment are necessary for using the model. Where current school enrollment data are not available in such detail but schoolage population can be projected from recent censuses and other information, the enrollment ratio method can be used with better expected results.

The population projections on which this study is based did not use the component method as information on grade and age were not

Table 13. Summary of change in employment and population resulting from oil shale development, Uintah County, Utah.

Year	Construction Force	Operating Force	Change In Local Service	Change In Total Employment	Change In Population
1	400	---	180	580	1450
2	400	---	340	740	1850
3	---	300	500	800	2000
4	---	300	660	960	2400
5	500	300	840	1640	4100
6	1000	300	1000	2300	5750
7	1500	300	1180	2980	7450
8	2000	1500	1340	4840	12100
9	1500	1500	1500	4500	11250
10	500	1500	1680	3680	9200
11	---	2500	1840	4340	10850
12	---	2500	2000	4500	11250
13	---	2500	2000	4500	11250
14	---	2500	2000	4500	11250
15	---	2500	2000	4500	11250
16	---	2500	2000	4500	11250
17	---	2500	2000	4500	11250
18	---	2500	2000	4500	11250
19	---	2500	2000	4500	11250
20	---	2500	2000	4500	11250

Kakish (1975)

available. The method used in this study is a modification of the enrollment ratio method.

In order to derive the number of school-age children, the ratio of school-age population to total population in Utah from 1930-1970 was obtained. (See Table 14) Since the school population did not show any trend as a proportion of the total, a simple arithmetic mean (0.24) was used as a likely ratio of school-age population to total population.

To estimate the increase in school-age population, the factor of .24 was applied to increases in total population due to oil shale development. (See Table 15) Alternatively, certain age ratios can be assumed from which these calculations can be made. In this study, both methods were used for comparison. Using the census figures, percentages of age components of the population of the state of Utah were derived for 1960-1970. The percentages for 0-4 is 13.4 percent; 5-11 is 17.4 percent, while 12-17 is 11.5 percent, derived from census figures 1960-1970. The school population figures in Table 16 were derived by using these percentages on the data found in Table 13.

It is significant that the projected school-age population derived from the census method and found in Table 16 are higher than those derived by applying the factor (0.24) and which appear in Table 15.[1] There seems to be no good reason why one set of estimates is more reliable than the other.

[1]The state average of school-age children to the total population (0.24) shown in Table 14 was applied to the projections of estimated population to yield projections of school-age population for various years. These estimates in Table 15 are likely to be biased upwards in the early years of the period. The reason is that construction workers, who constitute a large percentage of the population increase in the early years,tend to bring into the area fewer school-age children than do operation workers. Thus the state average of 2x children per unit of total population is too high as applied to construction population.

We now proceed to estimate actual expected enrollment from the school-age population. According to the study done by Yun Kim and Michael MacFarlane in collaboration with Katsuaki Oki (1974), all of the sociology department, Utah State University, Logan, Utah, the projected age specific enrollment rates for Utah are: 0.98 for kindergarten through 6th grade, and 0.96 for high school age.

Table 14. Ratio of school-age children to total population, Utah, 1930-1970.

Year	Population	School-Age Children	Ratio
1930	507,847	121,883	0.240
1940	550,310	123,846	0.225
1950	688,862	142,272	0.206
1960	890,627	216,317	0.242
1970	1,059,273	304.002	0.286
AVERAGE			0.24

Table 15. Projected increase in school-age population from oil shale development (1977-96) utilizing School-Age Population Ratio.

Year	Estimated Population[1]	Estimated School-Age Population[2]
1977	1,450	348
1978	1,850	444
1979	2,000	480
1980	2,400	576
1981	4,100	984
1982	5,750	1,380
1983	7,450	1,788
1984	12,100	2,904
1985	11,250	2,700
1986	9,200	2,208
1987	10,850	2,604
1988	11,250	2,704
1989	11,250	2,704
1990	11,250	2,704
1991	11,250	2,704
1992	11,250	2,704
1993	11,250	2,704
1994	11,250	2,704
1995	11,250	2,704
1996	11,250	2,704

[1]Kakish Thesis

[2]Estimated from ratio of school-age to total population derived from census figures in Table 14.

Table 16. Projected increase in school-age population, Uintah County, 1977-1996, utilizing Age Component Ratio

Year	Estimated Increase in Population[1]	Increase In School-Age Population[2]	Increase In Elementary Age Population[3]	Increase In Secondary-Age Population[4]
1977	1,450	419	243	176
1978	1,850	535	310	225
1979	2,000	578	335	243
1980	2,400	694	403	291
1981	4,100	1,185	687	498
1982	5,750	1,662	964	698
1983	7,450	2,153	1,249	904
1984	12,100	3,497	2,028	1,468
1985	11,250	3,251	1,886	1,365
1986	9,200	2,659	1,542	1,117
1987	10,850	3.136	1,819	1,317
1988	11,250	3,251	1,886	1,365
1989	11,250	3,251	1,886	1,365
1990	11,250	3,251	1,886	1,365
1991	11,250	3,251	1,886	1,365
1992	11,250	3,251	1,886	1,365
1993	11,250	3,251	1,886	1,365
1994	11,250	3,251	1,886	1,365
1995	11,250	3,251	1,886	1,365
1996	11,250	3,251	1,886	1,365

[1]Kakish, Unpublished Masters Thesis

[2]Ratio based on data presented on p. 47 which indicates 17.4% of population in ages 5-11 and 11.5% in ages 12-17

[3 and 4]Based on assumption that six grades are elementary and six grades are secondary.

