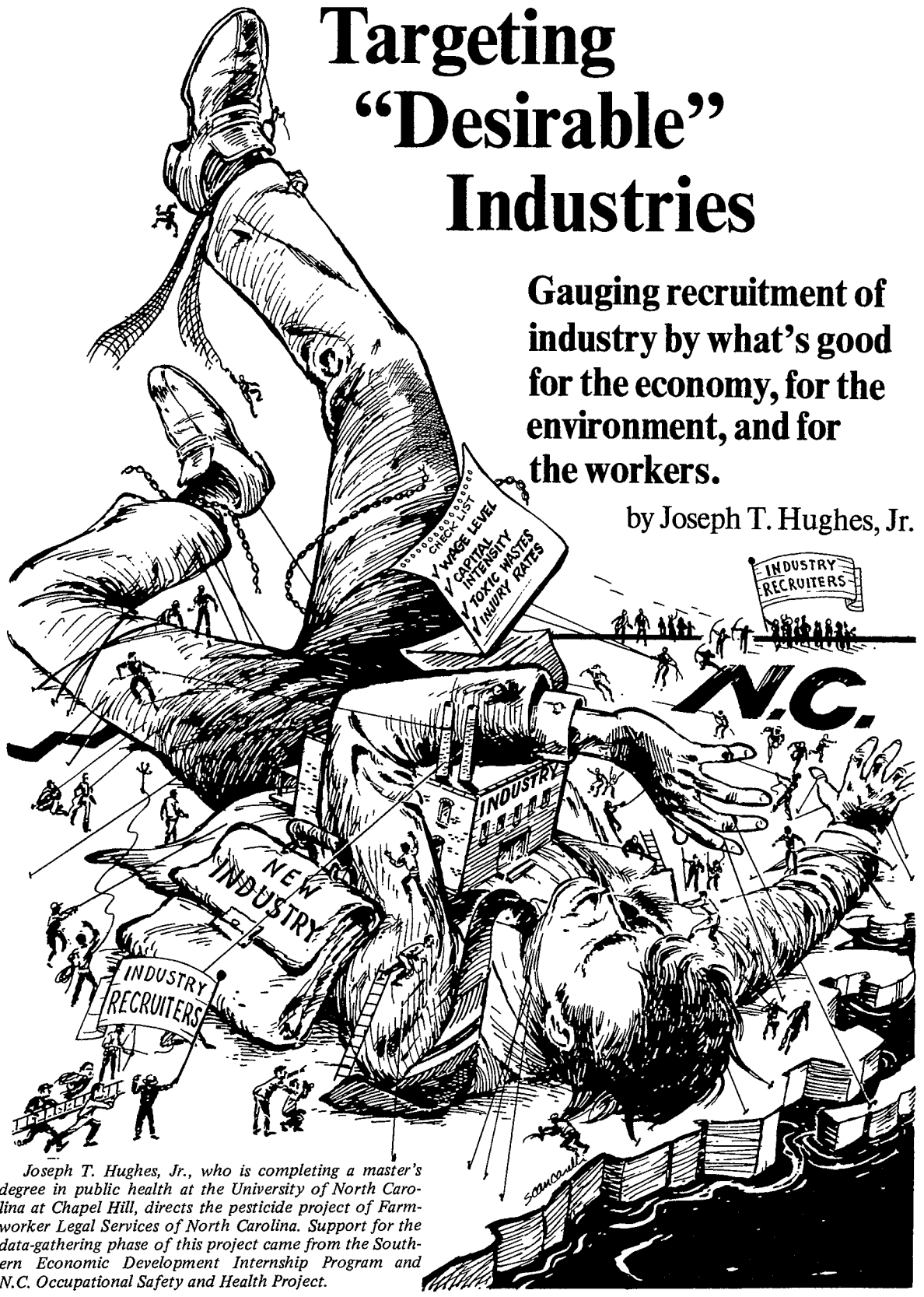


# Targeting “Desirable” Industries

Gauging recruitment of industry by what's good for the economy, for the environment, and for the workers.

by Joseph T. Hughes, Jr.



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Throughout the 1970s, every gubernatorial administration in North Carolina made industrial recruitment a major priority. Indeed, some \$6.6 billion in new industry came to the state during the decade, two-thirds of it since 1977.<sup>1</sup> The focus in this recruitment campaign was to raise the state's average industrial wage and per capita income and to "balance" industrial growth throughout the state.

