

AEROSPACE REPORT

IMPACT ON THE ALASKA ECONOMY OF

ALTERNATIVE GAS PIPELINES

UNIVERSITY OF ALASKA ARCTIC ENVIRONMENTAL INFORMATION AND DATA CENTER

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ALTERNATIVE GAS PIPELINES

By

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IMPACT ON THE ALASKA ECONOMY OF ALTERNATIVE GAS PIPELINES

. I. INTRODUCTION AND STUDY OUTLINE

A. Study Objectives

There are at present two principal proposed systems for transporting natural gas from Alaska's North Slope to the Continental United States. The first system, proposed by the Arctic Gas consortium, would be an all-land pipeline leading from Prudhoe Bay through Canada to the midwestern United States. The second system, proposed by the El Paso Alaska Company, would consist of a trans-Alaska pipeline and then shipment by LNG tanker to the U.S. West Coast.

Clearly, the alternative proposed gas transportation systems would have significantly different impacts on the Alaskan economy. The purpose of this study is to evaluate the economic impact on Alaska in terms of the induced change in total employment, industrial production, population, wages, personal income, and government revenues. Since the two routes would have significantly different effects during the operation phase, as well as during the construction phase, the estimates of the impact would be carried out to the year 1990. Further, the estimates would be made within the context of the overall growth and development of the Alaska economy.

B. Description of Alternative Gas Pipeline Routes Through Alaska

The pipeline proposed by Arctic Gas would lead from Prudhoe Bay east across the Canadian border to a point somewhat south of the McKenzie River Delta. At that point, the pipeline carrying Alaskan gas would join with a lateral from the McKenzie Delta Region which would carry Canadian gas.

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After moving south through Canada, the Alaskan gas would branch into two pipeline systems. The first pipeline would head west to supply markets in Washington, Oregon, and California. The second branch pipeline would head eastward to supply gas to markets in the midwestern and eastern regions of the country.

With less than 200 miles of the route falling within Alaska, construction of the Arctic Gas pipeline would have minimal impact on the Alaska economy. The impact is further reduced by the fact that the prime Arctic Gas route goes through a remote and sparsely settled region of the state. Virtually all of the construction workers would have to be located in isolated camps along the Arctic Coast. There would be some economic impact on Fairbanks to the extent that it were used as a staging area for supplying these camps.

The gas transportation system proposed by El Paso Alaska would use a trans-Alaska pipeline to move gas from Prudhoe Bay to Gravina Point on Prince William Sound. The gas pipeline would, for the most part, follow the same corridor as the Alyeska oil pipeline. A liquifaction plant and marine terminal would be constructed at Gravina Point. A fleet of cryogenic tankers would be used to ship the liquified gas to California where the LNG would have to be reconverted to its gaseous state.

If implemented, the El Paso proposal would clearly have a much greater economic impact on Alaska than would the Arctic Gas proposal. Construction of the trans-Alaska gas pipeline would be a very major undertaking. Its magnitude would be comparable to the construction of the Alyeska oil pipe-

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line. In addition, construction of the liquifaction plant and marine terminal at Gravina Point would involve a substantial workforce. This would have a significant statewide impact and a possibly severe impact on the local why nut communities.

The operation of the Arctic Gas pipeline would add insignificantly to Alaska's employment. A small number of maintenance personnel would be employed at the pumping stations within Alaska. In contrast, the operation of the El Paso system would have a much greater impact on employment levels. Because of the greater distance covered within Alaska, the operation of the trans-Alaska gas pipeline would involve more workers. However, most of the direct employment generated by the El Paso system would be a result of the operation of the liquifaction plant and marine terminal at Gravina Point.

C. Elements in the Economic Impact Process

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In evaluating the economic impact of the alternative gas pipeline proposals, it is convenient to split the process into four stages or elements: (1) the direct employment effects of pipeline construction, (2) the direct employment effects of pipeline operation, (3) the impact on government revenues and expenditures, and (4) the secondary impact induced by the direct effects. Estimation of the direct employment impact of pipeline construction and operation is a relatively straightforward task. This information is, for the most part, contained within the proposals submitted by Arctic Gas and El Paso. The vast bulk of the employment consists of the immediate pipeline workforce. During the construction phase there is, in addition, a small number of workers involved in the transportation of pipeline materials and camp supplies. It should be noted that almost none of the necessary pipeline materials are produced within Alaska. Therefore, apart from transportation requirements, the purchase of materials generates no employment within Alaska.

Along with the employment involved, the major direct impact of pipeline operation is in the revenues generated for state and local governments. The state levies production taxes and royalties based on the wellhead price of the gas. In addition, the government levies property taxes on the value of the pipeline. The state also receives income taxes from the wages and salaries paid pipeline employees and receives corporate income taxes from the pipeline-related businesses. Finally, the general increase in economic activity induced by the pipeline project contributes to state and local government revenues through additions to sales taxes, gross receipts taxes, and miscellaneous other charges.

The pipeline induced increase in economic activity and in population will also increase the demand for public services. A large portion of the additional government revenue will undoubtedly be spent in providing such services. The additional government expenditures will add to the employment and wages and salaries in the public sector.

The wages and salaries paid to pipeline employees and to government employees will in turn produce secondary impacts on the Alaska economy. When the wages and salaries are spent for personal consumption, this will increase the demand for goods and services in Alaska. Since virtually no consumer goods are produced within Alaska, the secondary impacts are largely

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confined to the services provided by the so-called support sector. The support sector consists of industries such as transportation, communications, public utilities, trade, finance, and services. These industries tend to increase their output in Alaska in response to increased personal income and population within the state. The increased output in turn generates additional employment and wage and salary payments in the support industries. This increase in income then causes a second round increase in the demand for support sector output. This is, of course, the start of the familiar multiplier process described in all basic economics textbooks. In Alaska the multiplier process is very much attenuated because so much of consumer spending goes for the purchase of goods produced outside of the state. Nonetheless, the response of the support sector is sufficiently large, particularly over the longer run, that it must be taken into account in evaluating the alternative pipeline proposals.

The direct and indirect increases in economic activity and employment have a major impact on the population of the state. Instead of reducing unemployment or underemployment, increases in Alaska employment tend to induce migration into the state. Thus, increases in employment lead directly to increases in population both in the short-run and in the long-run. Since there is little that can be done to control migration between the Lower 48 and Alaska, this pattern is very likely to continue into the future. As a result, population change can be expected to be a major element in evaluating the impact of alternative pipeline projects.

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D. Impact Measures

Given the inherent uncertainties in the situation, it is obviously unrealistic to expect to be able to estimate the economic impacts with great precision. Furthermore, given the limited availability of certain types of data, some of the impacts can be discussed in qualitative terms only. To the maximum extent feasible, however, the alternative gas pipeline proposals will be compared on the basis of a set of quantitative economic measures. The economic impact measures will be presented on an annual basis for the period from the start of pipeline construction to the year 1990.

One of the key impact measures will be the additional employment generated by the pipeline project. The employment impact will be broken into three major components: (1) pipeline employment, (2) government employment, and (3) private support sector employment.

Both the direct and indirect employment generated by the pipeline projects will add to the personal income of Alaska residents. The change in personal income will be measured both in current prices and, after adjusting for the anticipated rates of inflation, in "real" terms. Using the projected population changes, personal income will also be computed on a per capita basis.

Government revenues will be compared in terms of the changes in direct petroleum revenues, income taxes, and other major sources of revenue. Local government revenues will be distinguished from state revenues. Since a good deal of revenue-sharing is anticipated in the future, state and local govern-

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ment expenditures will be considered on a combined basis. The change in government expenditures will be measured on an aggregate basis and on a per capita basis.

A major consideration in evaluating the alternative gas pipeline proposals is the regional distribution of the economic impact. The principal !.impacted regions will be Anchorage, Fairbanks, and Southcentral Alaska. For each of these regions, separate estimates are provided for the change in employment, earnings, and population.

E. Report Outline

In the following sections of this report, an analysis of the process of change in Alaska will be used to provide estimates of the impact of the alternative gas pipeline projects. To begin, Section II below will lay out the key economic characteristics of the Arctic Gas and El Paso proposals. Estimates of direct employment in pipeline construction and operation will be derived from the data contained in the proposals. The time-staging and cost of the projects will be specified. The estimated capital costs and production rates will then be used to calculate estimated government revenues from property and production taxes.

Section III uses the estimates and assumptions specified in Section II to produce a set of basic estimates of gas pipeline impacts. These estimates incorporate all of the impact measures discussed above. Section IV then projects the regional distribution of pipeline impacts.

The fifth section goes on to analyze how the estimated impacts are altered in response to changes in certain key underlying assumptions. For

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example, it is conceivable that the cost of transporting the gas will be sufficiently high that the wellhead price of the gas will be zero or even negative. To examine the implications of this possibility, the two gas pipeline proposals are compared under the assumption of a zero wellhead price for North Slope gas. The impact of a gas pipeline will also be influenced by the general economic context within which it occurs. State government fiscal policies are a particularly important element of this general economic context. In this section of the report, the gas pipeline impacts are estimated in the context of expansionary state fiscal policies designed to promote rapid economic development of Alaska. This is in contrast to the basic set of estimates which incorporated more moderate growth policies.

The sixth section of the report contains a discussion of certain relevant effects other than those covered by the quantitative impact measures. One matter of considerable concern is the impact of pipeline construction on the availability and cost of housing. There is also the issue of the impact of a pipeline boom on the general cost of living. Based on recent oil pipeline experience, there is some discussion of the extent to which gas pipeline construction can be expected to lead to employment of Alaska Natives. Finally, some observations are made concerning the possible impacts of using North Slope gas within Alaska itself.

The final section of this report contains a summary of the major findings. It should be emphasized that the report does not contain any final recommendations for or against either proposal. Such recommendations involve value judgements inappropriate in a report of this nature.

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II. ECONOMIC CHARACTERISTICS OF THE GAS PIPELINE PROPOSALS

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For purposes of estimating the economic impact on Alaska, there are four major pieces of information that need to be supplied for each of the gas pipeline proposals. These are (1) the employment generated by construction of the pipeline, (2) the employment generated by operation of the pipeline, (3) the capital cost of the pipeline, and (4) the annual rate of gas production. All of this information is derived from the proposals submitted by Arctic Gas and El Paso Alaska. The last two pieces of information are used in estimating the tax revenues generated by the gas pipeline. To make these estimates, it is also necessary to specify the wellhead price of the gas and the tax rates imposed by the state government. In accordance with the standard assumptions defined by the Aerospace Corporation, the wellhead price of gas is assumed to be \$0.50 per mcf. Another standard assumption is that the North Slope gas production will reach 3.5 billion cubic feet per day. The applicable rates for property taxes, severance taxes, and royalties are assumed to be held at their present levels.