Table 17. Projected increases in school population for Uintah County 1977-1998 based on Table 16.[1]

Year	School-Age Population	Elementary Age Population	Secondary Age Population	Expected School Enrollment	
				Elementary	Secondary
1977	419	243	176	238	170
1978	535	310	225	304	216
1979	578	335	243	328	233
1980	694	403	291	395	279
1981	1,185	687	498	673	470
1982	1,662	968	698	949	670
1983	2,153	1,249	904	1,224	868
1984	3,497	2,028	1,468	1,987	1,409
1985	3,251	1,886	1,365	1,849	1,310
1986	2,659	1,542	1,117	1,511	1,072
1987	3,136	1,819	1,317	1,783	1,264
1988	3,251	1,886	1,365	1,848	1,310
1989	3,251	1,886	1,365	1,848	1,310
1990	3,251	1,886	1,365	1,848	1,310
1991	3,251	1,886	1,365	1,848	1,310
1992	3,251	1,886	1,365	1,848	1,310
1993	3,251	1,886	1,365	1,848	1,310
1994	3,251	1,886	1,365	1,848	1,310
1995	3,251	1,886	1,365	1,848	1,310
1996	3,251	1,886	1,365	1,848	1,310

[1]Based on Table 16 using the specific age enrollment rates for Uintah District.

Table 18. Projected increase in school-age population, elementary and secondary, Uintah School District, 1977-1996.[1]

Year	Estimated School-Age Population	Estimated High School-Age Population	Estimated Elementary-Age Population
1977	348	156	191
1978	444	200	244
1979	480	216	264
1980	576	259	317
1981	984	443	254
1982	1,380	621	759
1983	1,788	800	988
1984	2,904	1,307	1,597
1985	2,700	1,215	1,485
1986	2,208	994	1,214
1987	2,604	1,172	1,432
1988	2,704	1,217	1,487
1989	2,704	1,217	1,487
1990	2,704	1,217	1,487
1991	2,704	1,217	1,487
1992	2,704	1,217	1,487
1993	2,704	1,217	1,487
1994	2,704	1,217	1,487
1995	2,704	1,217	1,487
1996	2,704	1,217	1,487

[1]Based on Table 15 using the age specific enrollment rates

Table 19. Total expected increase in elementary school enrollment, Uintah County, 1977-1996.

Year	Projected Elementary School Enrollment Without Oil Shale[1]	Expected Elementary School Enrollment Increase Due to Oil Shale	Expected Elementary School Enrollment Enrollment
1977	1,814	238	2,052
1978	1,773	304	2,077
1979	1,732	328	2,060
1980	1,691	395	2,086
1981	1,669	673	2,342
1982	1,647	949	2,596
1983	1,625	1,224	2,849
1984	1,603	1,987	3,590
1985	1,581	1,849	3,430
1986	1,575	1,511	3,086
1987	1,569	1,783	3,352
1988	1,563	1,848	3,411
1989	1,557	1,848	3,405
1990	1,551	1,848	3,399
1991	1,574	1,848	3,422
1992	1,597	1,848	3,445
1993	1,620	1,848	3,468
1994	1,643	1,848	3,491
1995	1,664	1,848	3,512
1996	1,675	1,848	3,523

[1]Kim et al., 1975.

Table 20. Total expected increase in secondary school enrollment, Uintah County, 1977-1996.

Year	Expected Secondary School Enrollment	Expected Secondary School Enrollment Due To Oil Shale	Expected Total Secondary School Enrollment
1977	1,801	170	1,971
1978	1,748	216	1,964
1979	1,695	233	1,928
1980	1,644	279	1,923
1981	1,598	470	2,068
1982	1,552	670	2,222
1983	1,506	868	2,374
1984	1,460	1,409	2,864
1985	1,416	1,310	2,726
1986	1,402	1,072	2,474
1987	1,388	1,264	2,652
1988	1,374	1,310	2,684
1989	1,360	1,310	2,670
1990	1,345	1,310	2,655
1991	1,332	1,310	2,642
1992	1,319	1,310	2,629
1993	1,306	1,310	2,616
1994	1,293	1,310	2,603
1995	1,282	1,310	2,592
1996	1,299	1,310	2,609

Table 17 contains estimates of actual increases in school enrollment from the increases in school-age population derived in Table 16. Table 18 contains similar estimates from the school-age population data developed in Table 15.

Table 19 adds the increase in elementary school enrollments resulting from oil shale development taken from Table 17 to the projected enrollment in the absence of oil shale development. The time period covered is 20 years from the time of earliest development (1977). It is interesting that after the tenth year, the proportion of the total enrollment contributed by oil shale development exceeds 50 percent. Table 20 shows the same data for secondary school enrollment from 1977-1996. It is not until year 17 (1993) that the enrollment due to oil shale development exceeds that which would be expected without it.

Finally, Table 21 shows the estimated population in the various age groups corresponding to elementary and secondary schools, calculated by the ratio of various school ages to total population (age specific enrollment ratio) as explained in Table 15.

On the assumption of a continuing trend of 3.1 people per household, Table 15 would project 0.9 school-age children per family. If we assume 2.4 per household (which is the U.S. census number), this figure is reduced to 0.7 school children per family. Table 16, on the other hand, projects a figure of 0.7 on the first assumption and 0.6 on the second. Considering that other impact studies of this nature assumed at least 1.00 school child per family, it is evident that the projection based on Table 16 relies heavily on the assumption of a decreasing birth rate. In Utah, however, a figure of about 0.9 school children per family is probably closer to present conditions than 0.7, so all later projections are based on Table 15 assumptions.

Table 21 Projected school population for Uintah County, 1977-1988 based on Table 15.

