FINAL REPORT

TO THE

STATE OF CALIFORNIA AIR RESOURCES BOARD

RESEARCH DIVISION

SACRAMENTO, CALIFORNIA 95812

# AN INTERINDUSTRY ANALYSIS OF INDUSTRIAL AIR POLLUTANTS

FOR THE

STATE AND SUBSTATE REGIONS OF CALIFORNIA

Prepared Under Agreement #A7-143-30

The statements and conclusions in this report are those of the contractor and not necessarily those of the California Air Resources Board.

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## CONVERSION FACTORS

English to Metric System of Measurement

| Quantity | English unit | Multiply by | To get metric equivalent |
|---|---|---|---|
| Length | inches (in) | 25.4 | millimetres (mm) |
| | | .0254 | metres (m) |
| | feet (ft) | .3048 | metres (m) |
| | miles (mi) | 1.6093 | kilometres (km) |
| Area | square inches ($in^2$) | $6.4516 \times 10^{-4}$ | square metres ($m^2$) |
| | square feet ($ft^2$) | .092903 | square metres ($m^2$) |
| | acres | 4046.9 | square metres ($m^2$) |
| | | .40469 | hectares (ha) |
| | | .40469 | square hectometres ($hm^2$) |
| | | .0040469 | square kilometres ($km^2$) |
| | square miles ($mi^2$) | 2.590 | square kilometres ($km^2$) |
| Volume | gallons (gal) | 3.7854 | litres (l) |
| | | .0037854 | cubic metres ($m^3$) |
| | million gallons ($10^6$ gal) | 3785.4 | cubic metres ($m^3$) |
| | cubic feet ($ft^3$) | .028317 | cubic metres ($m^3$) |
| | cubic yards ($yd^3$) | .76455 | cubic metres ($m^3$) |
| | acre-feet (ac-ft) | 1233.5 | cubic metres ($m^3$) |
| | | .0012335 | cubic hectometres ($hm^3$) |
| | | $1.233 \times 10^{-6}$ | cubic kilometres ($km^3$) |
| Volume/Time (Flow) | cubic feet per second ($ft^3/s$) | 28.317 | litres per second (l/s) |
| | | .028317 | cubic metres per second ($m^3/s$) |
| | gallons per minute (gal/min) | .06309 | litres per second (l/s) |
| | | $6.309 \times 10^{-5}$ | cubic metres per second ($m^3/s$) |
| | million gallons per day (mgd) | .043813 | cubic metres per second ($m^3/s$) |
| Mass | pounds (lb) | .45359 | kilograms (kg) |
| | tons (short, 2,000 lb) | .90718 | tonne (t) |
| | | 907.18 | kilograms (kg) |
| Power | horsepower (hp) | 0.7460 | kilowatts (kW) |
| Pressure | pounds per square inch (psi) | 6894.8 | pascal (Pa) |
| Temperature | Degrees Fahrenheit (°F) | $\frac{1F - 32}{1.8} = 1C$ | Degrees Celsius (°C) |

## 1. Abstract

Regional interindustry economic models were developed for the four major air basins of the State of California for the year 1976. The models show a possible 154 detailed economic sectors for each basin. Primary air emissions data provided by the Air Resources Board for each of five critical pollutants (CO, HC, NOx, SOx, TSP) were processed and selectively merged with fuel combustion data derived for each sector of a statewide model. These data were subsequently adjusted to conform to air basin emission totals by major economic categories for each pollutant. The statewide emissions totals derived for each detailed input-output sector were converted to a set of pollution coefficients in tons of pollutant emitted per million dollars of product or service delivered. Similar procedures were applied to each of the air basins. These direct coefficients were related to the sectors of each regional model in a manner which permitted the direct and indirect industry linkages to be analyzed. The direct and indirect and induced emissions generated per million dollars of product or services delivered to consumers were calculated and ranked, and compared for the state and for each air basin. The methods used are probably the best that can be devised for placing consistency checks on primary air emissions data and for estimating the environmental impacts of regional economic development proposals as required by the Clean Air Act of 1977.

## 2. Acknowledgements

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## 3. Executive Summary

The purposes of the present study were essentially twofold. The principal purpose was to demonstrate the usefulness of regional inter-industry analysis for investigating and quantifying the direct and indirect air pollution impacts which may result from changes in regional levels of industrial production. A second purpose of the study was to relate available primary and secondary source data on air pollution emissions to detailed sectors of the California economy as a whole and to those of the major air basins. The available air emissions data were used to develop air pollution coefficients (pollutants dispersed in tons per million dollars of product output) for the state and for the air basins for five critical classes of pollutants. 1) SOx - sulphur oxides; 2) NOx - nitrogen oxides; 3) CO - carbon monoxide; 4) HC - hydrocarbons; 5) TSP - total suspended particulates.

In any industrialized economy, questions of environmental improvements or environmental degradation are fundamentally related to economics. State and regional air quality control programs are established for a variety of pollutors in order to preserve or attain the ambient air quality standards. For efficient air quality planning and comprehensive program impact analysis, the linkages between air pollutant emissions and economic activity must be identified and evaluated. Such economic impact analyses are required by the Clean Air Act of 1977 and can be facilitated by input-output studies.

Interindustry, or input-output, economics describes the form of economic analysis which has as its basis the study of the technological relations of industrial production. The foundation of the interindustry system is the input-output table. A typical input-output table shows how the output of each industry is distributed among other industries as inputs for further processing. The table also shows the output going to final consumption, or use, in various categories.