When all of this information is combined, the results are as shown in Tables 2-1 and 2-2. The total taxes generated by the Arctic Gas proposal ^A would level off at \$115 million in 1986. The average annual employment generated by construction of the Arctic Gas pipeline would reach a maximum of less than 700 persons in 1980. Fewer than 40 workers would be involved in the maintenance and operation of the pipeline.

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The total tax revenues generated by the El Paso gas pipeline proposal would level off at \$177 million in 1986. Since gas production rates are

assumed to be the same under the two proposals, the difference between this estimate and the Arctic Gas taxes is entirely attributable to the difference in property taxes. The El Paso proposal would involve a much larger construction workforce at the peak in 1980, about 7.6 thousand construction workers would be employed on an annual basis. Somewhat more than 600 !.workers would be employed in the maintenance and operation of the pipeline.

The techniques by which the data in Tables 2-1 and 2-2 were derived are shown in the remaining tables in this section. The footnotes to those tables cite the sources from which the basic information was obtained. The tables also show how the employment was allocated to the different geographic regions of the state.

ESTIMATED TAXES, CONSTRUCTION EMPLOYMENT, AND MINING EMPLOYMENT GENERATED BY ALASKAN ARCTIC GAS PIPELINE

1	\underline{Taxes}^{1}	Construction Employment ²	Mining Employment ³
الله ب	(Thousands of Dollars)		
1976	\$ 60	0	0
1977	120	38	0
1978	2,760	137	0
1979	6,120	567	0
1980	57,786	682	39
1981	62,368	0	39
1982	70,164	0	39
1983	86,787	0	39
1984	101,904	0	39
_ 1985	102,295	0	39
1986-	90 115,394	0	39

¹Royalty, production, and property taxes (gas).

²Alaskan Arctic Gas Pipeline Co., Table 11 F-1, "Estimated Manpower Requirements for Construction." All employment in Interior region.

³Alaskan Arctic Gas Pipeline Co., P. 71. All employment in Interior Region.

ESTIMATED TAXES, CONSTRUCTION EMPLOYMENT, AND MINING EMPLOYMENT GENERATED BY EL PASO ALASKA GAS PIPELINE

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	Taxes1	
-	(Thousands of Dollars)	Construction Employment Mining Employment
1976	\$ 690	, we can also the set of the set
1977	1,477	Ŏ
1978	16,903	1,481
1979	37,244	6,067
1980	104,478	7,572 624
1981	120,790	4,338 624
, 1982	132,151	1,908 624
1983	148,774	0 624
1984	163,891	0 624
1985	164,282	0 624
1986-90) 177,381	0 624
4	•	

1 Royalty, production, and property taxes (gas).

ESTIMATED CONSTRUCTION AND MINING EMPLOYMENT GENERATED BY EL PASO ALASKA GAS PIPELINE

Construction Employment

	<u>Pipeline¹</u>	Marine Terminal ²	Liquefactio	on Plant ³ Tota	<u>al</u>
1978	1,350	31	10)0 1,48	31
1979	3,100	86	2,88	31 6,08	57
1980	3,134	82	4,3	56 7,57	72
1981	1,500	0	2,8	38 4,33	38
1982	1,258	0	• 65	50 1,90	38

Mining Employment

	Pipeline ⁴	Marine Terminal ⁵	Liquefaction Plant ⁶	Total
1980-90	268	47	309	624

¹El Paso Alaska Co., p.1.5-29. "Alaska Gas Pipeline Construction Manpower Curve."
²El Paso Alaska Co., p.4.3-4. "Alaskan Marine Terminal Construction Manpower Curve."
³El Paso Alaska Co., p.3.3-4. "LNG Plant Construction Manpower Curve."
⁴El Paso Alaska Co., p.2.3-19. "Alaska Gas Pipeline Manning Table."

⁵El Paso Alaska Co., p.1-9.

⁶El Paso Alaska Co., p.3.3-12. "Alaskan LNG Plant-Contracted Manpower Requirements."

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ESTIMATED PIPELINE CONSTRUCTION AND PIPELINE MAINTENANCE (MINING) EMPLOYMENT BY ALASKA REGIONS GENERATED BY EL PASO ALASKA GAS PIPELINE

	Northwest	Southwest	Southeast	Southcentral1,2	Anchorage Interior ^{1,3}	Fairbanks1,
			Pipeline	Construction Employm	nent	
1977 1978 1979 1980 1981 1982	0 0 0 0 0 0		0 0 0 0 0 0 0	0 300 707 724 297 283	0 0 0 250 0 1,201 0 1,349 0 715 0 553	0 800 1,192 1,057 488 424
1980-90	0	0	<u>Pipeline Mai</u> 0	ntenance (Mining) Emp 51	oloyment O 93	128

¹Employment for the Interior region as defined by El Paso Alaska Co. was divided into Interior, Southeast Fairbanks Census Division, and Southcentral according to miles of pipeline in each region. Employment for Interior region excluding Fairbanks Census Division from p. 3A.5-13. El Paso Alaska Co. Table 3A.3-6 (Interior was adjusted from 1800 in 1980).

²P.3A.4-24. El Paso Alaska Co. Table 3A.4-5. Some estimation required (Southcentral was adjusted from 300 in 1980).

³Also includes Arctic. Arctic employment from p.3A.2-59. El Paso Alaska Co. Table 3A.2-10. p.3A.2-56 (1983 to 1990). (Arctic was adjusted from 70 in 1982).

⁴Fairbanks Census Division employment from p.3A.3-20. El Paso Alaska Co. Table 3A.3-12 and p.3A.3. 3-13, Table 3A.3-6. Fairbanks Census Division and Southeast Fairbanks Census Division were combined into Faribanks region.

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ESTIMATED CONSTRUCTION AND MINING EMPLOYMENT BY ALASKA REGIONS GENERATED BY EL PASO ALASKA GAS PIPELINE¹

(Thousands of Persons)

	Northwest	Southwest	Southeast	Southcentral	Anchorage	Interior	Fairbanks	State
			Cons	struction Employ	ment			
1977	0	0	0	0	0	0	0	0
1978	0	0	0	.4	Õ	•3	.8	1.5
1979	0	ō	0	3.7	0	1.2	1.2	6.1
1980	0	0	0	5.2	0	1.3	1.1	7.6
1981	0	0	0	3.1	0	.7	.5	4.3
1982	0	0	0	.9	0	•6	. 4	1.9
•								
an a			Mi	Lning Employment				
1980-90	0 0	0	0	• 4	0	•1	.1	.6

¹All marine terminal and liquefaction plant employment placed in Southcentral region. Pipeline employment placed in regions according to methodology shown in Table 2-4.

CUMULATIVE CAPITAL COSTS BY YEAR: AND ESTIMATED PROPERTY TAXES, ALASKAN ARCTIC GAS PIPELINE (Thousands of Dollars)

	<u>Gas Pipeline</u> 1	Property Taxes ³
1976	\$ 3,000	\$ 60
1977	6,000	120
1978	138,000	2,760
1979	306,000	6,120
1980	406,500	8,130
1981	474,500	9,490
1982-90	$500,000^2$	10,000

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¹Assumed cumulative capital cost schedule of El Paso Alaska Co.
²Alaskan Arctic Gas Pipeline Co. P.20 (Prime Route, 195 Miles in Alaska)
³20 mill-rate (current state level of taxation)

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CUMULATIVE CAPITAL COSTS BY YEAR AND ESTIMATED PROPERTY TAXES, <u>EL PASO ALASKA GAS PIPELINE</u> (Thousands of Dollars)

	<u>Gas Pipeline</u> l	Marine <u>Terminal²</u>	Liquefaction Plant ³	<u>Total</u> Pro	operty Taxes ⁴
1976	\$ 12,593	\$ 2,868	\$ 19,041	\$ 34,502	\$ 690
1977	23,325	8,265	42,263	73,853	1,477
1978	535,945	22,104	287,101	845,150	16,903
1979	1,187,239	37,910	637,042	1,862,191	37,244
1980	1,576,941	50,555	1,113,605	2,741,101	54,822
1981	1,839,543	56,298	1,499,761	3,395,602	67,912
1982-90	1,939,213	57,695	1,602,417	3,599,325	71,987

¹ E1	Paso	Alaska	Co.	Table	2.3-T3	•	
2 _{E1}	Paso	Alaska	Co.	Table	4.3-T2		
3 _{E1}	Paso	Alaska	Co.	Table	3.3-T2		
420	mill-	-rate (c	urren	it stat	e level of	taxa	tion)

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TOTAL WELLHEAD VALUE OF PRUDHOE GAS

	Price per MCF	Gas Production ¹	Wellhead Value
		(MMCF per day)	(Thousands of Dollars per Year)
1976	\$.50	0	0
1977	•50	0	0
1978	.50	0	0
1979	• 50	0	0
1980	.50	1,649	\$300,943
1981	•50	1,756	320,470
1982	•50	1,998	364,635
1983	.50	2,550	465,375
1984	.50	3,052	556,990
1.985	.50	3,065	559,363
1986-90	.50	3,500	638,750

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¹Docket No. CP75 - Exhibit H, Schedule 4. "Gas Available to Pipeline" - El Paso Alaska Co.



TAXATION RATES ON PRUDHOE GAS (Thousands of Dollars)

	Royalties ¹	Tax on Production ²	<u>Total</u>
1076			
1976	U	U	0
1977	0	0	0
1978	0	0	0
1979	0	0	0
1980	\$37,618	\$12,038	\$ 49,656
1981	40,059	12,819	52,878
1982	45,579	14,585	60,164
1983 🖉	58,172	18,615	76,787
1984	69,624	22,280	91,904
1985	69,920	22,375	92,295
1986-90	79,844	25,550	105,394
		•	

1 12-1/2% of Wellhead Value

- Current state levels of taxation.