Year	Estimated School-Age Population	Estimated High School Population	Estimated Elementary School-Age Population	School Population	
				Elementary	Secondary
1977	348	156	191	188	150
1978	444	199	244	239	192
1979	480	216	264	259	207
1980	576	259	317	310	249
1981	984	442	541	530	425
1982	1,380	621	759	744	596
1983	1,788	800	987	967	768
1984	2,904	1,306	1,597	1,565	1,254
1985	2,704	1,216	1,485	1,455	1,167
1986	2,208	994	1,214	1,190	953
1987	2,604	1,171	1,432	1,403	1,125
1988	2,704	1,216	1,487	1,457	1,167
1989	2,704	1,216	1,487	1,457	1,167
1990	2,704	1,216	1,487	1,457	1,167
1991	2,704	1,216	1,487	1,457	1,167
1992	2,704	1,216	1,487	1,457	1,167
1993	2,704	1,216	1,487	1,457	1,167
1994	2,704	1,216	1,487	1,457	1,167
1995	2,704	1,216	1,487	1,457	1,167
1996	2,704	1,216	1,487	1,457	1,167

CHAPTER V

COST OF PROVIDING PROJECTED FACILITIES

After the total school enrollment increase has been projected, the next step is to project teacher and classroom needs. The variable for the valuation of this impact is the number of pupils per teacher or classroom. From available literature it seems as though the number of pupils per teacher is not a major issue in the teaching-learning process. However, many authors suggest an optimum range for efficiency of operation. The figures used in this study are 30 elementary school children per classroom and 25 high school children per teacher. (These figures are near present student-teacher ratios of schools in Cache County, Utah.) A reasonable range of (+ or -5) from this figure is not considered detrimental to the learning process. The total capacity of existing school buildings in the Uintah School District is 4,350: 2,130 elementary and 2,220 secondary. (Uintah School District, 1975) The analysis of the previous chapter indicated the district will require space for an additional 2,496 pupils at the peak of population growth.

There are many variables to consider when estimating the cost of providing the needed classrooms and facilities. Inflationary trends tend to make price quotation obsolete almost immediately. The available price quotations are usually average price quotations covering several years, and, therefore, they rarely reflect present prices. In this analysis average construction costs of $88,100 per classroom are used in estimating the average cost for providing the additional classrooms. In order to provide the needed classrooms, a number of alternatives are open for officials to consider:

1. Stagger sessions.

2. Mobile classrooms.

3. Permanent classrooms.

4. Any combinations of the above.

In order to estimate the actual number of students and needed classrooms, this study uses the projected school population in Uintah County 1970-2000 (Yun Kim, 1975) and adds to it the increase from the shale oil project developed in the previous chapter.

Most construction companies do not care to quote construction prices unless they are sure of what is expected in terms of materials to be used. Generally, construction cost per classroom is estimated at $81,000 per classroom. This figure was arrived at by assuming that no classroom is less than 3,000 sq. feet or less than 100 square inches per child in a class of 30. Average construction quotations ranged from $22 to $32 per sq. foot. Between now and 1983, therefore, the Uintah School District needs approximately $5,751,000 in present dollar purchasing power to build classrooms. Annual local operating costs per classroom including teachers' salaries is estimated at $22,000 (derived from Table 11). The school district, therefore, requires $7,313,000 by 1983 to satisfy the peak needs. On a more permanent basis, the school district needs an additional $1,606,000 annually to operate the schools.

Tables 22 and 23 indicate that the greatest impact in the school district will be on the elementary school system. Table 22 shows the increase in classroom and teacher requirements based on the projections from Tables 15 through 19 and compared to existing school capacity and number of teachers. There is a peak requirement of 49 classrooms and 49 teachers at the eight year of the oil shale project; although the trend is steadily upward in the elementary school system until the peak is reached. Thereafter the requirement stabilizes somewhat at about 43 units until the end of the period.

Table 23 shows the increased needs for classrooms and teachers at the secondary school level. These projections are based on figures in Tables 15 through 20. Table 23 reveals the secondary school system will require 22 classrooms and teachers in the peak year which is also year eight of the project. On a more permanent basis, the secondary school needs level out at 18 units for five years and then declines somewhat.

Table 22. Projected classroom/teacher need for elementary school, Uintah School District, 1977-1996.

Year	Projected Elementary School Enrollment	Existing Elementary School Capacity	Increase In Elementary School Enrollment	Teacher/ Classroom Need
1977	2,052	2,130	---	---
1978	2,077	2,130	---	---
1979	2,060	2,130	---	---
1980	2,086	2,130	---	---
1981	2,342	2,130	212	7
1982	2,596	2,130	466	15.5
1983	2,849	2,130	719	24
1984	3,590	2,130	1,460	49
1985	3,430	2,130	1,300	43
1986	3,068	2,130	956	32
1987	3,352	2,130	1,222	41
1988	3,411	2,130	1,281	43
1989	3,405	2,130	1,275	43
1990	3,399	2,130	1,269	43
1991	3,422	2,130	1,292	43
1992	3,445	2,130	1,315	44
1993	3,468	2,130	1,338	45
1994	3,491	2,130	1,361	45
1995	3,512	2,130	1,382	46
1996	3,523	2,130	1,393	46

Table 23. Projected teacher/classroom needs for secondary schools: Uintah School District, 1977-1996.

Year	Secondary School Enrollment	Existing Secondary School Capacity	Excess Enrollment	Teacher/ Classroom Need
1977	1,971	2,220	---	---
1978	1,964	2,220	---	---
1979	1,928	2,220	---	---
1930	1,923	2,220	---	---
1981	2,068	2,220	---	---
1982	2,222	2,220	2	---
1983	2,374	2,220	154	6
1984	2,869	2,220	694	22
1985	2,726	2,220	506	20
1986	2,474	2,220	254	10
1987	2,652	2,220	432	17
1988	2,684	2,220	464	15
1989	2,670	2,220	450	18
1990	2,655	2,220	422	17
1991	2,642	2,220	435	17
1992	2,629	2,220	409	16
1993	2,616	2,220	396	16
1994	2,604	2,220	383	15
1995	2,592	2,220	372	15
1996	2,609	2,220	389	13

Estimated Costs of Alternatives for Meeting Requirements

The provision of temporary classrooms is the closest to the provision of permanent structures in cost. Average initial cost per temporary classroom is estimated at $10,600 which includes $10,000 for a 3,000 square foot unit plus about 4600 hookup and skirting charge. If the difference between the peak classroom needs and the permanent requirement is provided by the use of temporary structures, a total expenditure of about $106,000 would be necessary. If, however, the need is satisfied by the erection of permanent buildings, the total cost will come to about $810,000. If required facilities are provided with mobile rather than permanent structures, there is a saving of about $605,000. In addition, temporary structures have some advantages over permanent structures in that they allow more flexibility by:

1. They can be located near existing school buildings allowing students to use older large-investment facilities like the gymnasium and cafeteria.