An input-output table is essentially a double entry accounting system in which the rows show the product output distribution to other industries and to final use, while the columns show the purchases made by each industry from all other industries to produce its product. The entries in the table

are usually in dollar values and represent the actual physical purchases of goods and services taking place in the economy during the accounting period. If additional data are available on the physical units of inputs and outputs associated with the production processes such as man-years of labor, acre-feet of water, or tons of wastes emitted, it is possible to transform an input-output table into an interactions table showing these physical relationships on an interindustry basis. Thus, the input-output method of analysis, when applied to a regional economy, can be used to reveal the emissions directly resulting from a specific economic activity as well as the "indirect" emissions generated by other industries as they supply needed inputs on an interindustry basis.

It is often a relatively straightforward matter to identify the new industrial growth patterns taking place within a regional economy, for example, the expansion or introduction of a large automobile assembly facility. It is not necessarily a straightforward problem to assess the total impact of the new facility on regional ambient air quality standards. Although the direct emissions of the facility must be considered under the existing regulatory framework, the potential may exist for significant increases in "indirect" emissions resulting from the increased activity in the local steel, petrochemical, and electric utility industries as they increase their production to serve the needs of the new assembly plant.

A comprehensive interindustry air resource model can delineate and quantify the increases in direct and indirect emissions and allow for the reassessment of control strategies on the support industries such that the induced economic activity does not result in a degradation of the air environment.

In order to accomplish the purposes of the study regional interindustry transactions tables for the year 1976 were constructed for the following air basins:

1. South Coast
2. San Diego
3. San Joaquin Valley
4. The San Francisco Bay Area

A 157 sector input-output model of the California State economy was constructed for the base year 1976 by staff members of the California State Department of Water Resources. This Statewide model was then disaggregated regionally by DWR into the 12 hydrologic basins of the State.

For purposes of constructing the regional interindustry models for air basins, the Department of Water Resources data on final demands and gross outputs were used wherever possible, with modifications. In the majority of cases, both air and hydrologic basins are comprised of counties.

In the present study the South Coast Air Basin Model was constructed by aggregating the DWR data on production and final demands for the Los Angeles and Santa Ana hydrologic basins and then subtracting from this aggregation the gross outputs and final demands estimated for Ventura County. Since San Diego County is coincident with the San Diego Air Basin the County data were used without change to develop the air basin input-output model. The San Joaquin Air Basin Model was prepared by modifying the Department of Water Resources data for the Tulare Lake Hydrologic Basin and adding the demands and output data for the four counties of Madera, Merced, Stanislaus and San Joaquin. Finally, to structure the San Francisco Air Basin Model, the DWR data on final demands and gross outputs for the San Francisco Hydrologic Basin were taken to be adequately representative of the air basin boundaries and were used without modification.

Air pollutant emission coefficients were then developed in tons of pollutants emitted per million dollars of gross output for each of the sectors of the four air basins and of the California State economy as a whole.

To develop the coefficients, numerous sources of emissions data were consulted but ultimately the primary data compiled by the California Air Resources Board and local agencies were used with certain adjustment and control procedures. The procedures used are the best that can be devised without resorting to an extensive analysis of the primary data along with the abatement practices prevailing in each air basin. The procedures have merit in that they attempt to capture the differences in emission levels among air basins.

The adjusted emission coefficients derived for detailed sectors were used in conjunction with each air basin input-output model and the direct plus indirect plus induced emissions were calculated and ranked for each of the five pollutants. The rankings indicate in tons per million dollars of deliveries the total pollutant load generated in the air basin economy directly and indirectly for each industry. The values of the emission coefficients derived for the various industries seem to be reasonable in terms of orders of magnitude. The rankings indicate rather clearly those industries with the higher pollutant levels per million dollar of product deliveries. With all industries on a comparable basis, the disparities in emission levels in many instances are pronounced.

From the empirical results some observations may be made. First, for each pollutant, the sectors with the highest associated total emission rates will vary between basins. Second, in each basin (and in the statewide economy as well) the ranking of the economic sectors by total emissions differs from the rankings by direct emissions. Third, the ratio of total to direct emissions for a particular sector will vary across basins due to variations in direct emission rates and differences in industrial structure.

The ranking of the direct and indirect emission coefficients and subsequent interbasin comparisons place consistency checks on the basic emission data which cannot be achieved with other methods. The results serve to highlight the need for improvements in the emission inventory data gathering and processing methods.

Although it has not been done in the study, the emission coefficients could be related to employment and income levels for each basin and additional coefficients derived which ranked each industry in terms of employment or income generated per ton of pollutant emitted. In this manner those industries which generate the lowest income and employment levels per ton of pollutant emitted could be analyzed in greater detail as part of a broader policy analysis concerned with the potential growth pattern of the respective air basins.

The Clean Air Act, as amended, August 1977, states that an applicable implementation plan shall include an identification and analysis of the

air quality, health, welfare, economic, energy, and social effects of the plan (Sec. 172). Complying with these requirements is difficult because of the lack of adequate data. This is especially the case when the data relate to indirect effects.

The models developed in the present study provide data which are directly useful for air quality management decision making. The input-output models, when coupled with an econometric forecasting model, can estimate growth factors for 152 California industries which can then be used to help estimate future emission levels and ambient air quality.