24% of Wellhead Value

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Also discussed in El Paso Alaska Co. report, p. 3A.2-40

III. BASIC ESTIMATES OF GAS PIPELINE IMPACTS

A. Method of Analysis

The estimates of pipeline impacts are derived through the use of a computer simulation model developed in ISEGR's Man in the Arctic Program. The relationships in this model are based on econometric analysis of Alaska data covering the period since statehood. The complete model is shown in the technical appendix to this report. In projecting Alaska's development into the future, the relationships in the model are modified to reflect anticipated structural changes. Such changes are particularly significant in the government sector where the revenues generated by oil production will vastly increase the state's fiscal policy options. In the basic estimates presented here, it is assumed that the state will pursue a set of so-called moderate growth policies. A key assumption underlying this policy set is that the state will save 50 percent of all petroleum revenues. The purpose of such saving would be to retain some of the petroleum revenues for use in the future. The savings would be placed in an interest-earning investment The effects of modifying the assumed rate of saving are analyzed trúst fund. in Section V below.

A framework for comparing the alternative gas pipeline proposals is supplied by using the simulation model to project the general economic context within which the projects would be undertaken. This framework is particularly important because the Alaska economy will be changing so drastically over the relevant time period. The oil revenues which will begin to flow into the state treasury in 1978 will have an immense and pervasive impact on

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the Alaska economy. In addition to incorporating the effects of these oil revenues, the projections generated by the model take into account anticipated developments in other exogenous sectors such as fisheries, forestry, and federal government.

To provide a common basis for comparison, the computer model is first used to project Alaska's development ¹ under the assumption that no gas pipeline is constructed. A second projection is then made which incorporates the proposed Arctic Gas pipeline, and a third projection incorporates the El Paso pipeline and LNG facilities. The impacts of the alternative gas transportation systems are then measured as the differences between each of the last two projections and the no-gas-pipeline projection. The Arctic Gas and El Paso projections incorporate the data discussed in the previous section concerning the relevant employment schedules, construction costs, production rates, and timing of the respective pipeline projects.

B. Overview of Pipeline Impacts

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As shown in Table 3-1 and Figures 3-1 through 3-4, the El Paso proposal has a much greater impact on Alaska than does the Arctic Gas proposal. This conclusion applies both to the construction boom period and to the long-run growth pattern. In the peak construction boom year of 1980, the El Paso impact on personal income is \$560 million as compared to just \$67 million for Arctic Gas (Figure 3-1). Over the longer-run, the gap between the two proposals is reduced somewhat, but by 1990, the El Paso impact on personal income is still over three times as large as the Arctic Gas impact. The El Paso proposal would increase real gross state product by \$347 million in 1980, see Figure 3-2. After declining somewhat in the early years of pipeline operation, the El Paso impact on real gross state product reaches \$257 million in 1990. In contrast, the Arctic Gas proposal would increase real gross state product by \$24 million in 1980 and by \$35 million in 1990. It should be emphasized that all of these measures of gross state product are in real terms; that is, they are measured in constant 1958 dollars.

Because of the much greater amount of construction involved in the El Paso proposal, it increases employment in 1980 by 21.3 thousand persons, that is 18.6 thousand more workers than employed under the Arctic Gas proposal (Figure 3-3). By 1990, the El Paso proposal is still generating over 10 thousand more jobs than the Arctic Gas proposal. Only a small portion of this difference is attributable to the petroleum industry itself. The vast bulk of the difference is attributable to the greater economic activity generated by the El Paso proposal.

Given the nature of the Alaska economy, as new jobs are created new workers tend to migrate into the state; thus an increase in Alaska's population is a direct consequence of the extra employment generated by the El Paso proposal. During the construction of the El Paso system, the state's population would be increased by roughly 45 thousand persons, while the Arctic Gas project would add only about 5 thousand persons to the population (Figure 3-4). The increase in economic activity associated with the El Paso system would raise the state's 1990 population by about 30 thousand persons, and the Arctic Gas project would increase the state's population by roughly

10 thousand persons.

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As shown in Table 3-1, the increase in population tends to dissipate many of the apparent benefits of the additional economic activity. Neither of the proposed gas pipelines would produce any lasting increase in personal income per capita. During the construction phase, the El Paso proposal does increase per capita personal income, but this effect vanishes once the construction is completed. After adjusting for the effects of inflation, the impact on real per capita personal income is minimal even during the construction period. Thus, the gas pipeline projects would increase economic activity and would expand the size of the Alaska economy, but they would not necessarily increase the economic welfare of the typical individual within that economy.

It can be anticipated that much of the additional government revenues generated by the pipeline projects would be used to meet the needs of the expanded population. Expenditures of state and local governments in 1990 are projected to be increased by \$360 million under the El Paso proposal and by \$159 million under the Arctic Gas proposal. However, this seemingly substantial increase in government spending raises per capita government expenditures by just \$172 and \$125 respectively. Furthermore, if the effects of inflation were taken into account, the impact on per capita government expenditures would be even smaller. In fact, by 1990 the real increase in government expenditures per capita would amount to a gain of less than 2 percent. Once again, the economic benefits accruing to the typical resident of Alaska as a result of the gas pipeline projects would be limited by the associated increase in population levels.

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The projections of state and local government expenditures per capita also indicate that the public sector may experience some strain during the construction boom. This is particularly true under the El Paso proposal which causes a reduction in government expenditures per capita from 1978 through 1980. During this period, the construction of the El Paso system adds considerably to the population of the state but does not produce a corresponding increase in government revenues. While it is true that during this period the oil revenues will begin to flow into the state, much of that revenue will need to be used to meet the deferred needs of the present population. The backlog of demands for government spending is being built up as a result of the extremely tight fiscal situation which the state is now experiencing. As a result of the apparently unanticipated delay in construction of the oil pipeline, state spending has run far ahead of state For the next several years, the state is confronted with the revenues. problem of closing a very substantial fiscal gap. If the El Paso pipeline project were to add substantially to the population and thus to the demand for public services, this could conceivably exacerbate the situation in the period immediately after completion of the oil pipeline.

C. <u>Impact on State and Local Government Revenues and Expenditures</u> Since the government sector plays a major role in determining the patterns of development in Alaska, it is useful to examine the impact on this sector in more detail. As shown in Table 3-2, under both the Arctic Gas and the El Paso proposals, most of the impact on state revenues is attributable directly to the petroleum industry. As discussed in Section II above, the

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difference in state petroleum revenues is due to the different property taxes on the two systems. With regard to the non-petroleum sources of state revenue, the El Paso proposal generates much greater amounts of money. In 1990, non-petroleum revenues under the El Paso proposal amount to \$156 million; under the Arctic Gas proposal they amount to \$65 million.

The increased revenues from personal and corporate income taxes are due to the general increase in economic activity caused by the El Paso project. The expansion in economic activity also produces increases in other general fund revenues which are generated by fees, charges, excise taxes, and similar levies. These sources of revenues respond to increases in personal income and population in much the same manner as do personal income taxes. The special fund revenues require separate consideration because they are generally earmarked for specific purposes. For example, a major portion of the special fund revenues come from various kinds of airport fees. Such revenues are in turn used to sustain airport operations.

The impact on interest income accruing to the state is determined solely by the amount of money placed in the hypothesized investment trust fund. In the projections shown here, it is assumed that the state places half of its petroleum revenues in such a trust fund. Since the El Paso proposal generates larger amounts of petroleum revenues, the trust fund accumulates more rapidly and generates a larger interest income. If the state chose not to set aside any of the revenues generated by gas pipeline operations, neither proposal would have any impact on the interest income accruing to the state. Under the assumption of zero state saving, the total

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revenue available to the state would be lower, but a greater proportion of it would be available for current spending.

The major sources of local government revenues, apart from state revenue sharing, are property taxes, sales taxes, and miscellaneous charges and fees. While property taxes are important source of local revenues, they are not very responsive to changes in the level of economic activity. Thus, the local revenue impacts shown in Table 3-2 are primarily a result of the increases in sales taxes and fees caused by the pipeline induced activity. The projected increase in local revenues is substantially larger under the El Paso proposal than under the Arctic Gas proposal, \$116 million in 1990 as compared to \$36 million.

When state and local government revenues are combined (with state revenue sharing netted out), the El Paso proposal generates additional revenues of \$449 million in 1990 and the Arctic Gas proposal generates \$217 million. Under the assumption that the state saves half of its petroleum revenues, this leads to increases in state and local government expenditures of \$360 million and \$159 million respectively. As pointed out above, the differences in aggregate expenditure levels are almost exactly offset by the differences in population growth so that the two proposals produce very similar increases in state and local government expenditures per capita.

D. Impact on Industrial Production, Employment and Earnings

During the early years of the study period, the primary impact of the gas pipeline projects would be to increase the output and employment in the construction industry. Once the pipeline goes into operation, the projects

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would add to the output and employment in the mining industry. The tax revenues generated by pipeline operations would add to the employment and output of state and local governments. As workers in the mining, construction, and government sectors spend their additional income, the economic multiplier process would produce an increase in the output of the support sector industries in Alaska. These changing patterns of industrial expansion are shown in Tables 3-3 through 3-5.

During the period from 1978 through 1980 under either of the gas pipeline proposals, much of the economic impact is concentrated in the construction and mining industries. By 1980, the government and support sectors begin to take on a dominant role in the impact process. Under the Arctic Gas proposal, these sectors account for essentially the entire long-run economic impact since the operations of the Arctic Gas pipeline would generate a negligible amount of employment within Alaska, a few dozen workers at most. The total Arctic Gas impact on employment is estimated at 4.6 thousand persons in 1990. The government sector and trade and service industries would each account for 2 thousand workers with the remainder going into the other support sector industries (Table 3-4). Since trade and services are relatively low-paying industries, they would account for a much smaller proportion of the increase in wages and salaries.

In addition to producing a much larger aggregate impact, the El Paso proposal would produce a substantially different industrial distribution of impacts. The operation of the El Paso gas pipeline and the LNG facility would produce a major expansion in the real output of the mining industry.

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Since the El Paso proposal would generate much larger increases in personal income and in government revenues, the economic multiplier would play a more important role in the impact process. The result would be a relatively larger increase in trade and services and in other support industries. As shown in Table 3-4, the trade and service industries alone account for over half of the employment impact in 1990. Once again, the relatively low wages in these industries leave them with a somewhat smaller share of the total increase in earnings.