2. As the demand slackens, the units can either be resold or converted into other uses.

The difference between the peak and the permanent demand for classrooms and teachers is ten units. This difference could possibly be met by the use of stagger sessions while permanent structures are being erected. If this is done, the cost would go down by $106,000, the cost of the temporary structures.

The provision of permanent structures will also necessitate the acquisition of more land. For an elementary school population of 4,000 and on the basis of a minimum of five acres and 1 acre per 100 students, a total of 9 acres will need to be acquired. The county would have to look for a centrally located place that has easy access to utilities and service lines. This type of location must be found without sacrificing other important factors in the education process. It is better to have a small school than require elementary school children to ride more than 45 minutes between home and school. (Personal communication Cache District school officials and parents) A school plant is planned on a long-range basis of the school program. Costly mistakes in overbuilding and under building may be made unless possible changes are carefully weighed. When this is done, eventual realization of the most economical organization of school centers and attendance areas materializes.

The Uintah School District is probably already deficient in elementary school buildings. (Uintah School District, 1975) For example, a school built in 1940 is not considered adequate for the provision of facilities demanded by the present day public expectations. Central Elementary School, sitting on four acres and built in 1940, is a good example. Maeser has enough land for the required increases. Naples Elementary, quite new and sitting on a 20-acre field, may well be suited for new mobile units. It has an existing capacity of 300 students and a 1972 enrollment of 457; however, under the assumptions used in this study, there are ten acres in this plot of land that could be used for the mobile trailers for maximum use of existing facilities.

The Uintah School District ranks 16th in the average assessed valuation per pupil in average daily attendance among the forty districts in

Utah. It receives no state money for capital outlay and debt service. Since 1952, it has levied an average of 23.3 mills annually for maintenance and operation of schools, and 14.8 mills for capital outlay. It has received about 66 percent of its maintenance and operation expenditure from the state, however. State monies are received on the basis of weighted pupil units. Weighted pupil units are determined by an average of daily school membership and average daily attendance. The school districts are supposed to prepare this figure and the legislature, taking into account the extent of all programs in the state, votes on a flat rate per weighted pupil unit to be awarded the school districts.

In 1974 the districts were allowed $506 per weighted pupil unit. In 1975 the districts are expected to be allowed $621 per weighted pupil unit. The Unitah District has a weighted pupil unit of $4,970 for 1975-1976. Total money thus allowed for basic programs equals $4,086,370. Each district is required to levy a minimum of 28 mills. (Statistical Review of Government in Utah, 1975) For the 1975-76 school year, based on 98 percent collection and property valuation of $42,819,537 (1974) the district expects actual assessed valuation of $41,963,140.3. At the rate of 28 mills, the district expects to collect $1,174,979 from local efforts. The difference between $4,086,370 and $1,174,969 or $2,911,409 has to come from the state. On the basis of available funds, the Uintah School District can spend only $641.8 per student in ADA. Cost per student has been on the increase since 1960 with even sharper increases expected in the future. Expenses per pupil have risen from $631 in 1970 to $763 in 1973. With the expected increase in school population, the county would seem to require a large increase in property valuation to meet school expenses.

The mill levy to support schools in the Uintah School District is 44.66 mills. Some of these revenues, however, go into a state fund where they are added to mineral leasing funds, state load board funds, etc., and are then redistributed to the school districts on the basis of weighted pupil units. Because of the large revenues guaranteed from the public lands in Uintah County, the County contributes more to the uniform state school fund than is returned to the school district. For purposes of this study, however, it was assumed that the revenues guaranteed from the mill levy assessment will be those available to the District to meet costs.

Table 24. Projected cost to Uintah School District:[1] Uintah County, 1977-1996 (elementary)

Year	Capital Expenses[2]	Operating Expenses[3]	Total
1977	1,393,200	---	1,393,200
1978	1,393,200	---	1,393,200
1979	1,393,200	---	1,393,200
1980	1,403,800	22,000	14,258,000
1981	1,446,200	110,000	1,556,200
1982	1,393,200	330,000	1,723,200
1983	1,393,200	528,000	667,200
1984	1,393,200	1,078,000	2,471,200
1985	---	946,000	946,000
1986	---	704,000	704,000
1987	---	902,000	902,000
1988	---	946,000	946,000
1989	---	946,000	946,000
1990	---	946,000	946,000
1991	---	946,000	946,000
1992	---	968,000	968,000
1993	---	990,000	990,000
1994	---	990,000	990,000
1995	---	1,012,000	1,012,000
1996	---	1,012,000	1,012,000

[1]This calculation is based on 6 temporary structures and 43 permanent classrooms.

[2]Equal proportion of capital expense is projected per year and the temporary structures purchased as needed.

[3]Calculated by multiplying number of increases in student population by estimated operating expenses per student per year.

Table 25. Projected cost to Uintah School District, Uintah County, 1977-1996 (secondary).

Year	Capital Expenses[1]	Operating Expenses[2]	Total
1977	18,225	---	18,225
1978	18,225	---	18,225
1979	18,225	---	18,225
1980	18,225	---	18,225
1981	18,225	---	18,225
1982	18,225	---	18,225
1983	60,625	132,000	192,625
1984	18,225	484,000	502,225
1985	---	440,000	440,000
1986	---	220,000	220,000
1987	---	374,000	374,000
1988	---	330,000	330,000
1989	---	396,000	396,000
1990	---	374,000	374,000
1991	---	374,000	374,000
1992	---	352,000	352,000
1993	---	352,000	352,000
1994	---	330,000	330,000
1995	---	330,000	330,000
1996	---	286,000	286,000

[1]Based on 4 temporary classrooms and 18 permanent structures, equal proportion of structures built per year and temporary structures acquired as needed in 7th year.

[2]Increase in student population multiplied by estimated expenses per student per year.

Table 26. Total projected cost to Uintah School District, Uintah County, 1977-1996.