## 4. Recommendations

The present study made use of a Statewide input-output model for 1976 developed by the State Department of Water Resources primarily for water planning analysis. The sectoring of the model was designed to emphasize the agricultural industries and other water intensive industries. The Air Resources Board emissions inventory data are gathered at the 4-digit Standard Industrial Classification level of detail. It would be appropriate to retain the detail available for the primary emissions data and match these with input-output models similarly structured at the 4-digit SIC level of detail. When proposals are made for plant sitings or plant expansion they are not made for a complex mix or group of 4-digit SIC codes. They are made for a single 4-digit industry and the environmental impacts should be calculated for that industry alone. The present model is too aggregated for obtaining detailed impacts for any specific 4-digit industries. A major recommendation is to restructure the air basin models with the principal air polluting sectors being shown at the 4-digit SIC detail.

A second but equally important recommendation is to process and analyze the 4-digit SIC emissions inventory data and form a series of direct pollution coefficients for each air basin. These should be ranked and compared and the results analyzed statistically to determine interbasin and statewide differences among the important polluting industries at the 4-digit level of detail.

A third recommendation is that the necessary technical competence for carrying out of this type of research be developed by Air Resources Board staff members.

## 5. Introduction

In 1973 Professor Wassily Leontief of Harvard University was awarded the Nobel Prize in Economics for his development of input-output economics. As an outgrowth of Leontief's work, detailed input-output (I-O) models revealing the structural relationships within the U.S. economy are routinely prepared for each census year by the Department of Commerce. At the sub-national level the input-output approach has rapidly developed to become a cornerstone of regional economics (1,2,3). Because the technique allows the analyst to trace in considerable detail the reverberations of an initial stimulus to the economy, the technique has become essential to comprehensive economic and environmental impact analyses (4,5,6).

## 6. Input-Output Models

### (i) I-O Models: What Are They?

A regional input-output model provides a sharply focussed still-life picture of a regional economy. It reveals, as generally no other approach does, the ways in which the various sectors of the region's economy are meshed together and are linked to the potential sources of economic stimuli: the so-called 'final demands' of household consumption, private capital formation, government purchases and exports.

The number of sectors into which the regional economy is divided depends on several factors including the purpose to which the model is to be put and the resources at the disposal of the analyst constructing the model. The I-O model of the metropolitan St. Louis region contains fewer than 30 sectors while the greater Philadelphia I-O model possesses approximately 500. To gain a better understanding of the basic I-O model let us focus our attention on the simple, hypothetical 3-sector model of Figure 1, keeping

in mind that generally no analyst would set out to construct an I-O model of so few sectors--too much information regarding the structure of the economy would be lost at such a high degree of aggregation.

Figure 1

Hypothetical Transactions Table ($\$10^6$)

| Purchasers / Sellers | | Intermediate Sales: Agriculture | Intermediate Sales: Manufacturing | Intermediate Sales: Services | Final Sales: Households | Final Sales: Investment | Final Sales: Government | Final Sales: Exports | Total Output |
|---|---|---|---|---|---|---|---|---|---|
| Intermediate Purchases | Agriculture | 10 | 5 | 5 | 10 | 5 | 10 | 25 | 70 |
| | Manufacturing | 20 | 30 | 25 | 5 | 5 | 5 | 10 | 100 |
| | Services | 5 | 10 | 10 | 35 | 5 | 10 | 5 | 80 |
| Final Purchases | Imports | 5 | 15 | 5 | | | | | |
| | Value Added | 30 | 40 | 35 | | | | | |
| Total Outlay | | 70 | 100 | 80 | | | | | |

The first aspect of this picture of the economy to note is that the production sectors in the model (in this case, Agriculture, Manufacturing and Services) encompass the entirety of the economic activity in the region. Each of the sectors is represented as both a seller and a purchaser. That is, each sector buys inputs from, and sells its output to, each of the other sectors. It is from this double-entry accounting feature that the model derives its name "input-output."

The data shown in the model represent the economic transactions that have occurred over a particular period, generally of one year duration. These data yield significant information for each sector's sale and purchase linkages with the rest of the economy. Reading along the row of, say, the Manufacturing sector we see that during the year for which the model was constructed, the Manufacturing sector sold $20 million to Agriculture (e.g., farm machinery), $30 million to Manufacturing (e.g., frames from the steel industry to the auto industry), and $25 million to services (e.g., electronic computers). In addition to these intermediate sales--sales of product which will undergo further processing within the region, Manufacturing also made significant final sales--sales which will not undergo further regional processing. The sector sold $5 million to Households (e.g., autos), $5 million to Investment (e.g., inventories), $5 million to Government (e.g., office equipment), and $10 million to Exports (e.g., construction equipment to the rest of the country and to, say, France). Total sales (intermediate plus final) of the Manufacturing sector sum to $100 million.

As the rows reveal the sales distribution of the various sectors, the columns reveal the purchase patterns. Again looking at Manufacturing, it can be seen that this sector purchased $4 million from Agriculture (e.g.,

raw foodstuffs), $30 million from Manufacturing (e.g., steel frames by the auto industry), $10 million from Services (e.g., accounting services), $15 million from Imports (e.g., forest products produced outside the region), and $40 million from Value Added (e.g., wages). Total inputs to Manufacturing are $100 million, a figure identical to the Total Output of the sector. Total Output (Sales) is equal to Total Input (Purchases) for each of the three sectors because of the following identity:

Total Sales Revenue = Total Costs + Profit

The Transactions of Figure 1 account for all sales revenue and costs for each particular sector and for the residual, balancing item of profits which is part of Value Added. (Value Added is composed principally of wages and salaries, profits, rents, interest, dividends and business taxes.)