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GAS PIPELINE IMPACT MEASURES *

	Personal Income	Real Gross State Product	Employment	Population	Personal Income Per Capita	Real Per Capita <u>Personal Income</u>	State and Local Government Expenditures	State and Local Government ' Expenditures Per Capita
	(Millions of Dollars)	(Millions of 1958 Dollars	(Thousands of Persons)	(Thousands of Persons)	(Dollars)	(1967 Dollars)	(Millions of Dollars)	(Dollars)
•				<u>A R C</u>	<u>TIC CAS</u>			
1973	6.0	2.4	0.3	.5	3.8	1.6	2.1	1.0
1979	32.4	12.9	1.2	2.7	21.3	8.8	4.7	- 11.3
1980	66.6	24.3	2.7	5.8	28.7	11.3	38.5	36.8
1981	49.7	16.7	2.2	4.8	6.2	2.3	53.7	73.2
1982	52.0	16.1	2.1	4.7	4.7	1.7	55.4	67.5
1933	62.5	18.0	2.5	5.4	5.3	1.8	67.8	79.4
1984	76.5	21.2	2.9	6.3	6.0	2.0	82.9	93.1
1985	83.0	23.5	3.2	6.9	5.9	1.9	92.8	98.0
1986	102.8	25.9	3.5	7.7	6.4	1.9	108.6	110.8
1937	117.7	29.0	3.8	8.4	5.9	1.7	120.1	114.2
1938	132.0	30.8	4.1	9.0	5.3	1.5	132.3	113.7
1989	147.7	33.0	4.3	9.6	4.6	1.2	144.9	122.0
1990	165.1	35.3	4.6	10.2	3.8	1.0	158.8	125.2
	· .				O 2 A C			
с., ₁				5 <u>5</u>	<u> </u>			
1973	78.0	* 32.6	3.1	6.7	53.3	22.8	13.0	- 21.0
1979	325.5	130.6	12.2	26.9	203.0	83.5	40.7	-122.7
1980	\$59.5	346.6	21.3	46.8	259.1	102.3	149.6	- 67.0
1931	512.8	313.8	20.1	44.2	156.9	59.5	240.1	102.6
1982	419.7	271.6	16.6	36.6	72.8	26.5	242.5	129.4
1983	324.1	233.7	13.1	28.9	10.6	3.7	231.8	158.1
1984	315.2	227.5	12.2	26.8	6.1	2.1	216.6	130.3
1985	328.9	228.4	12.1	26.6	5.1	1.7	2:4.3	127.2
1986	353.7	231.2	12.3	27.1	5.5	1.7	247.0	142.3
1937	387.8	238.5	12.9	28.2	4.6	1.4	268.8	146.1
1988	424.4	243.8	13.4	29.4	3.3	1.0	296.0	155.4
1989	465.7	249.4	13.9	30.7	1.5	.4	326.0	164.0
1990	514.4	256.5	14.7	32.2	7	2	360.1	171.6

* The impacts are measured as deviations from the situation in which no gas pipeline is constructed.

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IMPACT	ON .:	STATE	AND	LOCAL	COVERNMENT	REVENUES	AND	EXPENDITURES	2	

	(Millions	o£	Dollars)	

	STATE REVENUES						<u>en al constante en esta de la constante en el c</u>		
Fiscal Years	Total	Petroleum Revenues	Personal and Corporate Income Taxes	Interest Income	Special Fund Revenue	Other General Find Revenue	LOCAL COVERNMENT REVENUE FROM OWN SOURCES	STATE AND LOCAL GOVERNMENT REVENUES	STATE AND LOCAL GOVERNMENT EXPENDITURES
	•				<u>A R C T I</u>	<u>C</u> <u>C</u> <u>A</u> <u>S</u>			
1976	0.1	0.1	0	0	0	0	0	.1	.1
1977	0.1	0.1	0	0	0	0	1	0	.1
1978	2.8	2.8	0	0	0	0	0	2.8	2.1
1979	7.0	6.1	.3	0.1	.2	.3	.8	7.8	4.7
1980	62.8	57.8	1.9	0.2	1.0	1.9	4.6	67.4	38.5
1981	74.8	62.4	3.8	2.3	2.1	4.2	10.1	84.9	53.7
1982	82.5	70.2	3.0	4.4	1.7	3.2	7.8	90.3	55.4
1933	102.3	86.8	3.2	6.9	1.8	3.6	8.8	111.1	67.8
1984	122.6	101.9	4.1	10.0	2.4	4.2	11.3	133.9	82.9
1985	129.5	102.3	5.1	13.5	3.1	5.5	14.5	144.0	92.8
1986	148.8	115.4	6.2	17.1	3.8	6.3	17.5	166.3	103.6
1987	156.3	115.4	7.5	21.1	4.6	7.7	21.6	177.9	120.1 W
1938	164.0	115.4	8.8.	25.2	5.6	9.0	26.0	190.0	132.3
1989	171.9	115.4	10.2	29.2	6.7	10.4	30.7	202.6	144.9
1990	150.2	115.4	11.7	.33.3	7.9	11.9	36.3	216.5	158.8
					<u>el</u> e	ASO			
									i de la companya de l
1976	. 7	•7	0	0	0	0	1	. 6	.7
1977	. 1.6	1.5	0	0	0	0	, O	1.6	1.7
1978	17.0	16.9	. 0.1	0	0	0	.2	17.2	13.0
1979	48.6	37.2	4.2	.3	2.2	4.7	10.7	59.3	40.7
1930	154.7	104.5	18.5	1.5	9.8	20.4	47.2	201.9	149.6
1931	213.5	120.8	33.2	5.3	18.2	36.0	86.9	300.4	240.1
1982	224.7	132.2	31.5	9.4	17.7	33.9	83.9	308.6	242.5
1983	233.6	148.8	26.8	14.1	15.4	28.5	72.6	306.2	231.5
1984	239.6	163.9	21.4	19.3	12.5	22.5	58.9	298.5	216.6
1985	246.1	164.3	21.4	25.1	12.8	22.5	60.2	306.3	224.3
1986	269.6	177.4	23.2	30.8	14.2	24.0	66.1	335.7	247.0
1937	282.7	1//.4	25.7	37.0	16.0	26.6	/4.8	357.5	268.8
1988	298.2	1//.4	29.2	43.2	18.6	29.8	80.5	384.7	296.0
1939	314.9	1//.4	32.9	49.5	21.5	33.5	99.7	414.6	326.0
1990	333.3	177.4	37.4	55.7	25.0	37.8	115.6	448.9	360.1

* The impacts are measured as deviations from the situation in which no gas pipeline is constructed.

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IMPACT ON REAL GROSS PRODUCT (Millions of 1958 Dollars)

the second s	<u>Total</u>		Mining and Pipeline Construction	State and Local Trade and Government Services		Other Support Industries	
4							
-			<u>A</u> 1	<u>R C T I C G A S</u>			
	1978	24	7	9	7	8	
	1979	12 9	· /	•2	3.6	4.2	
	1980	24.3	5.4	• • • • •	73	85	
	1981	16.8	0	4.1	5.9	6.8	
	1982	16.1	0	4.0	5.6	6.5	
la	1983	18.0	Õ	4.6	6.2	7.2	
	1984	21.2	Õ	5.3	7.4	8.6	
	1985	23.6	Õ	5.6	8.3	9.7	
an e re	1986	25.9	Õ	6.1	9.1	10.6	
ate de	1987	28.9	Õ	6.4	10.4	12.1	
-	1988	30.8	Õ	6.6	11.2	13.0	
- 1	1989	33.0	- 0	6.9	12.1	14.1	
* :	1990	35.3	0	7.1	13.0	15.2	
افسر							
	•						
				EL PASO			
1							
 	1978	32.6	11.5	1.2	9.1	10.7	
- 4 -	1979	130.7	46.9	3.5	37.0	43.3	
, the second sec	1980	346.6	140.3	12.1	66.4	127.8	
	1981	313.8	165.0	18.3	60.1	70.3	
	1982	271.6	148.7	17.4	48.7	56.8	
	1983	233.8	136.1	15.7	37.9	44.1	
•	1984	227.5	138.0	13.8	35.1	40.7	
-	1985	228.5	138.0	13.5	35.7	41.3	
- 	1986	231.2	138.0	14.0	36.8	42.5	
- a	1987	238.5	138.0	14.3	40.1	46.2	
19 1	1988	243.8	138.0	14.9	42.3	48.7	
17.17.1	1989	249.4	138.0	15.4	44.7	51.3	
لغد	1990	256.5	138.0	16.1	47.7	54.7	

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IMPACT ON EMPLOYMENT (Thousands of Persons)

27733 21 21					•
۰ او ا		Mining and			
		Pipeline	State and Local	Trade and	Other Suppor
	Total	Construction	Government	Services	Industries
		•			· · ·
		<u>A</u> <u>R</u>	$\underline{C} \underline{T} \underline{I} \underline{C} \underline{C} \underline{A} \underline{S}$		
1978	0.3	0.1	0.0	0.0	0.2
- 1979	1.2	0.6	0.2	0.3	0.1
1980	2.7	0.7	0.9	0.7	0.4
1981	2.2	0	0.8	0.8	0.6
1982	2.1	0	1.1	0.8	0.2
1983	2.5	0 • •	1.3	0.9	0.3
- 1984	2.9	0	1.4	1.0	0.5
1985	3.2	0	1.6	1.2	0.4
1986	3.5	0	1.8	1.4	0.3
1987	3.8	0	1.8	1.5	0.5
1988	4.1	0	1.9	·1.7	0.5
1989	4.3	0	1.9	1.9	0.5
1990	4.6	0	2.0	2.0	0.6
		<u>F</u>	<u>L PASO</u>		
1070	9 1	1 5	0.2	<u>Ó</u> R	Δε
1978	3.L 10.0	1J 6 7	0.3	33	1 0
19/9	12.2	2- U.L 0 0	2 4	5.5	1.0 2.1
1980	21.3	0.2	J•4 / 8	7 3	2.1 2.1
	20.1	4.7	4.0	7.0	2.1
1902	10.0	2.5	4.0	6 /	2.5
- 1983	13.1	0.0	4.4	6.1	1.6
1984	12.4	0.0	· J•2 2 Q	6.1	1.0
1985		0.0	5.0	6.2	1.0
J 1900	12.0	0.0	4.0	6 /	τ.J 1 Q
1987	12.7	0.0	4.1 / 7	6.6	1.0 2 A
1988	L3.4 12 0	0.0	4•Z	0.0 7 1	2.0
TAQA	12.7	0:0	4+4 / 5	75	1.0 9 1
T220	14•1	U+U	4 • 2	* • •	4 • 1

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IMPACT ON WAGES AND SALARIES (Millions of Dollars)