Year	Capital Expenses[1]	Operating Expenses[2]	Total[3]
1977	1,411,425	---	1,411,425
1978	1,411,425	---	1,411,425
1979	1,411,425	---	1,411,425
1980	1,422,025	22,000	1,444,025
1981	1,464,425	111,000	1,574,425
1982	1,411,425	330,000	1,741,425
1983	1,453,825	660,000	1,574,425
1984	1,411,425	1,562,000	2,973,425
1985	---	1,386,000	1,386,000
1986	---	924,000	924,000
1987	---	1,276,000	1,276,000
1988	---	1,276,000	1,276,000
1989	---	1,342,000	1,342,000
1990	---	1,342,000	1,342,000
1991	---	1,320,000	1,320,000
1992	---	1,320,000	1,320,000
1993	---	1,342,000	1,342,000
1994	---	1,320,000	1,320,000
1995	---	1,342,000	1,342,000
1996	---	1,298,000	1,298,000

[1]Sum of capital expenses in Tables 24 and 25.

[2]Sum of operative expenses in Tables 24 and 25.

[3]Obtained by adding the total operating expenses and capital expenses.

Table 25 describes the estimated cost of providing added requirements on the elementary level. As described in Table 22, an estimated number of 43 elementary school classrooms will be needed during the period of shale oil operation. In making this calculation, it was assumed that the district will build an equal portion of new structures every year until the estimated demand is met. Temporary structures required through the period until stable population occurs are purchased one at the beginning of the fourth year and four at the beginning of the fifth year. Since there were no expected increases in school enrollment during the first three years, no increased operating costs were expected. From the fourth year on, $22,000 operating costs per classroom were added to the capital expenses each year. Table 26 shows these costs on the elementary school level while Table 27 describes the yearly costs to the district due to these added requirements.

The estimated per pupil expenditure in the Uintah School District is $1,000 based on expenditures of other county schools of the same size. Assuming this same rate and a population of about 6,000 during the stable population periods, the district's operating budget will come to $6,000,000 per year.

CHAPTER VI

REVENUE PROJECTIONS

To estimate the revenue increase to local government from induetrial growth it is assumed that the only industry involved is oil shale. Revenue increases from the shale plant are estimated on a yearly basis. The estimates are based on expected investments per year and the required manposer. Revenue is expected to stabilize after the plant has been completed, except for depreciation allowances. Table 27 shows the expected yearly revenue from the plant. A figure of $875,000,000 estimated by the oil companies, is expected to be invested in the eight-year construction period for a 50,000 barrels/day plant. Table 13 indicated that the manpower requirement for construction ranges from a low of 400 during the first year to a peak of 2,000 during the eighth year. Subsequently, the number drops to 1,500 and then to 500 as construction is completed.

Table 27. Annual Increments of Revenues from shale oil plant.

Year	Estimated Annual Investment	Accumulated Investment	Accumulated Assessed Value	Estimated Revenue
1	$ 44,625,000	$ 44,625,000	$ 8, 925,000	$ 398,540.50
2	44,625,000	89,250,000	17,850,000	797,181.00
3	---	89,250,000	17,850,000	797,181.00
4	---	89,250,000	17,850,000	797,181.00
5	56,875,000	146,125,000	29,225,000	1,305,188.50
6	112,000,000	258,125,000	51,625,000	2,305,572.50
7	168,000,000	426,125,000	85,225,000	3,806,148.50
8	224,000,000	650,125,000	130,025,000	5,806,916.50
9	168,000,000	818,125,000	163,625,000	7,307,492.50
10	56,875,000	875,000,000	175,000,000	7,815,500.00
TOTAL	$875,000,000			

The figures in Table 27 were calculated by assuming that the programming of investment was proportional in each year to the programming of the manpower. The manpower data are taken from Table 13.

To asses the revenue from residential buildings due to oil shale development, either of two methods can be used: (1) direct calculations from the work of Roland Roberts (Roberts, 1975 Unpublished Thesis), (2) the work of the THK report (1975).

Roberts estimated the increase in numbers of mobile and permanent residential structures expected in Uintah County due to the oil shale project. The THK report estimated increases in revenues from residential buildings due to a 1,000 increase in population. All assumptions concerning the per capita incomes of the incoming population, the average value of new homes, and the mill levy are adjusted to fit Uintah School District conditions. This revenue per 1,000 increase in population is then multiplied by the increases in populations divided by 1,000. For purposes of comparison, both methods are used in this study.

In the Roberts' thesis two separate estimates were made:

1. Low mobile home demand and high permanent home demand (Table 28).

Table 30 shows the estimated revenue resulting from low permanent home demand. Tables 32 and 33 show the estimated revenues resulting from the low and high mobile home demand respectively.

Table 35 is a summary of the relevant material from Tables 24, 31 and 32. Tables 30 and 33 were used to assess the increase in government revenues due to increases in residential buildings. Tables 30 and 33 project a low permanent home demand and a high mobile home demand. Real estate people interviewed seemed to agree that most young people would prefer to buy permanent homes rather than mobile homes. However, because of the high cost of permanent homes, this study assumes low permanent home demand and high mobile home demand. Tables 30 and 33 were used in the estimation of government revenues due to increase in the property tax.

Table 28. Expected total increase in demand for housing, Uintah County, 1977-1996 (low mobile home demand and high permanent home demand).

Year	Permanent Homes	Mobile Homes
1977	122	362
1978	64	426
1979	196	261
1980	64	326
1981	134	761
1982	127	1,186
1983	134	1,620
1984	849	2,289
1985	1,692	1,992
1986	1,692	1,289
1987	2,245	1,245 ?
1988	2,310	1,310
1989	2,561	1,254
1990	2,412	1,208
1991	2,463	1,152
1992	2,514	1,106
1993	2,565	1,055
1994	2,616	1,004
1995	2,667	953
1996	2,715	905

Source: Roland Roberts' Unpublished Masters Thesis

Table 29. Expected total increase in demand for housing, Uintah County, 1977-1996 (high mobile home demand and low permanent home demand).