In the above manner the input-output transactions table presents a snapshot of the structure of the economy, highlighting the interrelationships between the various sectors of the economy. Although this picture by itself contributes significantly to our understanding of the workings of the economy, the usefulness of the I-O model extends far beyond this contribution.

(ii) I-O Models: What They Can Do

The I-O model can prove to be invaluable to impact analysis and to forecasting. It can readily be shown that the model will allow us to predict the effects throughout the economy of changes in the output of any one sector. Suppose at the national level there is an increase in the demand for Chevrolets. To fill this order (or to replace inventories if the order is filled from existing stocks), General Motors will have to buy, among other items, steel, glass and rubber. To make these deliveries to GM, the Steel sector will have to purchase inputs from the Coal Mining and Iron Ore Mining sectors;

the Glass sector will have to increase its inputs from the Stone & Clay and Primary Nonferrous Metals sectors and the Rubber sector must increase its purchases from the Chemicals and Fabricated Metals sectors. (Of course the I-O model would also tell us that each sector affected by the initial GM order would require inputs of power and transportation and warehousing and a variety of other goods and services as well.)

In turn, each of these sectors supporting the increased production of steel, glass and rubber will have to buy a wide range of inputs, which will initiate further rounds of transactions between sectors. Added to these reverberations of intersectoral sales and purchases is the increased consumption of households which results from the increased wage bill in the economy. Among the increased purchases by households may well be additional automobiles which would initiate the particular chain reaction just described all over again. However, these reverberations or rounds of spending will eventually end because in each round portions of the money circulating will "leak" from the economy as import purchases and savings.

In short, each purchase from a particular sector by a firm or by a final consumer initiates a series of reverberations throughout the economy. What the input-output model does is to trace through the maze of reverberations or interactions to show, when the rounds of spending have come to an end, what the increased output of each sector will be, given the initial increase in one of the final demand categories. (If final demand decreases, the I-O model will reveal the decreased output for the economy sector by sector.) Further, if the relationship between each sector's output and emission of air pollutants is known, the value of the input-output analytic approach to environmental analysis becomes increasingly evident. Let us

return to this point after looking more closely at the workings of the basic I-O model.

To illustrate how the I-O approach performs the systems analysis of a change in one of its sectors, let us look again at our hypothetical 3 sector model. Let's assume that the Government purchases of the output of the Manufacturing sector has increased by $10,000 and let us trace the effects upon the sales (and subsequently on the air emissions) of each of the 3 sectors of the regional economy. As a first step in the analysis, let us construct from the transactions table of Figure 1 a table of direct requirements, as shown in Figure 2.

Figure 2

Table of Direct Requirements Per Dollar of Total Outlay

| | Ag. | Man. | Serv. |
|---|---|---|---|
| Ag. | .14 | .05 | .06 |
| Man. | .29 | .30 | .31 |
| Serv. | .07 | .10 | .12 |

Each column of coefficients is determined by dividing the first 3 elements in a particular column of the transactions table by the Total Input figure of that column. For example, the coefficients in the Agriculture column were calculated as 10/70 = .14, 20/70 = .29 and 5/70 = .07. Each of these coefficients shows the amount of input required from the row sector for the column sector to product a dollar of output. Hence on the average Manufacturing requires 5 cents of inputs from Agriculture for every dollar of output produced. The coefficients in each column thus represent the "recipe" for each column sector's output. If we make the critical assumption that these recipes do not change over the period of analysis (a point

to which we shall later return), we can perform the systems analysis described above, which reveals the accumulated effect on each sector of a stimulus (positive or negative) to any one of the sectors.

In our illustrative case of a $10,000 increase in government purchases of output from Manufacturing, the Manufacturing sector will first expand its output by $10,000 to meet this increase in final demand. To do so the sector will have to make the following purchases:

| | Man. $10,000 |
|---|---|
| Ag. | 10,000 x .05 = $ 500 |
| Man. | 10,000 x .30 = 3,000 |
| Serv. | 10,000 x .10 = 1,000 |

However, in order to produce this supporting output, each sector will require the following inputs:

| Ag.: $500 | Man.: $3,000 | Serv.: $1,000 | Total |
|---|---|---|---|
| Ag. 500 x .14 = $ 70 | 3000 x .05 = $150 | 1000 x .06 = $ 60 | $ 280 |
| Man. 500 x .29 = 145 | 3000 x .30 = 900 | 1000 x .31 = 310 | 1,355 |
| Serv. 500 x .07 = 35 | 3000 x .10 = 300 | 1000 x .12 = 120 | 455 |

These requirements will set off a third round of spending as follows:

| Ag. $280 | Man.: $1,355 | Serv.: $455 | Total |
|---|---|---|---|
| Ag. 280 x .14 = $39.20 | 1355 x .05 = $67.75 | 455 x .06 = $27.30 | $134.25 |
| Man. 280 x .29 = 81.20 | 1355 x .30 = 406.50 | 455 x .31 = 141.05 | 628.75 |
| Serv. 280 x .07 = 19.60 | 1355 x .10 = 135.50 | 455 x .12 = 54.60 | 209.70 |

These rounds of spending will continue with each round becoming increasingly weaker in its impact. The total increase in sales for each sector resulting from the initial stimulus to the Manufacturing sector of $10,000 in government purchases can be estimated from the model by summing the

increases in sector sales in each round:

Agriculture: \$500 + 280 + 134.25 + ... = \$1000

Manufacturing: \$10,000 + 3000 + 1355 + 628.75 + ... = \$15,5000

Services: \$1000 + 455 + 209.75 + ... = \$1900.