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	Total	Mining and Pipeline Construction	State and Local Government	Trade and Services	Other Support Industries
		**************************************			······································
1. A.		<u>A</u> R	$\underline{C} \underline{T} \underline{I} \underline{C} \underline{G} \underline{A} \underline{S}$		
1070	r 0	<u>А</u> Г	1	~ 7	
1978	5.2	2.0	1.0	0./	1.0
1979	28.2	1/.5	17.0	4.2	4.0
1980	28.1	21.1	17.9	9.7	9.4
1981	43.4	0	25.0	10.5	7.9
1982	42.2	0	23.9	11.7	7.9
1983	54.1	0	JL.0	14.0	7.1 11 2
1984	0/.2	0	JO.1 125	20 0	12.0
1006	11.5	0	43,J 50 Q	20.0	15.0
1097	103 7	0	56 4	24.5	17 8
1000	116 5	0	62 1	• 3/- 3	20 1
1080	130 /	0	68 1	39.7	20.1
1000	1/6 1	ñ	74.8	45.8	25.5
100	THOUT	· · · ·		1500	
-			EL PASO		
1978	67.9	41.2	6.0	9.9	10.8
1979	283.5	176.1	18.8	43.8	44.8
1980	488.4	247.7	69.6	90.1	81.0
1981	448.2	1.55.1	111.9	103.2	78.0
1982	367.4	83.5	113.3	104.9	65.7
1983	284.1	22.0	108.3	100.8	53.0
1984	276.7	23.1	101.3	101.7	50.6
1985	289.1	24.4	105.1	106.6	53.0
1986	311.2	25.8	115.9	112.9	56.6
1987	341.7	27.1	126.2	124.0	64.4
1988	374.4	28.6	139.1	135.9	70.8
1989	411.3	30.2	153.3	149.9	77.9
1990	455.0	31.9	169.6	166.9	86.6

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IV. REGIONAL DISTRIBUTION OF ECONOMIC IMPACTS

ن آب In evaluating the effects of the gas pipeline proposal, it is important to recognize that the economic impacts are not spread evenly across all regions of the state. Nor is the regional distribution of economic impact the same under the El Paso proposal as under the Arctic Gas proposal. In ... addition to being much smaller in magnitude, the Arctic Gas project is entirely located in the isolated northeastern corner of the state. The El Paso gas pipeline, on the other hand, traverses the entire length of the state. The El Paso construction and operation of the LNG plant and marine terminal at Gravina Point will have major impacts both in the short-run and in the long-run on the Southcentral region in general and on the town of Valdez in particular.

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To trace out the regional impacts in detail, the workforce used in constructing and operating the respective pipeline is specified on a regional basis (for the derivation of the regional data see Section II above). Government expenditures and employment are allocated to the specific regions on the basis of past distributional patterns. These patterns have remained remarkably stable even in the face of substantial changes in the regional distribution of economic activity and population. On the basis of these data inputs, a regionalized version of the model shown in the appendix is used to project the regional economic impact of the proposed pipeline projects. Although the model itself operates on a seven-region basis, (see Map 1) the results presented here will concentrate on the three major impacted regions: the Anchorage, Fairbanks and Southcentral regions. The regional impact as measured by changes in employment, population, and wages and salaries are shown in Figures 4-1 and 4-2 and Tables 4-1 through 4-3. Because of its much larger magnitude, the impact of the El Paso project is much greater in all regions than is the impact of the Arctic Gas project. Perhaps the most notable feature of the regional projections is that the bulk of the impact occurs in Anchorage, even though neither project passes through Anchorage itself. This emphasizes just how important Anchorage is as the commercial center of Alaska.

Except during the very peak of the El Paso boom, well over half of the total impact is concentrated on the Anchorage area. Over the long-run, about 60 percent of the employment impact is focused on Anchorage. In terms of population, the El Paso proposal would increase Anchorage's 1990 population by over 18 thousand persons and the Arctic Gas proposal would increase the population by 5.7 thousand persons. In both instances, these population increases reprsent over half of the total population impact for the state as a whole. The El Paso proposal, unlike the Arctic Gas proposal, causes a moderate boom-bust cycle in the Anchorage area. As shown in Figure 4-1, the Anchorage employment impact peaks at 10.6 thousand persons in 1981, declines to 6.6 thousand persons in 1984, and then rises gradually along with the growth of the Alaska economy. Although these changes are not insignificant, neither are they overwhelming in the context of the general growth of the Anchorage area. By the early 1980s, Anchorage is projected to have a total population of approximately 250 thousand persons and a labor force well above 100 thousand. Thus, in relative terms, the employment impact of

the Arctic Gas project is minimal, and the impact of the El Paso project, even at its peak, is no more than 10 percent of the Anchorage labor force.

Both the absolute and the relative magnitudes of the differences between the two gas pipeline proposals are much more significant with regard to the Southcentral region. Since the Arctic Gas project is far removed from Southcentral Alaska, it has a negligible impact on the region but the construction of the El Paso facilities would produce a significant boom-bust cycle in the Southcentral region. During the peak construction year of 1980, the Southcentral employment impact of the El Paso project would be 6.3 thousand persons. That represents an increase of more than one-third in the regional labor force. The Southcentral employment impact then falls rapidly to reach just 1.4 thousand persons by 1983. Because of the construction of the LNG plant and the marine terminal, the projected impact of the El Paso project on the area is even larger than that anticipated from the Alyeska oil pipeline construction.

Over the longer-run, the El Paso project is projected to increase the population of Southcentral Alaska by roughly 3.5 thousand persons. With the regional population projected to exceed 70 thousand persons by the late 1980's, an increase of that magnitude should not pose any particular problems. Of course, there may be some localized problems since much of this additional population will need to be located in the general vicinity of Gravina Point. This may involve the creation of a new community and thus, the projection of the necessary public services. In general, however, the main problems confronting the region will be those associated with the boom and subsequent bust during the construction phase of the El Paso project.

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Apart from the effects on the Anchorage and Southcentral regions, neither gas pipeline project would have a concentrated impact on the other regions of the state. Even in Fairbanks, the other region which might be expected to show a significant change, the impact of either project is quite limited. Fairbanks would be used as a staging area for the Arctic Gas project, but with all workers living in camps along the Arctic Coast, the net impact would be negligible. The effect of the El Paso project, which would pass through Fairbanks, would be larger but still relatively moderate. At the peak in 1980, the El Paso project is projected to have an employment impact on Fairbanks of 2.6 thousand persons. With a projected labor force well over 30 thousand persons and a population of 65 thousand, Fairbanks should not experience a boom-bust cycle such as that projected for the Southcentral region. The projected impact on Fairbanks of the El Paso project is substantially less than that anticipated from the construction of the Alyeska oil pipeline.

During the construction boom period, the relatively high wages paid to construction workers produces an increase in per capita wage and salary earnings in the impacted regions. The only instance in which this increase is really significant is in the Southcentral region under the El Paso proposal. In that particular case, the earnings per capita in 1980 increase by 24 percent. This, of course, reflects the fact that construction workers make up such a large proportion of the total labor force in that region in that year. In Anchorage and Fairbanks, the pipeline impact is much smaller relative to the total size of the regional economies. Therefore, there is only a slight increase in per capita earnings in those regions.

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Once the construction phase is completed, the increase in population in each of the regions of the state very closely matches the increase in wages and salaries. As a result, none of the regions experience a significant increase in wage earnings per capita. Because of its limited magnitude, the Arctic Gas proposal does not significantly increase earnings per capita in any region in any year.

Table 4-1

REGIONAL IMPACT ON EMPLOYMENT (Thousands of Persons)

		<u>Total</u>	Anchorage	Southcentral	Fairbanks	All Other
			<u>A</u>]	R <u>CTIC GAS</u>		
	•					
1.15	1978	•3	.0	•0	•0	•2
•	1979	1.2	•6	.1	.2	.3
	1980	2.7	1.4	•2	•4	•8
	1981	2.2	1.3	•2	•3	•5
	1982	2.1	1.3	•2	•.3	•4
	1983	2.5	1.4	•2	•3 -	.6
	1984	2.9	1.7	.2	.4	• 6
	1985	3.2	1.8	• • 3	•4	.7
	1986	3.5	2.1	•2	.4	•8
	1987	3.8	2.3	.3	•5	•7
	1988	4.1	2.5	3	.5	.8
	1989	4.3	2.7	.3	•2	.9
	1990	4.6	2.9	• 3	.6	• 8
			•			
		•				•
				$\underline{\mathbf{E}} \ \underline{\mathbf{L}} \ \underline{\mathbf{P}} \ \underline{\mathbf{A}} \ \underline{\mathbf{S}} \ \underline{0}$		
	1978	3.1	1.3	.4	•8	•6
	1979	12.2	4.6	4.1	1.8	1.8
· · ·	1980	21.3	10.0	6.3	2.6	2.4
	1981	20.1	10.6	4.7	2.2	2.6
	1982	16.6	9.0	2.4	2.2	3.0
	1983	13.1	7.2	1.4	1.8	2.7
	1984	12.2	6.6	1.4	1.7	2.4
	1985	12.1	6.7	1.5	1.7	2.2
•	1986	12.3	7.0	1.4	1.7	2.2
	1987	12.9	7.6	1.4	1.6	2.3
	1988	13.4	8.1	1.3	1.7	2.3
	1989	13.9	8.6	1.3	1.7	2.3
	1990	14.7	- 9.2	1.4	1.7	2.4
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Table 4-2

REGIONAL IMPACT ON POPULATION (Thousands of Persons)

		Total	Anchorage	Southcentral	<u>Fairbanks</u>	All Other
•			Δ. Τ			
•			<u> </u>			
	1978	•5	.0	.0	•0	.4
	1979	2.7	1.1	•3	•3·	.9
	1980	5.8	2.8	.6	•5	1.9
•	1981	4.8	2.6	.4	.4	1.4
	1982	4.7	2.5	.4	.4	1.4
	1983	5.4	2.9	•5	.5	1.5
•	1984	6.3	3.4	.6	.6	1.8
•	1985	6.9	3.7	•8	.6	1.9
	1986	7.7	4.2	•6	.6	2.3
	1987	8.4	4.7	•7	.7	2.4
•	1988	9.0	5.0	• • • • • • • • • • • • • • • • • • •	•7	2.6
- 1	1989	9.6	5.3	•7	•7	2.9 •
	1990	10.2	5.7	•8	•8	2.8
		•				
				ET DACO		
		•		<u>EL FASU</u>		•
	1978	6.7	2.7	1.2	1.2	1.6
	1979	26.9	9.5	10.9	2.8	3.7
	1980	46.8	20.4	16.8	4.1	5.6
	1981	44.2	21.7	12.5	3.3	6.6
	1982	36.6	18.3	6.2	3.3	8.8
•	1983	28.9	14.6	3.8	2.6	7.8
	1984	26.8	13.4	3.8	2.6	7.0
,	1985	26.6	13.5	3.8	2.4	6.8
	1986	27.1	14.0	3.6	, 2.4	7.0
· *	1987	28.2	15.2	3.6	2.4	7.1
	1988	29.4	16.1	3.5	2.4	7.5
· • .	1989	30.7	17.0	3.5	2.4	7.8
	1990	32.2	18.1	3.6	2.4	8.0
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Table 4-3