Year	Permanent Homes	Mobile Homes
1977	28	456
1978	70	542
1979	279	365
1980	321	451
1981	344	997
1982	361	1,532
1983	383	2,078
1984	983	2,996
1985	1,051	2,633
1986	1,148	1,832
1987	1,702	1,789
1988	1,745	1,875
1989	1,844	1,776
1990	1,943	1,677
1991	2,042	1,578
1992	2,141	1,479
1993	2,240	1,380
1994	2,339	1,281
1995	2,438	1,181
1996	2,534	1,086

Source: Roland Roberts' Unpublished Masters Thesis

Table 30. Estimated increase in revenue from new residential buildings due to oil shale project, Uintah County, 1977-1996, permanent homes - low permanent home demand.

Year	Number[1]	Value[2]	Assessed Value[3]	Revenue[4]
1977	28	$ 700,000	$ 140,000	$ 6,252.4
1978	70	1,750,000	350,000	15,631
1979	279	6,975,000	1,395,000	62,300.7
1980	321	8,025,000	1,605,000	71,679.3
1981	344	8,600,000	1,720,000	76,815.2
1982	361	9,025,000	1,805,000	80,611.3
1983	383	9,575,000	1,915,000	85,523.9
1984	983	24,575,000	4,915,000	219,503.9
1985	1,051	26,275,000	5,255,000	234,688.3
1986	1,148	28,700,000	5,740,000	256,348.4
1987	1,702	42,550,000	8,510,000	380,056.6
1988	1,745	43,625,000	8,725,000	389,658.5
1989	1,844	46,100,000	9,220,000	411,765.2
1990	1,943	48,575,000	9,715,000	433,871.9
1991	2,042	51,050,000	10,210,000	455,978.6
1992	2,141	53,525,000	10,705,000	478,085.3
1993	2,240	56,000,000	11,200,000	500,192
1994	2,339	58,475,000	11,695,000	522,298.7
1995	2,438	60,950,000	12,190,000	544,405.4
1996	2,534	63,350,000	12,670,000	565,842.2

[1]Roland Roberts' Unpublished Thesis.
[2]Number of homes x $25,000 (estimated average price of a home).
[3]In Utah average assessed valuation is .20.
[4]Property is taxed as the rate of 0.04466 for schools in Uintah County.

Table 31 Estimated increase in revenue from new residential buildings due to the oil shale project (permanent houses - high demand).

Year	Number[1]	Value[2]	Assessed Value[3] (.2)	Revenue[4]
1977	122	$ 3,050,000	$ 610,000	$ 27,242.6
1978	64	1,600,000	320,000	14,291.2
1979	196	4,900,000	980,000	43,766.8
1980	64	3,050,000	61,000	27,242.6
1981	134	3,350,000	670,000	29,922.2
1982	127	3,175,000	635,000	28,359.1
1983	135	3,350,000	670,000	29,922.2
1984	849	21,225,000	4,245,000	189,581.7
1985	1,692	42,300,000	8,460,000	377,823.6
1986	1,692	42,300,000	8,460,000	377,823.6
1987	2,245	56,125,000	11,225,000	501,308.5
1988	2,310	57,750,000	11,550,000	515,823
1989	2,361	59,025,000	11,805,000	527,211.3
1990	2,412	60,300,000	12,060,000	538,599.6
1991	2,463	61,575,000	12,315,000	549,987.9
1992	2,514	62,850,000	12,570,000	561,376.2
1993	2,565	64,125,000	12,825,000	572,764.5
1994	2,616	65,400,000	13,080,000	584,152.8
1995	2,667	66,675,000	13,335,000	595,541.1
1996	2,715	67,875,000	13,575,000	606,259.5

[1,2,3,4] All derived as in Table 30.

Table 32. Estimated increase in revenue from new residential buildings due to the oil shale project, Uintah County, 1977-1996 mobile home (low demand).

Year	Number[1]	Value[2]	Assessed Value[3] (.2)	Revenue[4] (.04466)
1977	362	$ 3,620,000	$ 724,000	$ 32,333.8
1978	426	4,260,000	852,000	38,050.3
1979	261	2,610,000	522,000	23,312.5
1980	326	3,260,000	652,000	29,118.3
1981	761	7,610,000	1,522,000	67,972.5
1982	1,186	11,860,000	2,372,000	105,933.52
1983	1,620	16,200,000	3,240,000	144,698.4
1984	2,289	22,890,000	4,578,000	204,453.5
1985	1,992	19,920,000	3,984,000	177,925.4
1986	1,289	12,890,000	2,578,000	115,133.5
1987	1,246	12,460,000	2,492,000	111,292.7
1988	1,310	13,100,000	2,620,000	117,009.2
1989	1,254	12,540,000	2,508,000	112,007.3
1990	1,208	12,080,000	2,416,000	107,898.6
1991	1,152	11,520,000	2,304,000	102,896.6
1992	1,106	11,060,000	2,212,000	98,787.9
1993	1,055	10,550,000	2,110,000	94,232.6
1994	1,004	10,040,000	2,008,000	89,677.3
1995	953	9,530,000	1,906,000	85,121.96
1996	905	9,050,000	1,810,000	80,834.6

[1] Roland Roberts' Unpublished Masters Thesis.
[2] Estimated value (10,000 x no. of mobile homes).
[3] Assessed valuations, 1974 Statistical Review of Governments, Utah. (0.2 x value)
[4] Property Tax (Assessed Valuation).

Table 33. Estimated increase in revenue from new residential buildings due to the oil shale project, Uintah County, 1977-1996 mobile homes (high mobile home demand).