Although the approach is very straightforward, it is a very tedious and time consuming one, but one which, of course, the computer does very quickly and efficiently.[1] With the aid of a computer generated matrix inversion, as described in Section (iv) of this introduction, a table of total requirements can be constructed. From this table we may read directly the total (direct plus indirect) impact on each sector of a unit change in the final demand for any one particular sector. The table of total requirements for our hypothetical example is shown in Figure 3.

Figure 3

Table of Direct Plus Indirect Requirements

Per Dollar of Delivery to Final Demands

| | Ag. | Man. | Serv. |
|---|---|---|---|
| Ag. | 1.21 | 0.10 | 0.12 |
| Man. | 0.57 | 1.55 | 0.60 |
| Serv. | 0.16 | 0.19 | 1.22 |

Reading down the Manufacturing column of the table shown as Figure 3, we note that for a one dollar increase in the final demands for Manufacturing, Agriculture's sales increase by \$0.10, Manufacturing sales increase by \$1.55, and sales by the Service sector increase by \$0.19.

The above input-output approach or systems analysis can readily be extended to the examination of air pollutant emissions. Suppose, for example, that we wish to be able to predict the increased amount of nitrous oxides

emitted into the air basin of a particular region as a result of a stimulus to that region's economy. Assume that for our 3 sector economy the relationship between tons of NOx emitted per million dollars of output is as follows:

| | |
|---|---|
| Agriculture | 15 |
| Manufacturing | 20 |
| Services | 0 |

From these emission coefficients and the total requirements data of Figure 3, we can see that a million dollar increase in the demand for, say, Agriculture will result in an increase in NOx emissions in the region in the order of 1.21 x 15 + 0.57 x 20 + 0.16 x 0 = 29.55 tons.

To emphasize the value of the systems or general equilibrium approach of the I-O technique we have deliberately (and a bit unrealistically) chosen to assign an NOx emission coefficient of zero to the Service sector. Given these coefficients, a superficial analysis of a $1 million increase in the final demand for Services would conclude that no increase in NOx would be forthcoming since the sector is perfectly "clean." However, from our knowledge of the interrelationships of this clean sector with the other not-so-clean sectors of the economy, we know that some increase in NOx emissions will indeed occur. Again from the emission coefficients and from the results in Figure 3 we may formulate estimates of what that increase will be: 0.12 x 15 + 0.60 x 20 + 1.22 x 0 = 3.0 tons.[2] Although the direct impact in terms of NOx emissions of the increase in final demand for the Service sector is zero, the indirect impact (the impact generated via the intersector sales-purchase relationships) is significantly greater than

zero. As will be seen in the body of this report, for several regional economic sectors the indirect air pollutant emissions as revealed by the I-O model exceed the direct.

(iii) I-O Models: What They Cannot Do

The principal assumptions of the input-output model are 1) homogeneous activity in each sector; 2) constant returns to scale (i.e., if output is to increase by a certain percentage, all inputs must be increased by the same percentage) and 3) constancy of the direct requirements coefficients (and the emission coefficients if the latter are incorporated). It is the assumption of constant coefficients that is the crucial assumption of the model. The direct requirements or economic coefficients may change over time due to technological progress, changes in the relative prices of substitutable inputs, changes in the product mix of a particular sector (contrary to assumption #1 above, any one particular sector may be composed of activities with differing input patterns) and, at the subnational level, the location of new firms.

The basic I-O model as it has been described in the Introduction and as it has been employed in the study of air emissions herein reported is not designed to forecast phenomena, such as technological change, which result in changes in the model's economic coefficients. Although considerable research has been undertaken to develop techniques to update the model's coefficients (7,8,9), such updating procedures require substantial additional inputs to make appropriate adjustments to the model.

In regard to pollutant emissions two assumptions are generally made. First, given that the coefficients are based on average emissions per unit of output, it is assumed that any increase in output does not alter the

established relationship between emissions and output--the relationship is assumed to be linear and homogeneous of the first degree. Second, it is assumed that other sources of change in the emission coefficients, such as technical advances, do not occur within the period of analysis. As is the case with the I-O direct requirements coefficients, any significant influences on the values of these coefficients must be analyzed independently. The model as utilized herein is related to stationary emission sources and those transportation activities related to production.[3] Consideration of emissions emanating from sources related to household activities are not included.

Finally, it should be noted that the model may be used for forecasting purposes by projecting the model's exogenous variables (the final demand categories of household, investment, government and exports). However, given accurate economic and emission coefficients, the model's results will only be as valid as are the final demand projections. For this reason the I-O model is sometimes joined with econometric forecasting models that generate projections of the final demand categories. In some such cases the econometric models will also provide forecasts of price changes which bear directly on potential changes in the I-O direct requirements coefficients.

(iv) Mathematical Summary of the I-O Model

As previously shown, the I-O model records each sale in the economy as "intermediate" or "final". Total sales or output of any sector of an n-sector model can thus be expressed as:

$$\sum_{j=1}^{n} x_{ij} + y_i = x_i \qquad (i=1,\ldots,n) \qquad (1)$$

where $x_{ij}$ = the value of the output of sector i purchased by sector j,

$y_i$ = the final demand for the output of sector i, and

$x_i$ = the value of the total output of sector i.

