HIGH TECH: ALASKA'S BOOM INDUSTRY?

By John Van Houten

Alaska has not enjoyed the rapid (and highly publicized) growth in high technology employment experienced by some other regions of the country. A review of the nature of high technology and some of the trends surrounding these industries reveals why Alaska has not shared in this phenomenon. Most people working in high technology occupations are directly involved in developing or applying new technologies. While computer and electronics specialists, engineers, mathematicians, physical and life scientists, and engineering and science technicians are clearly included, no standardized, universally accepted definition of high technology exists.

The U.S. Department of Labor, Bureau of Labor Statistics (BLS), has identified three different, though overlapping, groups of high tech industries. Group I high tech industries are determined on the basis of their workforce. An industry is classified high tech if the number of its employees working in scientific and technical fields are at least one and a half times the average for all industries. Group II industries are industries that have a ratio of research and development expenditures to net sales that is at least twice the average for all industries. Inclusion into Group III is based both on the composition of the labor force and on research and development expenditures. Manufacturing industries are included in Group III if the proportion of scientific and technical workers in the industry was at least equal to the average for all manufacturing industries and the ratio of research expenditures to sales was at least close to the average for all industries.

Where does Alaska rank in a comparison of high technology employment? When taken as a percentage of total nonagricultural employment, Alaska ranks 46th among the states and U.S. possessions under the workforce definition. Alaska is tied for last place in Group II, under the definition of research and development expenditure as a percent of sales. Alaska ranks 50th when the hybrid of workforce skills and research and development definition of Group III is used (See Table 1).

Forty-eight industries have been classified as high tech by the BLS based on the proportion of their workers in scientific and technological fields (more than one and a half times the national average for all industries, see Table 2, Group I). Heavy construction, engineering services, wholesale heavy machinery, crude petroleum and natural gas production, and communications services are the major high tech industries contributing employment in Alaska.

When high technology is defined in terms of the ratio of research and

development expenditures to net sales, i.e., at least twice the 6.2% national average of all industries, Alaska is found to be without significant high tech employment (See Table 2, Group II). While there are state of the art technological applications in Alaska (especially in communications and oil exploration and extraction) there is very little actual research at development. In addition, since there is only very limited research and development outside of the manufacturing sector (both here and in the lower forty-eight) it is hardly surprising that Alaska, with so little primary manufacturing, is unrepresented.

A definition based on the proportion of technology-oriented workers equal to or greater than the national average (6.3%) and the ratio of research and development expenditures to sales equal to or greater than the national average (3.1%) identifies 28 major industrial groups none of which have

Table 1
High Technology Industries
Percent of Firms Qualifying as High Technology by State and U.S. Position
By Three BLS Definitions of 'High Tech'

Group I		Group II		Group III	
Delaware	25.1	Connecticut	6.8	Delaware	14.8
Michigan	19.8	New Hampshire	6.8	Connecticut	12.5
Connecticut	19.3	Arizona	6.6	Massachusetts	11.4
New Hampshire	18.4	Vermont	6.5	New Hampshire	11.2
Indiana	16.6	California	6.2	New Jersey	10.1
Texas	16.6	Massachusetts	6.0	Vermont	9.8
Massachusetts	16.5	Washington	5.6	California	9.6
New Jersey	16.4	Kansas	4.4	Arizona	8.4
Ohio	16.0	Puerto Rico	4.1	Puerto Rico	8.1
California	15.5	Utah	4.0	Washington	7.8
Oklahoma	15.4	New Jersey	3.7	Indiana	7.6
Vermont	15.4	Colorado	3.3	Kansas	7.0
Kansas	15.0	Minnesota	3.2	Minnesota	7.0
Colorado	14.4	Missouri	3.1	New York	6.7
Illinois	14.2	Indiana	3.0	Colorado	6.6
Arizona	14.0	**United States**	2.8	Missouri	6.5
Wisconsin	14.0	Florida	2.8	**United States**	6.3
United States	13.7	New York	2.8	Tennessee	6.2
Missouri	13.7	Texas	2.5	South Carolina	6.1
Minnesota	13.1	Maryland	2.1	Utah	6.0
Pennsylvania	13.1	Illinois	2.0	Illinois	5.9
Louisiana	13.0	Pennsylvania	2.0	Pennsylvania	5.9
Iowa	12.9	Rhode Island	2.0	Texas	5.9
Tennessee	12.9	Maine	1.9	Ohio	5.8
Washington	12.8	North Carolina	1.9	Wisconsin	5.5

significant employment in Alaska (see Tables 1 & 2, Group III).

Clearly, by any definition, high technology employment in Alaska is very limited and well below the national average level. A brief look at some of the trends in high tech employment further explains why Alaska has not participated in the high tech boom.

High technology enterprises usually locate in or near major research areas and universities that originate the ideas and technology that are then developed commercially by high tech entrepreneurs. High tech companies usually locate in areas that have a rich industrial infrastructure; a highly trained, technologically sophisticated labor pool; and in areas with low labor costs. In addition, high tech companies tend to locate in areas that already have a high concentration of high tech enterprises. Clearly all of