Year	Number[1]	Value[2]	Assessed Value	Revenue
1977	456	$ 4,560,000	$ 912,000	$ 40,729.9
1978	542	5,420,000	1,084,000	48,411.4
1979	365	3,650,000	730,000	32,601.8
1980	451	4,510,000	902,000	40,283.3
1981	997	9,970,000	1,994,000	89,052.0
1982	1,532	15,320,000	3,064,000	136,838.2
1983	2,078	20,780,000	4,156,000	185,607.0
1984	2,796	29,960,000	5,992,000	267,602.7
1985	2,633	26,330,000	5,266,000	235,179.6
1986	1,832	18,320,000	3,664,000	163,634.2
1987	1,789	17,890,000	3,578,000	159,793.5
1988	1,875	18,750,000	3,750,000	167,475.0
1989	1,776	17,760,000	3,552,000	158,632.3
1990	1,677	16,770,000	3,354,000	149,789.6
1991	1,578	15,780,000	3,156,000	140,947.0
1992	1,479	14,790,000	2,958,000	132,104.3
1993	1,380	13,800,000	2,760,000	123,261.6
1994	1,281	12,810,000	2,562,000	114,418.9
1995	1,181	11,810,000	2,362,000	105,486.9
1996	1,086	10,860,000	2,172,000	97,001.5

[1]Roland Roberts' Unpublished Masters Thesis

[2]Obtained by multiplying value of each home by number in #1 above.

Using the THK report method (1975) as applied to Utah conditions, the increase in tax revenues from residential buildings due to a 1,000 increase in population is estimated to be $84,864.[1] The assumption is a 216 increase in demand for site homes and 84 increase in demand for mobile homes with a 1,000 increase in population. Using $84,864 per 1,000 people and applying it to Kakish's data from Table 13 we arrive at the figures in Table 34.

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[1]This calculation is made as follows:

216 x $25,000 = $5,400,000

(Both single and multiple homes permanent)

$5,400,000 x .2 = $1,080,000 (assessed valuations)

$1,080,000 x .068 = $73,440

$84 x 10,000 = $840,000 (mobile homes)

$840,000 x .20 = $168,000

$168,000 x .04466 = 11,424

$73,440 + $11,424 = $84,864

Table 34. Increase in tax revenues due to increase in residential buildings.

Year	Change in Population	Change in Revenue Due To Increase In Residential Homes[1]
1977	1,450	$ 123,053
1978	1,850	156,998
1979	2,000	169,728
1980	2,400	203,683
1971	4,700	347,942
1982	5,750	487,968
1983	7,450	632,237
1984	12,100	1,026,854
1985	11,250	954,720
1986	9,200	780,786
1987	10,850	920,774
1988	11,250	954,720
1989	11,250	954,720
1990	11,250	954,720
1991	11,250	954,720
1992	11,250	954,720
1993	11,250	954,720
1994	11,250	954,720
1995	11,250	954,720
1996	11,250	954,720

[1]Based on the THK Method (1975).

Table 35. Summary of total revenue due to oil shale.[1]

Year	Shale Oil Plant	Permanent Homes	Mobile Homes	Total
1977	$ 398,590.5	$ 6,252.4	$ 40,729.9	$ 445,572.8
1978	797,181.0	15,631	48,411.4	861,223.4
1979	797,181.0	62,300.7	32,601.8	892,083.5
1980	797.181.0	71,679.3	40,283.3	909,143.6
1981	1,305,188.5	76,815.2	89,052.0	1,471,055.7
1982	2,305,575.5	80,611.3	136,838.2	2,523,025.0
1983	3,806,148.5	85,523.9	185,607.0	4,077,279.4
1984	5,806,916.5	219,503.9	267,602.7	6,294,023.1
1985	7,307,492.5	234,688.3	235,179.6	7,777,360.4
1986	7,815,500.0	256,348.4	163,634.2	8,235,482.6
1987	7,815,500.0	380,056.6	159,793.5	8,355,350.1
1988	7,815,500.0	389,658.5	167,475.0	8,372,633.5
1989	7,815,500.0	411,765.2	158,632.3	8,385,897.5
1990	7,815,500.0	433,871.1	149,789.6	8,399,160.7
1991	7,815,500.0	455,978.6	140,947.0	8,002,045.6
1992	7,815,500.0	478,085.3	132,104.3	8,425,689.6
1993	7,815,500.0	500,192.0	123,261.6	8,438,953.6
1994	7,815,500.0	522,298.7	114,418.9	8,452,217.6
1995	7,815,500.0	544,405.4	105,486.9	8,465,391.9
1996	7,815,500.0	565,842.2	97,001.5	8,478,343.7

[1]High mobile home demand and low permanent home demand. The figures in Table 35 based on Tables 27, 30, and 33.

Table 36. Financial status of Uintah School District due to oil shale development: 1977-1996[1].

Year	Cost	Revenue	Balance
1977	$1,411,425	$445,572.8	$-965,852.2
1978	1,411,425	861,223.4	-550,201.6
1979	1,411,425	892,083.5	-519,341.5
1980	1,444,025	909,143.6	-534,881.4
1981	1,574,425	1,471,055.7	-103,369.3
1982	1,741,425	2,523,025.0	+781,600.0
1983	1,574,425	4,077,279.4	+2,502,854.4
1984	2,993,425	6,294,023.1	+3,300,598.1
1985	1,386,000	7,777,360.4	+6,391,360.4
1986	924,000	8,235,482.6	+7,311,482.6
1987	1,276,000	8,355,350.1	+7,079,350.1
1988	1,276,000	8,372,633.5	+7,096,633.5
1989	1,342,000	8,385,897.5	+7,043,897.5
1990	1,342,000	8,399,160.7	+7,057,160.7
1991	1,298,000	8,002,045.6	+6,704,045.6
1992	1,320,000	8,425,689.6	+7,105,689.6
1993	1,342,000	8,438,953.6	+7,096,953.6
1994	1,320,000	8,452,217.6	+7,132,217.6
1995	1,342,000	8,465,391.9	+7,123,391.9
1996	1,298,000	8,478,343.7	+7,180,343.7

[1]Estimated financial status of school district obtained by subtracting costs from revenues due to oil shale development.

Table 35 shows the expected increase in district revenue due to the oil shale project. Revenue increases result from increased property value expected from the oil shale plant and residential buildings. The total revenue is estimated with the assessed value at 20 percent of the fair market property valuation and the tax rate is assumed to be .04466 of the assessed valuation. The total revenue is the expected benefit to the school district due to the oil shale project.