Historically, North Carolina has ranked very low in wages and income in national indices, primarily because of the large number of farms and the concentration of the lower-paying textile, apparel, and furniture industries. To improve the economic condition of the state, administrations during the 1970s searched for more capital-intensive, higher-paying industry. They used whatever lures were available to land coveted companies in industrial sectors like electronics, machinery, and transportation. The highly-publicized campaign of Gov. James B. Hunt, Jr. to attract the microelectronics industry to the state perhaps best illustrates this trend.<sup>2</sup>

As industry hunters rushed to broaden the state's industry base and improve wages and incomes, other policymakers began to consider the effects that a large influx of new industry would have on the state's environment. In 1971, the N.C. General Assembly passed a law that directed the Department of Conservation and Development to "conduct an evaluation...of the effects on the State's natural and economic environment of any new or expanding industry or manufacturing plant locating in North Carolina."<sup>3</sup> (In 1977, following reorganization of the executive branch, industrial recruitment functions shifted to the Department of Commerce and this statute was recodified and changed to read: "The Department of Commerce shall conduct an evaluation in conjunction with the Department of Natural Resources and Community Development...") In 1980, the Governor's office established the Toxic Substances Project within the N.C. Board of Science and Technology. And in 1981, the General Assembly passed the Waste Management Act,<sup>4</sup> one of Gov. Hunt's top legislative priorities for the session.

These actions indicate a growing awareness of the role of environmental concerns in the industrial recruitment matrix, but they have not been strong enough to influence in a major way the character of the state's industrial recruitment policy. "No in-depth environmental evaluation [of new industry] is conducted by the Department of Commerce," reported the Legislative Research Commission's Study Committee on the Management of Waste Disposal, Hazardous and Toxic Substances, Air Quality, Noise Pollution, and Pesticides in 1980.<sup>5</sup> The report went on to

say, "The Department of Commerce recommended that the current statute [143B-437] be repealed or clarified."<sup>6</sup> A review of the Department of Commerce (DoC) annual reports on new industry for the past decade reveals no evaluation of the issues of environmental soundness or worker health. But the functions of the Department, as delineated in state law, include "the expansion and recruitment of environmentally sound industry" and "labor force development."<sup>7</sup>

Department of Commerce officials state that the Department does exhibit concern for environmental issues. They point to a two-person staff that works entirely on environmental concerns of new companies. These two persons explain various environmental standards to potential new companies and work to fit an industry's needs into the best possible state location (i.e., if a company is a major water discharger, DoC urges it to avoid river areas with pollution problems). As an overall policy, Department officials say that regulatory methods — permits, legal standards, etc. — are the best means of considering environmental questions.

The Department's explanation for how it considers environmental issues in industrial recruitment raises questions of major importance. DoC officials say, for example, that its annual reports do not address environmental issues because companies have to abide by existing environmental permit requirements, which are enforced primarily by the Department of Natural Resources and Community Development. Relying on a permit system that goes into effect only *after* new industry arrive represents a limited view of DoC responsibility for the environmental impact of new industry. Secondly, how can a two-person staff adequately cope with the complex range of environmental issues for the more than 500 new companies that approach North Carolina each year regarding possible location in the state. A staff of this size in a department with an \$18 million annual budget — \$2.7 million of which is allocated for two divisions primarily responsible for industrial recruitment (Industrial Development and International Development) — represents a modest commitment indeed to environmental concerns. Finally, DoC officials acknowledge that the Department incorporates virtually no efforts concerning worker health issues into its industrial recruitment program. All of these factors indicate a major gap in the state's industrial recruitment strategy: *Criteria for seeking new industry do not include environmental factors to a significant degree and ignore worker health factors entirely.*

Considering economic criteria exclusively in industrial recruitment efforts is a natural inclination, for the historical character of the state

## *"No in-depth environmental evaluation is conducted by the Department of Commerce."*

demands attention to improving the low average industrial wage, the low per capita income, and the industrial mix. But the impact of new industry on the environment and on workers' health must also concern policy planners, for the state must retain a commitment to protecting its human and natural resources. While industrial recruiters and environmentalists often view their goals as incompatible, some types of industry offer great economic rewards with minimal environmental and health threats. These industries need to be identified and encouraged to come to the state.

This article represents an initial effort to incorporate economic and environmental/health factors in developing an overall industrial "desirability" index. Because little attention has been given to environmental issues and none at all to worker health issues in recruiting new industry, this study assigns equal weight to economic and to environmental/health factors. This method serves to emphasize the point that environmental and worker health concerns can be incorporated as more than just a mitigating factor for an otherwise attractive type of company. They can be built into the recruitment criteria from the outset. Indeed, as this study shows, some types of industry are attractive both for economic and for environmental and health reasons.