Group I		**Group II**		**Group III**	
New York	12.5	Oklahoma	1.8	Maryland	5.2
South Carolina	12.4	Alabama	1.7	Virgin Islands	5.2
Kentucky	12.0	Nebraska	1.7	North Carolina	5.1
Utah	11.9	Ohio	1.7	Virginia	4.6
Arkansas	11.8	New Mexico	1.6	Arkansas	4.5
Wyoming	11.6	Oregon	1.6	Florida	4.5
Maryland	11.4	Idaho	1.5	Idaho	4.5
North Carolina	11.2	Iowa	1.3	West Virginia	4.5
New Mexico	10.9	South Carolina	1.3	Rhode Island	4.4
Puerto Rico	10.9	South Dakota	1.3	New Mexico	4.3
Mississippi	10.6	Georgia	1.2	Oregon	4.2
Virginia	10.4	Tennessee	1.0	Louisiana	4.0
Alabama	10.3	Virginia	1.0	Alabama	3.8
West Virginia	10.2	Michigan	0.9	Michigan	3.8
Idaho	10.0	Kentucky	0.8	Kentucky	3.7
Georgia	9.8	Arkansas	0.7	Oklahoma	3.7
Florida	9.6	Mississippi	0.7	Iowa	3.3
North Dakota	9.4	Nevada	0.7	Mississippi	3.3
Oregon	9.3	Louisiana	0.6	Nebraska	3.3
Rhode Island	9.3	Wisconsin	0.6	Georgia	3.2
Nebraska	9.0	Delaware	0.5	Maine	3.1
Alaska	8.2	North Dakota	0.2	Nevada	2.8
Virgin Islands	8.1	West Virginia	0.2	South Dakota	2.5
South Dakota	7.9	Dist. of Columbia	0.1	Wyoming	1.1
Montana	7.5	Montana	0.1	Montana	0.9
Maine	7.0	Wyoming	0.1	**Alaska**	0.6
Nevada	6.6	**Alaska**	•	Dist. of Columbia	0.6
Dist. of Columbia	5.3	Hawaii	•	Hawaii	0.5
Hawaii	4.2	Virgin Islands	•	North Dakota	0.5

Source: U.S. Department of Labor, Bureau of Labor Statistics; ES202 Report on Employment and Wages.

• Too small to be significant.

these trends, when combined with Alaska's already formidable problems of geographic isolation, severe weather, and small population explain the lack of high technology employment in Alaska.

Alaskans can console themselves, however, by realizing that for all the publicity surrounding the admittedly high growth rates for high tech employment, the actual number of jobs generated nationally is relatively small. Also, the original base was quite small, in comparison to the workforce as a whole. In the next ten years, the proportion of high tech jobs will only increase from the present 3% to a projected 4% of the workforce. High technology industries will be responsible for only 6% of the new jobs

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Table 2
High Technology Industries
By Three BLS Definitions of 'High Tech'

SIC	Industry	High Tech Group I	II	III	Alaska # of Firms	Emp.
131	Crude petroleum and natural gas	X			20	2287
162	Heavy construction, except highway and street	X			217	5794
281	Industrial inorganic chemicals	X		X	0	0
282	Plastic materials and synthetics	X		X	0	0
283	Drugs	X	X	X	0	0
284	Soaps, cleaners, and toilet preparations	X		X	0	0
285	Paints and allied products	X		X	1	•
286	Industrial organic chemicals	X		X	0	0
287	Agricultural chemicals	X		X	1	•
289	Miscellaneous chemical products			X	0	0
291	Petroleum refining	X		X	4	•
301	Tires and inner tubes	X			0	0
324	Cement, hydraulic	X			0	0
348	Ordnance and accessories	X		X	0	0
351	Engines and turbines	X		X	0	0
352	Farm and garden machinery	X			0	0
353	Construction, mining, and material handling machinery	X			4	20
354	Metalworking machinery	X			1	•
355	Special industry machinery, except metalworking	X		X	0	0
356	General industrial machinery	X			1	•
357	Office, computing, and accounting machines	X	X	X	0	0
358	Refrigeration and service industry machinery	X			0	0
361	Electric transmission and distribution equip.	X		X	0	0
362	Electrical industrial apparatus	X		X	0	0
363	Household appliances	X			0	0
364	Electric lighting and wiring equipment	X			0	0
365	Radio and TV receiving equipment	X		X	0	0

expected to be created in the next decade. It is also interesting to note that of the jobs generated by high technology industries, less than one-third of these jobs will be technological in nature. The remaining two-thirds will ' ' in the usual mix of managerial, clerical, service, and production.

It is helpful to keep in mind as the media continues its fascination with the 'miracle' of high technology, that in the eighties, both in Alaska and nationwide, employment growth in absolute numbers will be dominated by sales and service occupations, not high technology occupations. (See July *Alaska Economic Trends.)*

SIC	Industry	High Tech Group I	II	III	Alaska # of Firms	Emp.
366	Communication equipment	X	X	X	1	•
367	Electronic components and accessories	X	X	X	0	0
369	Miscellaneous electrical machinery	X		X	3	•
371	Motor vehicles and equipment	X			1	•
372	Aircraft and parts	X	X	X	1	•
376	Guided missiles and space vehicles	X	X	X	0	0
381	Engineering, laboratory, scientific, and research instruments	X		X	0	0
382	Measuring and controlling instruments	X		X	0	0
383	Optical instruments and lenses	X		X	0	0
384	Surgical, medical, and dental instruments	X		X	0	0
386	Photographic equipment and supplies	X		X		0
483	Radio and TV broadcasting	X			52	1187
489	Communication services, n.e.c.	X			24	1543
..	Electric services	X			48	1181
493	Combination electric, gas and other utility services	X			3	•
506	Wholesale trade, electrical goods	X			63	705
508	Wholesale trade, machinery, equipment, and supplies	X			175	2452
737	Computer and data processing services	X		X	59	496
7391	Research and development laboratories	X		X	9	78
891	Engineering, architectural, and surveying services	X			330	3042
892	Noncommercial educational, scientific and research organizations	X			31	329

Source: U.S. Department of Labor, BLS Monthly Labor Review, Nov., 83.

1/ ES202 Report, 3rd Quarter 1983.
• Nondisclosable