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REGIONAL IMPACT ON WAGES AND SALARIES (Millions of Dollars)

-		Total	Anchorage .	Southcentral	Fairbanks	All Other
			Α	RCTTC GAS		
			<u> </u>			
	1978	5.2	2.1	•8	1.0	1.2
Ĺ.	1979	28.2	9.1	4.9	7.2	- 7.0
	1980	58.1	25.4	7.6	11.0	14.0
- F	1981	43.4	25.2	3.6	5.8	8.8
۔ تــ	1982	45.5	26.3	3.9	6.2	9.1
	1983	54.7	32.2	4.6	6.4	11.5
7.	1984	67.2	33.2	7.0	9.0	18.0
	1985	77.3	44.0	6.0	9.8	17.5
	1986	90.4	53.7	6.0	10.6	20.1
Ξ.	1987	103.7	62.5	8.4	13.2	19.6
	1988	116.5	69.6	8.4	13.3	25.3
ц	1989	130.4	78.3	8.8	14.3	29.0
n	1990	146.1	88.8	13.0	18.1	26.1
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		•				
с.	and the second second			$\underline{\mathbf{E}} \ \underline{\mathbf{L}} \underline{\mathbf{P}} \ \underline{\mathbf{A}} \underline{\mathbf{S}} \underline{0}$		
-		•				•
	1978	67.9	22.0	14.1	23.2	8.5
· ·	1979	283.5	78.6	134.3	47.3	23.3
1	1980	488.4	177.7	221.2	66.0	23.5
, i	1981	448.2	201.0	159.6	56.6	31.0
	1982	367.4	180.3	72.8	51.8	62.5
	1983	284.1	153.2	34.7	36.2	60.0
	1984	276.7	141.0	36.6	37.5	61.6
- •••	1985	289.1	155.5	37.9	37.7	58.0
÷.	1986	311.2	170.7	39.7	39.7	61.2
-	1987	341.7	193.6	42.3	42.1	63.7
	1988	374.4	214.8	44.0	43.6	72.1
- 1 C	1989	411.3	239.3	46.6	46.8	78.6
-	1.990	455.0	269.3	52.0	51.6	82.1
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V. PROJECTED IMPACTS UNDER CHANGED FISCAL ASSUMPTIONS

A. Wellhead Price of North Slope Gas

A major factor determining the economic impact of either gas pipeline project is the amount of revenue generated for the state of Alaska. The revenues come from property taxes on the value of the pipeline and from production taxes and royalties on the wellhead value of the gas produced. Since the production taxes are levied on the value, not the volume, of gas being produced, these revenues are obviously dependent on the assumed wellhead price of the gas. In the basic set of estimates presented above, the wellhead price is assumed to be \$0.50 per million cubic feet. This is in accordance with the standard assumptions specified by the Aerospace Corporation.

The assumption concerning wellhead price has recently been challenged by a study produced by a-task force appointed by the Governor of Alaska. The task force report argues that the cost of transporting gas from the North Slope may be sufficiently high that the wellhead price of the gas will be zero or even negative. In that case, the production of the North Slope gas would generate no revenues whatsoever for the State of Alaska. The property taxes could, of course, still be levied on the gas pipeline. The task force goes on to recommend that the state of Alaska support a trans-Alaska gas pipeline such as the one proposed by El Paso Alaska. The key element underlying this conclusion is that the production of the gas is likely to generate no revenue for the state. Therefore, it is argued that the state will derive benefit from the North Slope gas only if the gas is available for use within the state itself. Under the Arctic Gas proposal the gas would obviously not be available for Alaskan use.

The state's position is summarized in the following excerpt from the task force report.

The task force has some concerns about the ability of either project to deliver gas competitively without government subsidy and with the result of a positive wellhead value. If the wellhead value is zero or very small, our royalties from the gas will be very slight and our severance taxes, which are based on wellhead value, will also be minimized. We find this to be a significant feature in our analysis since it has led us to conclude that if we are to derive any significant economic benefit from the developed Alaskan resource, it may well have to be through direct use of the gas ourselves... Accordingly, it is clearly in the State's best interest in obtaining a maximum return from its North Slope gas to keep that gas in the state for use here, and since we can only do that with a Trans-Alaskan line, it is in the State's interest to support such a route.

Since the assumption of a zero wellhead price for gas is so central to the position currently taken by the state of Alaska, this assumption is used here to make a second set of estimates of pipeline impact. These estimates are shown in Tables 5-1 through 5-5. To facilitate comparisons, similar impact measures from the basic set of estimates are also included in the tables. The first effect of the zero wellhead price is to sharply reduce state revenues. With a zero wellhead price, the Arctic Gas pipeline produces a minimal increase in state revenues. The increase in state revenues under the El Paso proposal is only about half as large as it was with a wellhead price of \$0.50.

The long-run employment impacts are also reduced sharply. The projected increase in employment in 1990 under the Arctic Gas proposal is only 500 persons (Table 5-3). In the basic set of estimates, the impact was 4.6 thousand persons. The 1990 employment impact of the El Paso proposal is reduced from 14.7 thousand persons to 10.5 thousand. As would be expected, the employment impact during the construction phase remains essentially unchanged. The small differences which are observed in the estimates are due to the elimination of the revenues earned on the production of gas used in the development of the field.

The reduction in the employment impact is accompanied by a much less rapid growth in population. The El Paso project is estimated to increase Alaska's population in 1990 by about 23 thousand persons (Table 5-4). That compares to a previous estimated impact of 32 thousand persons. With a zero wellhead price, the Arctic Gas proposal is estimated to increase the 1990 population by a little over one thousand persons rather than the previous estimates of ten thousand. As before, the El Paso project would produce a very large increase of population during the construction phase. With no revenues being generated by gas production, the growth in population would now taper off more rapidly following completion of construction.

The impact on personal income follows the same pattern as previously. It reaches a peak in 1980, declines through 1984, and then increases gradually over the rest of the period. The Arctic Gas impact on personal income is only \$19 million in 1990, that is an increase of less than 0.2 of 1 percent (Table 5-5). The El Paso impact is less than it was under a wellhead price of \$0.50, but it is still quite substantial. It amounts to \$367 million in 1990. Since the lower personal income impact is accompanied by a smaller population increase, the effect on per capita personal income is essentially the same as before.

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B. Rapid Development Fiscal Policies

In the basic set of estimates, it was assumed that the state would save 50 percent of its petroleum revenues. This allocation is obviously completely under the discretionary control of the state government. Since petroleum is a non-renewable resource, it seems likely that at least some portion of the revenues would be set aside for future use. The precise fraction which is set aside will be determined by the general social attitudes concerning the appropriate pace of growth in the state of Alaska. If the state should choose to limit its growth rate, it might decide to set aside a larger fraction of petroleum revenues; or if the state chooses to pursue more rapid economic development, it might set aside a much smaller fraction of revenue. Another set of impact measures are prepared in which it is assumed that the state pursues rapid development fiscal policies. As part of these policies, it is assumed the state saves only 25 percent of petroleum revenues.

As shown in Table 5-1, the rapid development fiscal policies produce almost no change in total state revenues. These policies do, however, produce a significant increase in state and local government expenditures (see Table 5-2). As compared with the basic set of impact estimates, government expenditures in 1990 are now \$50 million higher under the Arctic Gas proposal and \$110 million higher under the El Paso proposal. The impacts on employment are increased accordingly. The Arctic Gas proposal is now estimated to increase 1990 employment by 6.4 thousand persons and the El Paso proposal is estimated to increase employment by 18.9 thousand persons. The employment gap between the two proposals also widens modestly from 10.1 thou-

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sand persons to 12.5 thousand in 1990. For both proposals, the employment impact during the construction phase is much the same as in the basic set of estimates. It is only in the later years, when the gas revenues become more significant, that the rapid development policies produce substantial changes.

By 1990, the rapid development filscal policies produce an estimated population increase of over 41 thousand persons under the El Paso proposal. The population impact under the Arctic Gas proposal is estimated at 14 thousand persons in 1990. Both the level of population impacts and the gap between the two proposals have expanded in comparison to the estimates provided under the more moderate growth policies.

Under the rapid development fiscal policies, the impact on personal income is larger and growing more rapidly than in the basic set of impact estimates. This reflects the fact that the revenues generated by the gas pipeline projects have a greater relative effect in the context of more rapid economic growth. By 1990, the Arctic Gas impact on personal income is estimated at \$225 million and the El Paso impact is estimated at \$653 million. As usual, the increase in personal income is very nearly matched by the increase in population so that the net impact on per capita personal income is minimal.