This study examines the 20 national industrial sectors, as established by the U.S. Department of Labor, in order to develop rankings by industry sector for "economic desirability" and for "environmental/health desirability." Combined, these two rankings serve as the basis for locating each of the industrial sectors into an overall "industry desirability" grouping. This ranking process incorporates primarily national data for all the possible types of industry. The study also ranks by industry sector the new companies recruited to the state during the 1977-80 period for number of new jobs and for amount of new dollar investment.

Table 1 summarizes the study data (see pages 30-31). The industry sectors are grouped in the far left column into four categories: very desirable, desirable, moderately desirable, and less desirable. Moving from left to right, the chart is divided into three major sections: Section A, the data and rankings on industry recruited to North Carolina (1977-80); Section B, the data and rankings on economic factors and the summary ranking for economic desirability; and Section C, the rankings for environmental and health factors and the

summary ranking for environmental/health desirability. The last column with overall industry desirability scores completes the chart. The sections of the article below and the footnotes to Table 1 explain the methodologies and sources used for developing each part of the table. They also serve as the references for Tables 2 through 6, which are incorporated into the article text.

Table 1 provides the basis for comparison of economic and environmental/health desirability to new industry recruited to North Carolina from 1977-80. And the very structure of the table indicates which industry sectors have the most overall desirability, as measured in this study.

### **New Industry to North Carolina, 1977-80**

This study analyzes new industry recruited to North Carolina during the 1977-80 period. Data were collected on all new companies listed as coming to the state during this period by the N.C. Department of Commerce (DoC).<sup>8</sup> For the new plant listings that included specific information on number of new jobs and amount of expected new investment, the data were grouped and analyzed according to the Standard Industrial Classification (SIC) codes of the U.S. Department of Labor.

This study includes data only on new companies; it does not include expansion of industry already within the state, such as a new Burlington Industries plant. This is an important distinction to understand. Companies already located in the state might consider state industrial recruitment strategies in deciding whether to expand their investment and number of jobs in North Carolina. But making such an assessment is beyond the scope of this analysis. This study concentrates on the clear and self-evident relationship between the state's recruitment criteria and the influx of new companies to the state.

Examining even the "new industry" data published by DoC has some built-in statistical problems. The Department of Commerce compiles data on new industry by the year the new plant is announced, not by the year in which it begins operations. Consequently, the number of jobs and amount of investment listed by DoC might change by the time the plant actually begins operations.

Other statistical issues result from the choice of

TABLE 1. Comparative Analysis: Industry Recruitment

Industry Group (SIC Code) <sup>1</sup>		A. New Industry to N.C. (1977-1980) <sup>2</sup>							
								Capital Intensity (dollars per job) <sup>3</sup>	
		No. of Jobs	Percent of Total	Rank	Amount of Investment (in \$1,000)	Percent of Total	Rank		Rank
Very Desirable	Printing (27)	445	1%	17	65,625	3%	9	\$147,471	2
	Transportation (37)	4,875	11%	3	216,750	10%	3	44,460	10
Desirable	Machinery (35)	8,450	19%	1	744,950	33%	1	88,150	3
	Petroleum (29)	183	0%	19	61,000	3%	11	333,333	1
	Tobacco (21)	2,300	5%	9	100,075	4%	8	43,510	11
	Electronics (36)	6,020	14%	2	190,200	8%	4	31,590	13
	Measuring Instru. (38)	1,105	3%	10	18,500	1%	15	16,742	18
	Food (20)	4,045	9%	4	246,950	11%	2	61,050	5
Moderately Desirable	Stone/Clay/Glass (32)	687	2%	16	33,300	1%	14	48,471	6
	Apparel (23)	834	2%	13	9,450	0%	18	11,330	20
	Primary Metals (33)	595	1%	15	51,000	2%	12	85,714	4
	Chemicals (28)	2,358	5%	7	63,450	3%	10	27,000	14
	Textiles (22)	3,704	8%	5	123,325	5%	6	33,290	12
	Fabricating Metals (34)	3,056	7%	6	137,050	6%	5	44,840	9
	Furniture (25)	795	2%	14	18,000	1%	16	22,641	16
	Misc. Mfg. (39)	30	0%	20	700	0%	20	23,333	15
	Lumber/Wood (24)	962	2%	11	45,250	2%	13	47,037	7
Less Desirable	Paper/Pulp (26)	842	2%	12	17,700	1%	17	21,021	17
	Rubber/Plastic (30)	2,220	5%	8	100,700	4%	7	45,360	8
	Leather (31)	200	0%	18	2,500	0%	19	12,500	19
	Totals <sup>11</sup>	43,706	100%		\$2,246,475	100%			

FOOTNOTES TO TABLE

<sup>1</sup>The U.S. Department of Commerce divides all manufacturing industries into 20 Standard Industrial Classifications (SIC) which are listed here in two-digit SIC codes. In some studies, each code can be broken down to a four-digit number for detailed analysis of each industry group; this was not possible for all the economic and health factors of this study. If future studies of this type could get data at the four-digit level, the results would provide helpful distinctions of different sections of the same industry group. The industry groups are listed from most to least "desirable," according to the ranking in the last column.