The economy is thus conceptualized by n linear equations, each equation expressing the transactions of a particular sector with the processing sectors, and with final demands (sales). Equation (2) represents the major portion of our first table, the Transactions Table. As such, it is merely a set of balance equations or accounting identities. To complete the mathematical description of the Transactions Table we write:

$$\sum_{j=1}^{n} x_{ij} + p_j = x_j \qquad (j=1,\ldots,n) \qquad (2)$$

where $p_j$ = final purchase (purchases of imports and other factors) by sector j.

$$x_i = x_j \qquad \text{for all } i=j \qquad (3)$$

The second Table of the I-O model, the Table of Direct Requirements can be expressed as the matrix $(a_{ij})$ where

$$a_{ij} = \frac{x_{ij}}{x_j} \qquad (i, j=1,\ldots,n) \qquad (4)$$

Substituting (4) into (1) yields

$$x_i = \sum_{j=1}^{n} a_{ij}x_j + y_i \qquad (i=1,\ldots,n) \qquad (5)$$

which may be expressed more compactly as

$$X = AX + Y \qquad (6)$$

where

$$x = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} ; \qquad A = \begin{bmatrix} a_{11}a_{12}\cdots a_{1n} \\ a_{21}a_{22}\cdots a_{2n} \\ \vdots \quad\quad \vdots \\ a_{n1}a_{n2}\cdots a_{nn} \end{bmatrix} ; \qquad Y = \begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix} \qquad (7)$$

It may now be shown that total output minus intermediate demand equals the net output of the system or final demand.

$$X - AX = (I-A)X = Y \qquad (8)$$

where I is an n x n identity matrix. Given the exogenous or final demands on the economy, it is possible to solve the system for total outputs,

$$X = (I-A)^{-1}Y \qquad (9)$$

where $(I-A)^{-1}$ is the third table of the I-O model, the Table of Direct Plus Indirect Requirements, which is frequently written in transposed form, $(I-A)^{-1}_T$, for convenience of reading tabular information.

(v) Summary

The input-output model of a particular economy is designed to reveal the interrelationships between the various sectors of that economy. Because the model provides estimates of the change in the output of each

and every sector in the economy resulting from an economic change in any one of the sectors, it is often invaluable to economic impact analysis. With the addition of air emission coefficients to the model, the changes in total emissions in a regional air basin emanating from a change in any one sector's production can also be estimated on a sector by sector basis. The crucial assumptions of the input-output approach to the analysis of air emissions are the constancy of the I-O model's economic and emission coefficients.

## 7. Regional Input-Output Modeling

### (i) Regional Trading Patterns - Central Place Theory

If an input-output analysis is to be applied to a given geographic region, certain basic conditions must be met. The fundamental assumption that the regional industries trade with one another should be fulfilled. This can generally be determined from data relating to the regional trading areas delineated by the Bureau of Economic Analysis (BEA), U.S. Department of Commerce. The U.S. has been divided geographically into 173 trading areas, or groups of counties, defined as BEA Economic Areas. These delineations were made on the basis of "central place theory with its emphasis on cities as the hubs around and within which integrated economic activity concentrates..." (10). A grouping of these areas, or any logical portion, or hub, would qualify as a meaningful input-output region for analytical purposes. The nature of the regional input-output model as outlined in Section 2 is such that it not only traces the flows of goods and services among the local industries but also provides estimates of trade flows in to and out of the local area for the various sectors of the model.

The composite trading area which constitutes the State of California is made up of eight BEA economic areas. These are BEA areas: 164-San Diego; 165-Los Angeles-Long Beach; 166-Fresno; 167-Stockton; 168-Sacramento; 169-Redding; 170-Eureka; 171-San Francisco-Oakland. A map showing the California counties and BEA economic areas is presented as Figure 4.

### (ii) Modifying National Technical Coefficients to Represent Local Interindustry Structure

If the trading conditions among the local industries are satisfac-

FIGURE 4


California BEA Economic Areas

torily met, the ensuing task is the application of modified or scaled or adjusted national technical coefficients in order to simulate the inter-industry structure of the local economy. This problem has been studied in depth and at least eight different approaches for modifying national coefficients have been systematically evaluated by Morrison and Smith (11). The so-called RAS (12) method has been ranked first in overall qualifications. The Simple Location Quotient (SLQ) method ranked second in three out of five possible tests. However, the RAS method (13) can only be used if gross trade flows by detailed sector can be estimated independently for the region under study.

The California state input-output table for 1976 was constructed on the basis of both the SLQ and RAS approaches. The input-output tables for the four air basins were based principally on the SLQ method.

The SLQ method requires three major data items as inputs for structuring the regional input-output model. These are: (1) a detailed national inter-industry transactions table which has been transformed to a gross domestic base. The table should include a value added vector which has been decomposed to show Employee Compensation, Property Type Income, and Indirect Business Taxes; (2) a column vector of regional gross domestic outputs; (3) the regional final demand vectors. The latter are typically: Personal Consumption Expenditure (PCE); Capital Formation (GPFCF); Federal Government Expenditures (FGE); State and Local Government Expenditures (S&LGE); and Foreign Exports (FE).

If national coefficients are to be used as a basis for developing regional technical coefficients, it is necessary to maintain much of the sec-

tor detail provided by the national tables (14). Walderhaug (15) has stressed the need for maintaining such detail. Karaska (16) and Drake et al. (17) found that the variation in input-output coefficients increased with the level of aggregation.

To illustrate the need for detail, particularly in the manufacturing sectors, the Food and Kindred Products sector SIC 20 may be used as an example. The 2-digit SIC Food and Kindred Products sector consists of forty-eight 4-digit codes, ranging from abattoirs to the preparation of spices and extracts. Each have widely differing inputs. If the national coefficients for the aggregated Food and Kindred Products sector are applied to estimate inputs for, let us say, a local bakery or confectionary, the chances for error are obvious. In order to minimize errors of this type, the detail of the input-output sectoring provided by the national table was substantially maintained at the state and county level for the current modeling effort.