Table 36 compares costs with revenues. During the first five years the table shows expenditures in excess of revenues. This is because of capital expenses by the district to accommodate expected increases in enrollment. During the sixth year, the district can expect revenues in excess of costs. This continues for the remaining fourteen years.

The differences in costs and revenues in the final column of Table 36 indicate that costs exceed revenues for the first five years, but afterward revenues greatly exceed costs. If the stream of net revenues (revenues minus costs) is discounted to the present, the internal rate of return that yields a net revenue present value equal to zero is in excess of 40%. This means that the school district should have no problem bonding itself to raise capital for the initial school construction when costs exceed revenue. The district's financial capability is much more than adequate to pay off the bonds, assuming that current mill levies are assessed.

Of course these data also suggest that the district could reduce the mill levy and still be solvent. Perhaps the levy could even be reduced to the minimum 28 mills required by the state for all districts.

Withdrawal of the Oil Shale Industry

Ghost towns are common and appear when supporting industry withdraws. Usually they are associated with the depletion of nonrenewable resources on which the economy was based. Oil shale is a nonrenewable resource and community decline must be faced sometime in the future. Should the industry be closed down, there may be a decline to the preindustrial population. How long before this decline sets in is a matter of conjecture at this point in time. Of special interest to this analysis is what problems the school district will face during this adjustment process. The magnitude of the shock will depend to a large extent on the programs used to provide the additional facilities. If the oil industry shuts down, many businesses that moved in with it will probably run into financial problems. Land values will decline and so will property valuations and taxes.

Looking at the suggested alternatives for meeting school needs, it is obvious that the greatest debt problem will arise if the additional facilities are permanent structures. Even if the service industries that move in remain and continue to pay property taxes, there may be some overbuilding and high maintenance costs. The least cost alternative for supplying temporary educational services would seem to be with stagger sessions. With mobile structures, as much as 30-70 percent of the initial cost could be recovered as they are salvaged and moved to other uses. But these two alternatives suffer from the fact that stagger sessions are often inconvenient and mobile structures are often inferior to permanent ones in utilitarian value.

Two possible outcomes could result from the early withdrawal of the shale oil industry from the county.

1. The school district might be stuck with large liabilities due to front-end capital investment if the economy runs into trouble before sufficient revenues can be captured to offset these front-end costs.

2. On the other hand, it could also happen that the tax base would be increased permanently; and as the population decreases due to industry withdrawal, there would be a substantial surplus per student in ADA. It might also be possible for some other companies to take over the assets of the oil company and continue to provide the added revenue associated with industrialization.

It would appear that the first outcome would be more probable than the second. The shutdown of the oil company during the first five years would appear to put the school district into severe financial difficulty unless permanent structures are avoided. The height of the demand on the school district is about the eighth year and this pressure does not stabilize until the twelfth year. Oil company withdrawal before the school district has been able to balance its account will undoubtedly create financial stress.

CHAPTER VII

SUMMARY AND CONCLUSIONS

The major objective of this thesis was to study the impact of population pressure on the Uintah School District due to oil shale development. This study has shed light as to project impact on the following areas:

1. School-age population.
2. Projected demand for teachers and classrooms.
3. Cost of providing for increases in school population.
4. Increase in revenue due to oil shale.
5. Taxing capacity of the school district.
6. Financial status of the district.
7. Projected result of premature oil company withdrawal.

Population projections for the Uintah County were prepared by Muin Kakish, Economic Department, Utah State University, Logan, Utah. The population projections for the school district were based on this study using a modified enrollment ratio method. Census data and school enrollment data were used extensively. The projections of the school enrollment rates provided the probable ratio of students in the school-age category who would be enrolled in school. The use of school enrollment data also provided the future trend of teacher and classroom demand. The lack of detailed population analysis prevented the projection of students by grade. Teacher and classroom demand were projected on a student/teacher ratio in general.

By applying student/teacher ratios to the projected school population, the probable trends in teacher demand and classroom demand for elementary and secondary levels were projected.

With 97 percent of school-age population enrolled in school, any major increases in school population would have to come through migration or changes in fertility. This study (found) projected for the period 1977-1996 with oil shale development there would be a 42 percent increase in elementary school population and a 21 percent increase in secondary school population. This increase is attributed chiefly to migration changes.

The total increase in teachers needed during the twenty-year period relates to the increase in student population for the same period by levels. Elementary student population was projected to increase by 1,471 students and 49 teachers whereas the secondary school population was projected to increase by 515 students and 22 teachers. The total increase of teachers over the period 1977-1996 would be 71.

This study also provides information as to the revenue and cost to the school district during this period of oil exploration and development.

It is projected that the school district will need to spend $9,977,400 on capital expansion during this period to house increased school enrollment. Additional operating expenses were estimated at $396,000 for secondary schools. The elementary level requires even more capital investment and operating expenses. It is projected in this study that the school district will need to spend $3,483,000 for capital expenses and $946,000 for operating expenses for elementary schools during this period. This figure represents facilities for a stable school enrollment. In actual fact, the figures range from a low of $18,225 to $60,625 capital expenses for secondary schools and a low of $1,393,200 to a high of $1,446,200 capital needs for elementary schools. On the operation side, the need ranges from a low of $22,000 to a high of $1,078,000.

It is observed that the method of providing for needed facilities is the most influential factor in the total cost to the school district. Stagger sessions, for example, are the cheapest means of providing needed facilities, especially during the peak period in order to avoid overbuilding.

As in most boom conditions, both governmental and nongovernmental agencies are called upon to provide a multitude of new services and expand existing ones. Invariably, there is always a lag in the need for governmental services and the means of paying for them.

This study observed that there is a lag in revenue during the first five years of the shale oil project. After the first five years, the district is able to take surplus revenues. Not until then can people begin to think about a reduction in the mill levy. However, there is every indication that the oil shale project will have a net fiscal impact on the school district eventually, thus reducing the tax burden on the citizens.

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