<sup>2</sup>Source: *New and Proposed Industries Announced for North Carolina*, an annual listing by the Industrial Development Division, N.C. Department of Commerce, categorized according to two-digit SIC codes. By study definition, data includes only new industry which reported the number of jobs created and the amount of new investment.

<sup>3</sup>Total dollar investment by industry group divided by the number of jobs created results in an index for capital intensity - dollars invested per job created.

<sup>4</sup>Source: *Survey of Manufacturing 1979*, Bureau of Labor Statistics, U.S. Department of Labor. Because new industries come to the state from various parts of the country and because wage levels of the jobs resulting from this new North Carolina industry cannot be determined (some plants are still under construction), national wage averages were used.

<sup>5</sup>The Economic Desirability Ranking was determined by adding the capital intensity ranking and the average hourly wage ranking for each industry group. The industry with the lowest sum (petroleum) ranked first; the industry with the highest sum (apparel) ranked last. Some industry groups had the same score and hence got the same ranking. For example, both food and fabricating metals had a score of 17, tying them for ranking number 7. Where ties occurred, no sector got the subsequent rank; i.e., no sector ranked number 8.

<sup>6</sup>Source: *Projected Input-Output Tables of Economic Growth Project: Volume 1*, Bureau of Labor Statistics, U.S. Department of Labor, February, 1980. For each SIC code, this report calculates direct requirements of chemical use per dollar of resulting gross domestic output. This measurement describes the relative importance of

## North Carolina and Industry Desirability Rankings

### B. Economic Factors

### C. Environmental/Health Factors

U.S. Average Hourly Wage <sup>4</sup>	Rank	Economic Desirability Ranking <sup>5</sup>	Lowest Intensity of Chemical Use (Rank) <sup>6</sup>	Lowest Hazardous Waste Generation (Rank) <sup>7</sup>	Lowest Occupational Illness and Injury Incidence (Rank) <sup>8</sup>	Lowest Occupational Injury Severity (Rank) <sup>8</sup>	Environmental/ Health Desirability Ranking <sup>9</sup>	Industry Desirability Score <sup>10</sup>
5.94	7	4	12	8	3	3	4	8.0
8.53	3	5	2	15	9	12	6	11.0
7.32	5	3	3	12	13	11	7 (tie)	11.5
9.36	1	1	16	18	5	6	11	12.0
5.67	10	10 (tie)	5	2	6	7	2	12.5
5.32	11	14	7	14	7	4	5	19.0
5.17	13	16	13	7	2	2	3	19.0
5.27	12	7 (tie)	9	1	19	19	12	19.5
5.85	9	6	15	4	14	18	14 (tie)	20.5
4.23	19	20	1	3	1	1	1	21.0
8.98	2	2	11	19	15	16	19	21.0
7.60	4	9	20	20	4	5	13	22.0
4.66	18	15	14	9	8	8	7 (tie)	23.5
5.85	8	7 (tie)	6	17	18	15	16 (tie)	24.0
5.06	16	17 (tie)	4	5	17	13	7 (tie)	26.0
5.03	17	17 (tie)	8	11	11	9	7 (tie)	26.0
5.07	14	10 (tie)	10	6	20	20	16 (tie)	27.0
7.13	6	12 (tie)	17	16	12	14	18	30.5
5.97	15	12 (tie)	19	10	16	17	20	32.5
4.22	20	19	18	13	10	10	14 (tie)	33.5

chemicals in producing the final product — i.e., the intensity of chemical use — not the gross amount of usage. The number one industry ranking indicates the *least* intensity of chemicals used.

<sup>7</sup>Source: *Assessment of Hazardous Waste Generation and Commercial Hazardous Waste Management Capacity*, U.S. Environmental Protection Agency (EPA), December, 1980. EPA collected much of this data in implementing the Resource Conservation and Recovery Act of 1976. This report estimates that 60 percent of total off-site toxic waste volume is generated by five industry groups: fabricated metals (17%), primary metals (14%), chemicals (12%), electronics (9%), and petroleum (8%). The number one ranking indicates the *least* amount of hazardous wastes generated.