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ALTERNATIVE FISCAL ASSUMPTIONS: STATE REVENUE IMPACTS

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	Basic Impact Estimates			Zero Wellhead Price		Rapid Development Fiscal Polic:	
		Arctic Gas	<u>El Paso</u>	Arctic Gas	El Paso	Arctic Gas	<u>El Paso</u>
	e de la composición d						
1978		2.8	17.0	2.8	17.0	2.8	17.1
1979		7.0	48.6	7.0	48.6	7.0	48.8
1980		62.8	154.7	13.1	105.0	63.2	157.6
1981		74.8	213.5	17.3	156.2	76.3	220.1
1982		82.5	224.7	14.3	138.5	82.8	230.1
1983		102.3	233.6	13.9	143.2	102.3	239.1
1984		122.6	239.6	14.1	129.7	122.4	244.1
1985		129.5	246.1	14.4	129.9	1.29.3	251.7
1986		148.8	269.6	15.0	134.5	147.9	275.4
1987		156.3	282.7	15.5	140.6	155.6	290.1
198 8		164.0	298.2	16.1	148.9	1.63.0	306.2
1989		171.9	314.9	16.8	158.3	170.9	324.5
1990		180.2	333.3	17.5	169.4	179.6	345.6

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ALTERNATIVE FISCAL ASSUMPTIONS: STATE-LOCAL GOVERNMENT EXPENDITURE IMPACTS

	. 34 <u>.</u> 	Basic Impact Estimates		Zero Wellhead Price		Rapid Development Fiscal Policies		
		Arctic Gas	<u>El Paso</u>		Arctic Gas	El Paso	Arctic Gas	El Paso
1978		2.1	13.0		2.1	13.0	2.2	13.1
1979		4.7	40.7		4.7	40.7	6.3	50.3
1980	•	38.5	149.6		13.7	124.8	53.9	183.6
1981		53.7	240.1	٠.	19.8	206.4	73.4	288.3
1982		55.4	242.5		12.9	190.9	75.9	292.9
1983		67.8	231.8		11.7	172.4	93.2	289.7
1984	•	82.9	216.6		11.7	143.2	113.8	279.1
1985		92.8	224.3		12.2	141.7	125.8	292.8
1986		108.6	247.0		12.9	149.2	146.0	323.6
1987		120.1	268.8		13.7	160.1	160.4	353.3
1988		132.3	296.0		14.6	175.9	174.7	386.4
1989		144.9	326.0		15.7	193.9	190.2	424.8
1990		158.8	360.1		16.9	216.3	207.8	470.3

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ALTERNATIVE FISCAL ASSUMPTIONS: EMPLOYMENT IMPACTS

		Basic Impact Estimates Zero Wellhead Price Rapid Developmen					t Fiscal Policies	
		Arctic Gas	<u>El Paso</u>	Arctic Gas	<u>El Paso</u>	Arctic Gas	<u>El Paso</u>	
1978	•	•3	3.1	•3	3.1	•3	3.1	
1979		1.2	12.2	1.2	12.2	1.2	12.3	
1980	•	2.7	21.3	1.8	20.6	3.2	22.4	J.
1981		2.2	20.1	1.0	19.0	2.7	21.7	õ
1982		2.1	. 16.6	•7	14.9	2.8	18.5	•
1983		2.5	13.1	.6	11.2	3.3	15.3	
1984	·	2.9	12.2	• 6	9.8	3.9	. 14.9	•
1985		3.2	12.1	.6	9.4	4.2	15.0	
1986		3.5	12.3	.5	9.3	4.8	15.6	
1987		3.8	12.9	-5	9.5	5.2	16.2	
1988		4.1	13.4	• 5	9.7	5.6	16.9	÷
1989		4.3	13.9	.5	10.1	6.0	17.9	
1990		4.6	14.7	•5	· 10.5	6.4	18.9	

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ALTERNATIVE FISCAL ASSUMPTIONS: POPULATION IMPACTS

Basic Impact Estimates			Zero Wellhe	ad Price	Rapid Development Fiscal Policies		
		Arctic Gas	<u>El Paso</u>	Arctic Gas	<u>El Paso</u>	Arctic Gas	<u>El Paso</u>
1978		•2	6.7	• 5	6.7	•5	6.6
19 79		2.7	26.9	2.7	26.9	2.7	27.1
1980	·	5.8	46.8	4.0	45.1	6.9	49.2
19 81		4.8	44.2	2.2	41.7	5.9	47.5
1982		4.7	36.6	1.6	32.9	6.2	40.8
1983		5.4	28.9	1.3	24.5	7.3	33.6
1984		6.3	26.8	1.2	21.5	8.6	32.7
1985		6.9	26.6	. 1.2	20.7	9.3	33.0
1986		7.7	27.1	1.2	20.4	10.6	34.3
1987	1 - 12 	8.4	28.2	1.2	20.9	11.5	35.7
1988		9.9	29.4	1.2	21.4	12.3	37.2
1989		9.6	30.7	1.2	22.3	13.2	39.2
1990		10.2	32.2	1.2	23.2	14.1	41.4

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ALTERNATIVE FISCAL ASSUMPTIONS: TOTAL PERSONAL INCOME IMPACTS

	Basic Impact Estimat	<u>tes</u>	Zero Wellhead	Price Rapid	Development Fis	scal Policies
	Arctic Gas El I	<u>Paso A</u>	rctic Gas	<u>El Paso</u>	Arctic Gas	<u>El Paso</u>
1978 1979	6.0 78 32.4 32	3.0	6.0 32.4	78.0 325.5	6.1 33.3	77.1 328.2
1980 1981 1982	66.6 - 559 49.7 512 52.0 419	9.5 2.8 9.7	47.7 22.0 16.4	542.2 486.0 377.5	77.9 62.3 67.7	582.9 548.1 463.3
1983 1984 1085	62.5 324 76.5 315	4.1 5.2	14.6 14.3	273.0 250.6	84.1 104.0	377.2 382.1
1985 1986 1987	88.0 328 102.8 353 117.7 387	3.9 3.7 7.8	14.6 15.1 15.8	253.2 263.5 283.6	140.5 159.6	406.1 444.0 485.5
1988 1989 1990	132.0424147.7465165.1514	4.4 5.7 4.4	16.8 18.0 19.4	306.1 335.5 366.8	179.2 200.5 224.6	532.8 588.3 653.0

VI. OTHER GAS PIPELINE IMPACTS

From the experience with the Alyeska oil pipeline, it is apparent that a gas pipeline will produce effects not reflected, or reflected only partially, in the impact measures discussed above. Massive construction projects cannot help but have disruptive effects when imposed on an economy as small as that of Alaska. The disruption can be particularly severe in those localities directly impacted by the pipeline construction.

In the past year, the consumer price index for Alaska rose more rapidly than the comparable measure for the U.S. as a whole. This was the first time since statehood that this had happened. Prior to 1974, the Anchorage CPI had consistently risen less rapidly than the U.S. price index. Since Anchorage serves as the commercial center for the entire state, the behavior of prices in Anchorage is probably a fair indication of price behavior throughout the state.

The housing situation in Fairbanks, which is much more directly impacted` than Anchorage, is approaching the point of a zero vacancy rate. In this condition of extreme excess demand, rents are rising very rapidly. In fact, housing is difficult to secure at any price. The housing situation in Valdez, a community of about 1,000 people at the southern terminus of the Alyeska pipeline, is becoming preposterous. A recent newspaper account reported a two-bedroom apartment in Valdez being rented for \$1,600 a month.

In Fairbanks, a variety of social impacts are becoming increasingly significant. Crimes of robbery, vice, drunkeness, and assault are reported to have increased markedly. The perceived rise in the rate of teenage crime,

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particularly drug abuse and shoplifting, has been attributed in part to the necessary double shifting of both elementary and high schools. Long-time Fairbanks residents complain incessantly about the increase in traffic congestion. The telephone system, which was far from a model of efficiency originally, is on the verge of collapsing entirely under the strain. It is often quicker to send a messenger several miles rather than to attempt to live place a phone call to downtown Fairbanks.

The increases in the cost of living and the social impacts have, of course, been very unevenly distributed over the population of Fairbanks. The changes have been particularly painful for persons with fixed incomes and limited mobility. Even among the working population, substantial numbers of people have experienced declines in real income. Salary increases in non-pipeline jobs have not kept pace with the increasing cost of living, particularly the cost of housing.

Having made all of the above observations concerning the disruptions produced by pipeline construction, it should be noted that there are two very serious reservations concerning their applicability to the gas pipeline situation. First, there is little or no reliable data being collected to show that the disruptions are as widespread as is popularly presumed. Second, even if it is true that the construction of the oil pipeline is now causing these types of social impacts, it is not clear that the construction of the gas pipeline will produce the same sorts of impacts. In fact, there are compelling reasons to think that the construction of the gas pipeline will have significantly less impact than the construction of the oil pipeline is having.

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Unless there is a significant unanticipated delay in the startup of the construction of the gas pipeline, it should follow very closely upon the completion of the oil pipeline. This means that the gas pipeline will be introduced into an economy which has already had several years to adjust to the strains of the oil pipeline construction. Even if the El Paso system is built, that project is no larger then the Alyeska oil pipeline. Thus, the gas pipeline should not be viewed as a major strain being placed upon an unprepared economy, but at most, the continuation of an existing situation.

At the time that a gas pipeline might be constructed, the state will also be in a much sounder fiscal position to meet any strains associated with that construction. During that period the revenues from North Slope oil production will begin to flow into the state treasury. Although the state will need to satisfy certain deferred demands for public services, it should not be under the extreme fiscal strain that it is now experiencing. In particular, the state should be in a position to transfer the necessary funds to those communities experiencing a disproportionate share of the gas pipeline impact. Finally, it should be stressed that all of the above comments apply only to the El Paso pipeline proposal. The Arctic Gas project would have such a minor impact on Alaska that it could not conceivably be viewed as placing a social or economic strain on the state.

An issue which has been raised in connection with the Alyeska oil pipeline, and which will undoubtedly be relevant to the gas pipeline as well, is the matter of how much it can be expected to add to employment of Alaskan Natives. In general, the answer seems to be that a pipeline project generates only modest amounts of Native employment. The Fairbanks Native Center

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estimates that at any point in time only about 500 Natives are employed on the Alyeska pipeline. Of course, there is a very high rate of turnover so that during the course of a year many more than 500 individuals may be employed on the pipeline. Thus, the Native employment at a particular point in time may significantly underestimate the number of Native families which receive some income from pipeline employment.

There is one other potential impact of the gas pipeline that needs to be mentioned because it has been stressed by the Governor's task force. The argument is made that the El Paso proposal offers benefits to Alaska by making gas available for use within the state. This argument has a great deal of appeal for many segments of the Alaska population. Unfortunately, no data or analysis have been presented to confirm or refute the validity of the argument.

North Slope gas could conceivably be used for home heating in Alaska. Since Anchorage is already being supplied with natural gas from Cook Inlet, Fairbanks would be the primary market for home heating gas. But a refinery is now being constructed in North Pole, just outside Fairbanks, to produce home heating fuels from North Slope oil. Thus, the North Slope gas would have to compete with the North Slope oil for the Fairbanks market. To the extent that this competition were effective, it would undercut the economic viability of the North Pole refinery. Furthermore, there is some possibility that, under the climatic conditions in Fairbanks during the winter, the use of gas for home heating might produce more environmental problems than the use of oil.