(iii) Empirical Considerations

In empirical work in the U.S. the sectors of the national input-output tables are developed on the basis of Standard Industrial Classifications - (SIC) codes. These codes identify individual industries (enterprises) rather than activities. So that the tables may more nearly approximate the assumptions of the basic input-output model, transfers of secondary and joint products are made among the industries. The majority of the 400 sectors of the typical U.S. national model are defined at the 4-digit SIC code level of detail.

(iv) Methodology for the Construction of Regional Input-Output Tables

In general, regional economic accounts can be established by two approaches. The first is usually considered to be more precise but it is difficult to carry out and to establish a concordance with other regions and with the nation as a whole. This first method can be considered as an "upward movement" beginning with the available accounting data of local firms and family expenditure data and aggregating these to form a set of accounts for the region under study. The second approach is more coherent but is usually felt to be less precise. This latter approach can be thought of as a "downward movement" from the national level to the region. The techniques for developing comprehensive intranational models encompassing all regions of the national economy involve elements of both approaches being employed simultaneously. At the local level the available secondary data on production, income and earnings are assembled. At the national level the detailed income and product data are arrayed. By choosing the most suitable regional measures the technique seeks to allocate the national totals of production and demand by sector to regions in order to establish the appropriate detail of a regional economic accounting scheme. The simultaneous use of these two approaches while maintaining the maximum degree of detail feasible, yields the best possible set of regional accounts consistent with one another and with the national totals (18). Such a procedure was followed for the present modeling effort using the available 1976 national, state, and county data sets.

The most recent official input-output table for the U.S. economy is for 1967[4]. Although the technical coefficients of the 1967 table may

be satisfactory for some current studies, there is a general discomfort about the reliability and validity of research of this type when it is based on a table that is, in fact, some twelve years old.

Several research groups have devoted substantial time and resources to these so-called "updating" problems relating to input-output tables. The most satisfactory updating technique appears to be accomplished by using the RAS method pioneered and popularized by Professor J.R.N. Stone of Cambridge, England (19). This method has been applied to U.S. national input-output tables with encouraging results (20). The present modeling work on the California economy could draw heavily on such related national and regional input-output research being sponsored for other specific purposes (21).

The updating of the official 1967 national table to 1976 and the development of a number of computer programs for manipulating national and regional economic data sets provided the underpinning for the development of the structural models of the California economy.

Essentially, the national 1967 input-output table was updated to 1976 using Bureau of Labor Statistics, Division of Economic Growth estimates of gross domestic output (22) and similar data on final demand (23). The overall table was benchmarked to agree with U.S. Department of Commerce published data on Gross National Product and its components for 1976 (24).

After completing the update of the national table the next task was to allocate the national production totals established for the individual sectors of the 1976 U.S. table to California state industries, and also

to develop state-wide final demand estimates. Basically, the state data for 1963 developed under the multiregional input-output program funded by the Economic Development Administration (25) were updated using various proxy measures for scaling the 1963 data up to 1976. The results were made to conform with the national data so that state estimates would be consistent with national 1976 totals as in the original 1963 research effort.

The California state production totals for 1976 were verified and benchmarked with available control totals such as statewide income, earnings and employment, and were then allocated to California counties using procedures similar to those used in the nation-to-state allocations. Fundamentally, it was necessary to construct final demand estimates and gross domestic output estimates for all California counties. These estimates were based on Bureau of Economic Analysis county income and earnings series by major source (26) and modified County Business Patterns (CBP) payroll and employment data (27).

The employment and payroll data provided by the county, state, and national summary files of the 1972 County Business Patterns can be used as basic proxy measures for allocating national gross domestic output first to states and then to counties. These could then be updated using 2- and 3-digit data for 1976. In using the County Business Patterns data, the assumption is made that production worker payrolls can serve as a basis for estimating levels of industrial output for counties and states. If this assumption is rejected then virtually no readily available economic measures exist at the 4-digit Standard Industrial Classfication (SIC) detail

for counties which can be used to estimate levels of industrial production. To give strength to the basic assumption, however, a recent study of U.S. payroll data by Browne (28) points to the fact that regional differences in wage rates are considerably less than might be inferred by casual observation.

The County Business Patterns data are unique in that production employment and payrolls are shown in detail, with employment in the so-called administrative and auxiliary units (sales or headquarters offices) being shown separately as a lump sum category for each county.

The importance of the CBP data format cannot be minimized. If an analysis of industrial structure or resource use is undertaken on the basis of the reported SIC employment without regard to its true nature in terms of occupation (production versus non-production) then the opportunity arises for major errors. In the absence of County Business Patterns type data it would be necessary to revert to some method in which the bona fide industrial activity of each reporting unit could be verified.

The County Business Patterns data suffer from the defect that non-disclosure regulations require the Bureau of the Censuses to withhold certain payroll and employment data. Statistical techniques have been devised and implemented in earlier studies (29) which use totals for a broader level of SIC detail along with summing and balancing methods to obtain the best estimates for the missing data. In some instances machine readable business directory data can be merged with the County Business Patterns files to obtain the maximum level of reliable data detail for counties. These procedures were used in the present study to provide a comprehensive set of

data for California counties.

The state and local input-output models were developed using a computer program based on the SLQ technique. When the provisional SLQ models were obtained, trade flow data derived from independent sources were used in conjunction with the RAS technique to further adjust the models (30).