<sup>8</sup>Source: *Occupational Illnesses and Injuries in the United States by Industry*, Bureau of Labor Statistics, U.S. Department of Labor, August, 1980. (Data based on industry surveys conducted in 1978.) Number one rankings indicate the *lowest* incidence and *lowest* severity of work-related illnesses and injuries.

<sup>9</sup>The Environmental/Health Desirability Ranking was determined by adding the rankings of the four environ-

mental/health factors — intensity of chemical use, hazardous waste generation, and occupational illness and injury incidence and severity — for each group. The industry with the lowest sum (apparel) ranked first; the industry with the highest sum (rubber/plastic) ranked last. As with the economic desirability ranking, ties occurred. The procedure explained in footnote 5 was also followed here.

<sup>10</sup>The overall Industry Desirability Ranking was determined by adding the economic and health desirability rankings. This method gives equal weight to economic and to environmental/health factors. Where ties occurred in the economic or the environmental/health rankings, the number used in the overall score was determined in the following manner: The positions affected by the tie were first added and then divided by the number of sectors tying. For example, four sectors tied for ranking 7 in environmental/health desirability. Hence, those sectors covered rankings 7, 8, 9, and 10. Totaling these four numbers and dividing by four yields a score of 8.5, which was used in computing the overall desirability score for these four sectors. This method avoided tilting a score in the more desirable direction because of ties.

<sup>11</sup>The percentage totals do not add to 100 because of rounding, all done to the nearest whole percent.

the primary data source for new industry. This study relied on DoC listings of individual plant openings (see footnote 8) rather than DoC aggregate data by industry sector, which is published in the DoC annual reports.<sup>9</sup> The aggregate data has two severe limitations: 1) it includes new plants which were announced but later canceled; and 2) it precludes the summarizing of individual company data into an aggregate data base from a research perspective independent of the Department of Commerce viewpoint.

Working from the individual company sources, this study omits data on new plants listed by the DoC but later canceled, such as the proposed \$400 million oil refinery in Brunswick County. Also, the study does not include new plants for which the DoC does not provide data on jobs and investment; in almost all cases, these were small operations in lower-paying industries like textiles and apparel. Consequently, the industry data included in this study are primarily large-plant investments. The study sample accounted for two-thirds of the new jobs recruited during the 1977-80 period and almost half of the total new investment (\$2.2 of the \$4.8 billion), yet it included only 10 percent of the total plant openings.

Section A of Table 1 shows the number of new jobs and amount of new investment recruited from 1977-80 by industrial sector. This section of the table also ranks the sectors according to the most new jobs and investment. Since the data base omits numerous small plant openings in labor-intensive sectors such as textiles and apparel, these rankings might somewhat understate the positions of some sectors and overstate the positions of others. Due to the statistical problems outlined above, the DoC aggregate source is not very helpful in testing the representativeness of this study sample; but, *it is the best publicly-available source*. A comparison of the study sample with the aggregate DoC data for 1980 produced very similar rankings.

Using the study sample data for new industry recruited from 1977-80, rankings for number of new jobs and amount of new investment were compiled. Table 2 below shows the top five sectors in jobs and investment:

Table 2. Top Five Sectors: Jobs and Investment

Sector	% of New Jobs	Sector	% of New Investment
Machinery	19	Machinery	33
Electronics	14	Food	11
Transportation	11	Transportation	10
Food	9	Electronics	8
Textiles	8	Fabricating Metals	6

Machinery easily ranked first in both areas, accounting for almost one of every five new jobs produced and a whopping one-third of new investment in North Carolina. Electronics, which includes the intensely recruited microelectronics sector, ranked second in new jobs (14 percent) and fourth in new investment (8 percent). Traditional North Carolina industry leaders such as textiles and cigarette manufacturing also ranked high in new jobs and in new investment as did more recently recruited sectors like transportation, chemicals, and fabricated metals.

## Economic Factors

Because of the state's historical reliance on low-paying, labor-intensive industries, wage level and degree of capital intensity are the two most important measurements of economic attractiveness for most industrial recruiters in North Carolina. Consequently, these are the two economic criteria used in this study to determine an economic desirability ranking for the 20 industry sectors.