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The task force report also stresses that, under the El Paso proposal, North Slope gas could be used in Alaska for industrial purposes, particularly in the production of petrochemicals. While such a possibility does exist, at least in principle, there are two serious weaknesses in this line of argument. First, it is not clear that a gas-using industry would choose to locate in Alaska without state subsidies. Second, even if such an industry did locate in Alaska, it is not obvious that it would generate benefits for the state sufficient to outweigh the associated economic and environmental costs. In the absence of careful industry studies, it is not possible to say whether the use of North Slope gas within Alaska would generate net benefits or net costs for the state.

VII. SUMMARY OF FINDINGS

In the context of the general growth and development of the Alaska economy, the two proposed gas pipeline projects are estimated to have the

following impacts:

Arctic Gas

- During the construction phase, the Arctic Gas pipeline would have a maximum annual impact on employment of roughly 2.7 thousand persons. The associated increase in personal income would be \$67 million. In both cases the impact represents less than a 2 percent increase.

- At full production of 3.5 billion cubic feet per day, the gas pipeline would generate severance taxes and royalties of \$105 million a year. The property taxes on the pipeline would amount to \$10 million a year. These tax estimates assume the current tax rates would be continued into the future.

- Over the longer-run, as illustrated by the projected 1990 data, the estimated impact on employment would be 4.6 thousand persons. The impact on personal income would be \$165 million and the increase in population would be 10 thousand. In all cases the impact is less than a 2 percent increase.

- The Arctic Gas pipeline would produce no significant impact on personal income per capita and would generate only a slight increase in state and local government expenditures per capita. This reflects the fact that the projected aggregate economic impact is offset by the projected increase in population.

- Since the Arctic Gas pipeline is located in a remote area of the state, the impact would be concentrated on the supply centers of Anchorage and Fairbanks. With no major communities in the immediate vicinity, the Arctic Gas pipeline would have no particularly disruptive local effects.

- If the wellhead price of natural gas should fall to zero, rather than the assumed value of \$0.50 per mcf, the long-run impact of the Arctic Gas pipeline would be negligible.

El Paso

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- During the construction phase, the proposed El Paso gas pipeline is estimated to increase employment by 21 thousand persons, to increase personal income by \$560 million, and to increase population by 47 thousand persons. These impacts represent increases of between 10 and 15 percent. - At full production, the El Paso pipeline would result in production taxes and royalties of \$105 million a year, the same as under the Arctic Gas proposal. At current tax rates, the El Paso pipeline would produce property taxes of \$72 million a year.

- Over the longer-run, as illustrated by the projected 1990 data, the El Paso pipeline would result in an increase in employment of 14.7 thousand persons, an increase in personal income of \$514 million, and an increase in population of 32 thousand persons. These are all increases of roughly 5 percent and are substantially larger than the increases projected under the Arctic Gas proposal.

- The El Paso pipeline would result in no significant change in personal income per capita and there would be only a slight increase in state and local government expenditures per capita. These results are essentially the same as those obtained under the Arctic Gas proposal.

- The impact due to the construction of the El Paso pipeline would be heavily concentrated on Southcentral Alaska and particularly on the vicinity of Valdez. The Southcentral region would also experience a long-run impact due to the operation of the LNG facilities at Gravina Point. However, most of the long-run impacts would be concentrated on the commercial center of Anchorage and, to a lesser extent, on Fairbanks.

- If the wellhead price of natural gas should be zero, the long-run impacts of the El Paso pipeline would be cut by 25 to 30 percent, but would still remain quite substantial.

- If the El Paso project were undertaken in the context of state policies to promote rapid economic development, the impact of the project would be increased by about 30 percent. Under these state fiscal policies, the projected impact for 1990 would be to increase personal income by \$653 million and to increase population by 41 thousand persons. As before, there would be no significant impact on personal income per capita.

TECHNICAL APPENDIX

1.

ALASKA ECONOMIC MODEL

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KEY TO ALASKA ECONOMIC MODEL VARIABLES

For industry variables beginning in XX, EM, WS, WR:

XX = Real output

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- EM = Employment
- WS = Wages and salaries
- WR = Wage rates

Industry identification codes:

A9	Agriculture, Forestry and Fisheries
P9	Mining
CN	Construction (CN° is non-pipeline construction)
м9	Manufacturing
Т9	Transportation
CM	Communications
PU	Public Utilities
D9	Trade
FI	Finance, Insurance, Real Estate
S9	Service
GF	Government-Federal
GA	Government-State and Local
9 9	Total
CV	Civilian
OT	Other

Definition of other variables

BSGS	State Government Revenue from Business License Taxes and
	Selective Sales and Gross Receipts
CPIU	U.S. Consumer Price Index
ECONX	Employment in Pipeline Construction
ECPS	State Government Construction Bond Funds
E99L	Local Government Total Expenditure
E99S	State Government Total General Expenditure
GFBAL	State Government and General Fund Balance
PI	Personal Income
PIBR	Real Personal Income
PINW	Nonwage Personal Income
POP	Population
POPM	Population, Military
POPMD	Population, Military Dependents
POPN	Population, Native
PPX	Population excluding Natives, Military, and Military Dependents
RFDL	Local Government Revenue from Federal Government
RFDS	State Government Revenue from Federal Government

State Government Interest Revenue RINS RMCL Local Government Charges and Miscellaneous General Revenue RM9S State Government Revenue, Miscellaneous RN Rate of Natural Increase for Native Population -ROR Rate of Return earned on the State General Fund Balance RPES State Government Revenue Bonuses from Mineral Leases (State Lands) RPI Relative Price Index RP8S State Government Petroleum Revenue Other than Bonuses RP9S State Government Total Petroleum Sector Revenue State Government Total Special Fund Revenue RSFS RSTL Local Government Revenue. From State Government RTCS State Corporate Income Taxes RTIS State Individual Income Taxes RTOL Local Government Other Taxes RTPL Local Government Property Taxes R99L Local Government Total General Revenue **R99S** State Government Total Revenue SAVR Proportion of State Government Petroleum Revenue placed in an Investment Trust Fund SAVS Amount of State Government Petroleum Revenue placed in an · Investment Trust Fund SLGEXP State and Local Government Expenditures Ť. Time WEUS U.S. Average Weekly Earnings

Note:

A "1" added to the end of a variable name indicates that the variable has been lagged one time period.

A "L" added to the end of a variable name indicates that the natural logarithm of the variable has been taken.

ALASKA ECONOMIC MODEL

A-3-

Agriculture, Forestry and Fisheries

XXA9	exogenous
EMA9	exogenous
EMOT	exogenous
WRA9L	= 7.71921 + .433 WEUSL

Mining

	 A second s	
EMP9	exogenous	
XXP9L	= 4.35829 + 1.50338 EMP9L	,
WRP9L	= 5.52326 + .88036 WEUSL	

Construction

ECONX	exogenous
XXCNL°	= -2.22252 + .92144 PIBRL
EMCNL°	= -2.30714 + 1.05848 XXCNL°
XXCN	= [(EMCN° + ECONX)/EMCN°] XXCN°
EMCN	= EMCN° + ECONX

Manufacturing

XXM9 exogenous EMM9L = -.45625 + .23307 XXM9L + .71225 EMM91L WRM9L = 2.07508 + 1.41076 RPIL

Transportation

XXT9L = -.94592 + .67173 PIBRL + .14876 XXP9L EMT9L = -.55993 + .40059 XXT9L + .33149 EMT91L WRT9L = 4.94191 + .90331 WEUSL

Communications

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XXCML = 3.38979 + .16404 PIBRL EMCML = -4.64274 - .03751T + 1.34452 XXCML WRCML = 6.63249 + .62714 WEUSL

Public Utilities

XXPUL	= -7.06537 + 1.56139 PIBRL
EMPUL	= -3.0158502040T + .86732 XXPUL
WRPUL	= 4.26448 + 1.09146 WEUSL

Trade

XXD9L = -2.46867 + 1.03333 PIBRL + .06377 XXP9L EMD9L = -1.72460 + .90468 XXD9L WRD9L = 5.90984 + .65622 WEUSL

Finance, Insurance, Real Estate

XXFIL = -3.17268 + 1.12331 PIBRL EMFIL = -1.77193 + .03116T + .57861 XXFIL WRFIL = 4.17482 + 1.02939 WEUSL

Services

XXS9L = -4.25405 + 1.24981 PIBRL EMS9L = -.68919 + .35580 XXS9L + .69514 EMS91L WRS9L = 2.22973 + 1.32098 RPIL

Federal Government

XXGF exogenous EMGFL = -1.69731 - .00375T + 1.02948 XXGFL WRGFL = 3.53628 + 1.15614 WEUSL

State and Local Government

WSGAL = -.86658 + 1.01196 SLGEXPL WRGAL = 4.53025 + .98515 WEUSL EMGA = WSGAL/WRGAL XXGAL = 1.38405 + .97604 EMGAL

Personal Income

PINWL	=	83235 + .88192 WS99L
PI	=	WS99 + PINW
PIBR	=	PI/RPI
RPIL	=	1.17055 + .82072 CPIUL

Population

POPM	exogenous
RN	exogenous
POPMD	= 1.12 POPM
POPN	= (1. + RN) POPN1
EMCV	= EM99 - POPM
PPXL	= .86443 + .94466 EMCVL
POP	= PPX + POPN + POPM + POPM
POPC	= POP $-$ POPM
State and Local Government Revenues and Expenditures

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RP8S	exogenous
RFDS	exogenous
RPBS	exogenous
ROR	exogenous
RINS	= ROR (GFBAL1)
RTISL	= -6.08130 + 1.32952 PI1L
RTCSL	= -9.29373 + 1.52890 PI1L
BSGSL	= -3.20382 + .89666 PI1L !
RM9SL	= -6.65284 + 1.39523 PI1L
RSFSL	= -9.05880 + 1.61653 PI1L
RP9S	= RP8S + RPBS
R99S	= RTIS + RTCS + BSGS + RM9S + RINS + RSFS + RP9S + RFDS
ECPS	exogenous
SAVR	exogenous
SAVS	= SAVR (RP8S)
E99S	= R99S $-$ SAVS
GFBAL	= GFBAL1 + R99S - E99S + ECPS
SLGEXP	= E99S + E99L - RSTL
RFDL	exogenous
RTPLL	= -6.02962 + 1.31906 PI1L
RTOLL	= -6.75126 + 1.25343 PI1L
RMCLL	= -8.88866 + 1.71968 PI1L
R99L	= RTPL + RTOL + RMCL + RSTL + RFDL
E991. =	R991.