Section B of Table 1 includes a capital-intensity measurement by industry sector (amount of new investment divided by number of new jobs); this computation serves as the basis for the ranking for capital intensity. Similarly, the average hourly wage for each sector, using national data, is recorded in Section B of Table 1; this listing serves as the basis for the wage-level rankings. The capital-intensity and wage level rankings were combined to determine the overall economic desirability ranking (see the last column in Section B). Table 3 below shows the top five sectors for capital intensity, wage level, and economic desirability:

Table 3. Top Five Sectors: Capital Intensity, Wage Level and Economic Desirability

Capital Intensity	Wage Level	Economic Desirability
Petroleum	Petroleum	Petroleum
Printing	Primary Metals	Primary Metals
Machinery	Transportation	Machinery
Primary Metals	Chemicals	Printing
Food	Machinery	Transportation

From 1977 to 1980, the state successfully recruited a great deal of industry which is both capital intensive and high paying. Fifty-seven percent of the new jobs created were in the top ten industry sectors in terms of capital intensity. Fifty-three percent of the new jobs were in the top ten sectors in national wage level. See Table 4 below.

**Table 4. Comparison of Capital Intensity and Wage Level Rankings to Percentage of New Jobs Created 1977-80.**

Top Ten in Capital Intensity		Top Ten in U.S. Wage Level	
Sector	% of New Jobs	Sector	% of New Jobs
Petroleum	0	Petroleum	0
Printing	1	Primary Metals	1
Machinery	19	Transportation	11
Primary Metals	1	Chemicals	5
Food	9	Machinery	19
Stone/Clay/Glass	2	Paper/Pulp	2
Lumber/Wood	2	Printing	1
Rubber/Plastic	5	Fabricating Metals	7
Fabricating Metals	7	Stone/Clay/Glass	2
Transportation	11	Tobacco	5
Total	57%	Total	53%

As Table 4 shows, the state did not score well with the sectors ranking at the top of either the capital intensity or wage level category. Printing and petroleum led in capital intensity, but neither sector accounted for more than one percent of the new jobs created between 1977-80. Similarly, primary metals and petroleum, the sectors with the highest average hourly wages, each accounted for only one percent of new jobs.

The most successfully recruited sector, machinery, ranked third in capital intensity and fifth in wage levels. Electronics, second in number of new jobs, ranked only 13th in capital intensity and 11th in wage levels. Textiles, which ranked 5th in new jobs created, rated 18th out of 20 industry sectors in hourly wage level (\$4.66, 30 percent below the national manufacturing average).

## Environmental and Health Factors

Just as the economic factors for this study were chosen because of their particular importance to North Carolina, the environmental and health criteria relate to widely-recognized problems in the state. The state's Water Quality Management Plan of 1980 reported that over 30,000 chemicals are used in commercial production of goods in this state, with some 1,000 compounds being introduced annually.<sup>10</sup> Only a small portion of these chemicals have ever been tested for their carcinogenicity (cancer-causing capability) or for other negative health effects. Consequently, the intensity of chemical use was chosen as a criteria for evaluating the various industrial sectors.

In 1980, North Carolina ranked eleventh among the 50 states in total volume of hazardous wastes produced, according to the U.S. Environmental Protection Agency, and in 1979, the state

ranked fourth in volume of low-level radioactive wastes produced.<sup>11</sup> Moreover, the wastes being generated by industries already located in the state are not being adequately managed. "Only a very small percentage of the total volume of hazardous waste generated in North Carolina can be accounted for in known disposal sites," reported the Governor's Technical Advisory Committee on Hazardous Wastes.<sup>12</sup> Due to the above factors, the relative level of hazardous waste generation was selected as a critical environmental measurement for desirable industry.

During the past decade, the problems of workplace-caused injuries and illnesses in North Carolina have received increasing attention. In 1980, *The Charlotte Observer* won a Pulitzer Prize for a series of articles on byssinosis or brown lung, a respiratory disease afflicting workers in the textile industry. The extent of worker health hazards in the highly-recruited microelectronics industry surfaced in 1981 when the General Assembly funded a microelectronics center.<sup>13</sup> The N.C. Department of Labor reported over 71,000 work-related illnesses and injuries in the state's manufacturing sectors during 1976 and an annual incidence rate that equaled 10 percent of the state's manufacturing workforce.<sup>14</sup> These events and reports reflect the growing awareness of the importance of workplace illness and injury in the state. Consequently, these two measurements were included as the worker health criteria for this study.

Section C to Table 1 shows the rankings for the four indices: intensity of chemical use, hazardous waste generation, occupational illness and injury incidence, and occupational illness and injury severity. Those industrial sectors with the worst records for each of the four indices received the *worst* — i.e., the *lowest* — rankings. The chemical sector, for example, generated the most toxic wastes and ranked 20th in this category while the food sector produced the least toxic wastes and hence ranked first. Table 1 provides rankings for all four categories. (The raw data for each category can be obtained from the sources listed in footnotes 6-8 to Table 1). Combining the results of these four categories yields an environmental/health "desirability" ranking, as shown in the last column of Section C.

A review of two of the categories indicates that many of the industries recruited most successfully during the 1977-80 period have low environmental/health desirability ratings. Fifty-nine percent of the new jobs in the study sample were in the ten sectors producing the highest toxic waste volumes (sectors ranked 11-20). Sixty percent of the new jobs fell in the ten sectors with the worst injury/illness severity records (sectors ranked 11-20). See Table 5 below.

**Table 5. Comparison of Hazardous Waste Generation and Occupational Illness/Injury Severity Rankings to Percentage of New Jobs Created 1977-80.**

Worst Ten in Hazardous Wastes Generation*		Worst Ten in Illness/Injury Severity*	
Sector	% of New Jobs	Sector	% of New Jobs
Chemicals	5	Lumber/Wood	2
Primary Metals	1	Food	9
Petroleum	0	Stone/Clay/Glass	2
Fabricating Metals	7	Rubber/Plastic	5
Paper/Pulp	2	Primary Metals	1
Transportation	11	Fabricating Metals	7
Electronics	14	Paper/Pulp	2
Leather	0	Furniture	2
Machinery	19	Transportation	11
Misc. Manufact.	0	Machinery	19
Totals	59%	Totals	60%

\*The sectors are listed from number 20 ranking through number 11. Chemicals, for example, ranked 20 in volume of hazardous waste generation, and miscellaneous manufacturing ranked 11.

As Table 5 indicates, six sectors which ranked high in numbers of new jobs — machinery (1), electronics (2), transportation (3), fabricating metals (6), and chemicals (7) — placed in the ten sectors producing the most hazardous wastes. North Carolina's traditional industries — tobacco, apparel, textiles, furniture, and lumber — generate low volumes of toxic wastes and hence placed in sectors ranked 1-10 in this category.

As Table 5 also shows, six sectors ranking high in number of new jobs — machinery (1), transportation (3), food (4), fabricating metals (6), and rubber/plastic (8) — placed in the ten sectors recording the greatest severity of occupational illnesses and injuries.

### Industry Desirability Index

The economic and environmental/health rankings served as the basis for dividing the 20 industrial sectors into four industry desirability groups: very desirable, desirable, moderately desirable, and less desirable. For each industry sector, the two rankings were totaled, a process yielding scores from 8.0 (printing) to 33.5 (leather) (see footnote 10 to Table 1 for further information on the process). If a sector scored from 2.0 to 10.0, it had an average score in the top five rankings for economic and environmental/health factors and hence was "very desirable"; sectors scoring from 10.5 to 20.0 averaged in the second five and were "desirable"; sectors scoring from 20.5 to 30.0 averaged in the third five and were "moderately desirable"; sectors scoring from 30.5 to 40 averaged in the bottom five and were "less desirable."

Between 1977 and 1980, over 60 percent of the new jobs and almost three-fourths of new investment fell among the "very desirable" or "desirable" sectors (see Table 6 below).

**Table 6. Comparison of "Very Desirable" and "Desirable" Industry Sectors to Percentage of New Jobs and New Investment**

Sector	% of New Jobs	% of New Investment
<i>Very Desirable</i>		
1. Printing	1	3
<i>Desirable</i>		
2. Transportation	11	10
3. Machinery	19	33
4. Petroleum	0	3
5. Tobacco	5	4
6. Electronics	14	8
7. Measuring Instruments	3	1
8. Food	9	11
Totals	62%	73%

As Table 6 shows, the only "very desirable" sector, printing, notably accounted for very few new jobs (ranked 17th). But machinery and transportation, the leaders in the "desirable" group, ranked first and third, respectively, in both the number of new jobs and amount of new investment. Textiles and apparel, traditionally important industries to the state, fell in the "moderately desirable" range because of low wages and low capital intensity. Among the "less desirable" sectors was the rubber/plastics sector, which ranked eighth in number of new jobs in North Carolina during the last four-year period.

### Conclusions

Economic desirability in a new industry sometimes stands sharply at odds with environmental and health attractiveness. In this study, five of the six sectors with the highest wage levels — chemicals, primary metals, petroleum, paper, and transportation — are also five of the six that produce the most toxic wastes. On the other hand, some types of industry are highly desirable both for economic reasons and for environmental/health factors. The printing, machinery, and transportation sectors, for example, ranked among the most desirable in both categories.

This was an exploratory study, not meant as a definitive statement for setting criteria to guide North Carolina's industrial recruitment efforts. Hopefully, these preliminary findings will spur further research and policymaking efforts by the N.C. Board of Science and Technology, the Department of Commerce, and the Department of Natural Resources and Community Development



to ensure that the state's work force and natural resources will not be unduly harmed by newly-recruited industry. More in-depth studies could review individual company performance, rather than relying on national data sources, and could consider numerous other variables including impact on air and water resources, types of products and their safety, and potential for continued industrial expansion.

As the state continues to pursue new industry, the "desirability" of incoming companies must be monitored more closely. Between 1977 and 1980, the state appears to have successfully recruited primarily desirable industry, as measured by economic and environmental/health factors. As Table 6 shows, about six of every ten new jobs and over 70 cents of every dollar of new investment recruited during this period were in industrial sectors which this study found to be "very desirable" or "desirable." But these figures appear to have resulted more from good fortune than from good policy. Three major areas of concern emerged from this study regarding how state officials design recruitment strategies and report on the degree of their success.

First, in judging which industry to recruit, the Department of Commerce does not seem to employ any major criteria concerning the environment or worker health. This study represents a first effort to fill that gap. The Department should take the next step and gather information on past performance of potential new companies. Publicly-available sources now exist which could provide the state with data on individual companies for most of the criteria used in this study. For example, each year all companies must submit data on worker illness and injury to the U.S. Department of Labor.<sup>15</sup>

Second, the Department of Commerce and the Department of Natural Resources and Community Development do not appear to be complying with the statutory requirement "to conduct an evaluation . . . of the effects on the State's natural and economic environment of any new or expanding industry or manufacturing plant locating in North Carolina."<sup>16</sup> This mandate should affect not only the criteria in seeking new industry but also the monitoring of the new industry once it has begun operation.

Third, in evaluating newly recruited industry to the state, any researcher must depend upon Department of Commerce data which report the industry announcing they will come to the state for a given year. Some of these industries eventually cancel their plans and others adjust the size of the projected operation either upward or downward. The Department of Commerce should provide the public with a far more accurate measuring tool regarding recruitment of industry

by reporting for a given year on the amount of new industry which actually began operations in the state for that year.

High-paying, high-technology industries affect non-renewable human and natural resources to greatly differing degrees. Careful targeting of desirable industry — as measured by economic and environmental/health standards — can help both to upgrade the state's low economic indices and to preserve the state's much cherished environment and highly productive work force. Planning at the front-end of industrial recruiting can avoid the mistakes that other states have made. Criteria to guide future industrial recruitment efforts must be developed in order to determine which industry is truly most desirable to all North Carolinians. □

#### FOOTNOTES

<sup>1</sup>1980 Annual Report, N.C. Department of Commerce, Economic Development Division, Figure 4, p. 12 (see "New" industry column).

<sup>2</sup>Researchers disagree over the extent to which the microelectronics campaign will improve the state's economy. See "Microelectronics — The New Wave," *N.C. Insight*, Vol. 4, No. 3, fall 1981.

<sup>3</sup>Chapter 824 of the 1981 Session Laws of N.C., now codified as G.S. 143B-437.

<sup>4</sup>N.C.G.S. Chapter 143B, Article 3, Part 27.

<sup>5</sup>*Management of Waste and Other Environmental Programs*, Legislative Research Commission, Interim Report to the 1979 General Assembly of North Carolina, Second Session, 1980, June 5, 1980, Appendix I, p. I-1.

<sup>6</sup>*Ibid.*

<sup>7</sup>N.C.G.S. 143B-431.

<sup>8</sup>"New and Proposed Industries Announced for North Carolina — Year of 1977" and report by the same name for 1978, 1979, and 1980, Industrial Development Division, N.C. Department of Commerce (entire report used).

<sup>9</sup>1980 Annual Report, Economic Development Divisions, N.C. Department of Commerce, p.10. See similar chart in annual reports for 1977, 1978, and 1979.

<sup>10</sup>N.C. Water Quality Management Plan, 1980, Department of Natural Resources and Community Development, p. 8.

<sup>11</sup>Report of the Governor's Task Force on Waste Management, February 1981, p. 3. Also see "Chemical Wastes . . .," *N.C. Insight*, Vol. 4, No. 1, April 1981.

<sup>12</sup>Final Report, Technical Advisory Committee on Hazardous Wastes, Governor's Task Force on Hazardous Waste Management, September 1980.

<sup>13</sup>See "Microelectronics — The New Wave," *N.C. Insight*, Vol. 4, No. 1, spring 1981.

<sup>14</sup>Occupational Illnesses and Injuries for 1976, N.C. Department of Labor, 1978.

<sup>15</sup>Occupational Safety and Health Act (OSHA) Form 200. Even though some states, such as North Carolina, administer OSHA themselves, the Form 200 data is publicly available through the Management Information System (MIS) of the U.S. Department of Labor.

<sup>16</sup>N.C.G.S. 143B-437.