(v) Accuracy and Related Matters in Regional Models

At the national level, census data are used to develop the interindustry transactions which are in turn reconciled with the data of the National Income and Product Accounts. Below the national level, for states and regions, the counterpart of the U.S. income and product accounts do not exist and census data on industry sales and purchases by geographic region are more limited. Because of this lack of data, regional interindustry economic research has developed slowly and is characterized by several distinct approaches. The essential difference in these approaches lies in the relative emphasis given to survey techniques and the use of primary data as opposed to the reliance on secondary data sources and methods for deriving regional estimates of interindustry flows of goods and services by indirect means. Although the controversy within the economics profession over the relative merits and cost-effectiveness of "survey" versus "non-survey" techniques is still unsettled there is increasing evidence that secondary data sources, if properly exploited, can serve as a basis for constructing regional input-output tables that are satisfactory for most analytical purposes (31) (32) (33).

For some states and regions where it was felt that as high a degree of accuracy as possible might be warranted in the preparation of a regional

table, proposals have been made and extensively funded for gathering data as comprehensively as possible from local enterprises. Arrow and Hirsch have commented specifically on this procedure (34).

> Very few manufacturers of any scale keep accurate accounts in a manner which permits them to summarize readily their annual shipments by geographical destination. In addition, many types of manufacturers cannot know what the destination of their product is. For example, a peach canner who sends his shipment to a warehouse in Los Angeles cannot know whether those peaches will be consumed there, shipped to the East Coast, or exported abroad. As a matter of fact, at the time the canner is making his shipment, no decision may have been reached about the final disposition....The data used in national tables comes from the purchaser of the inputs rather than the shipper. These data are harder to come by but clearly more reliable in that they require no guessing by the respondent.

The fundamental problem is one of estimating, or simulating, the inter industry flows of goods and services among the sectors of a regional economy. In the so-called survey approach, which Arrow and Hirsch address, the task is to obtain sufficient primary data from regional firms to permit the establishment of a local table of interindustry transactions.

In the non-survey approach the task is one of modifying national technical coefficients to simulate the interindustry flows of the local economy using secondary data sources.

In order to deal with the questions of accuracy and validity that are sometimes raised in connection with the data contained in regional input-output tables a certain perspective must be given.

When dealing with matters of accuracy it is necessary to have an absolute standard against which comparisons can be made.

If Arrow and Hirsch are correct in their statements as cited above then for any regional economy of modest dimensions, the real, or actual, interindustry flows may be unknown and for practical purposes unknowable, even with the use of the most advanced survey techniques, because of the basic data problems inherent in the accounting practices of most industries.

The non-survey approach relies on quantitative methods that have been tested by researchers working on small-area input-output models under controlled conditions in which the real, or actual, interindustry flows for the local economy could be established. Some eight possible methods for simulating known interindustry flows were tested and the results compared with the known flows (35). The non-survey techniques which ranked the highest can then be applied with some greater measure of confidence in regional I-O studies where actual flows cannot be established by other methods.

Under these circumstances, however, the analyst obviously cannot say that the derived flows or coefficients are accurate within certain tolerance levels. In reality they give a first approximation to the actual regional economic structure based on the best available data and methods.

## 8. The California Input-Output Models - 1976

### (i) The Statewide Model

The economy of the State of California is broadly diversified and accounted for approximately 11% of U.S. Gross Product in 1976. California Gross State Product for 1976 was estimated as $186.2 billion, the counterpart U.S. figure is $1706.5 billion.

In the input-output accounting scheme Gross Product consists of the sum of all final demands less imports. The following values have been abstracted from the California table of interindustry flows which is presented in Appendix 1.

| | (Millions of Dollars) |
|---|---|
| Personal Consumption Expenditures | 121975.906 |
| Capital Formation | 25298.500 |
| Federal Government Expenditures | 15588.869 |
| State and Local Government Expenditures | 28239.386 |
| Exports | 54215.520 |
| Total Final Demand | 245318.181 |
| Less Imports | 59076.131 |
| Gross State Product | $186,242.05 |

The California transactions table given in Appendix 1 shows a total of 164 rows, or sectors. 156 of these are considered to be within the processing quadrant of the input-output table. Of the 156 sectors shown

in the processing quadrant six are null, but were apparently retained because of the format, or structure, of the national table used to create the California model.[5] Additionally, the Government Industry and Special Industries sectors are also null except for the Value Added entries. These sectors are typically removed from the model before forming the inverse or undertaking further manipulations.

The competitive imports sector may also be treated exogenously leaving 153 specific sectors, of which, it should be repeated, six are null. There are thus 147 active sectors in the California statewide model. Four of these null sectors appear in Agriculture (Tobacco, Dried Peas, Sugar and Vegetables not elsewhere classified (NEC), Oil Crops (NEC). Among the non-agricultural sectors, Coal Mining, and Tobacco Manufactures are absent.

The so-called "Dummy Industries" have been included to maintain the definitions and conventions used by BEA in constructing the U.S. input-output table. The "Dummy Sectors" are defined at the national level as Office Supplies and Business Travel, Entertainment and Gifts, and Scrap and By-Products. As artificially constructed for the I-O model, these sectors have no direct employment or pollutants associated with them but do interact with the other sectors of the economy indirectly. Sector 156, - "Special Industries" is defined by BEA to contain "Rest of the World Industry" and "Household Industry".

The Leontief inverse for the statewide model is not shown but the column sums of the inverse are calculated and ranked. These are shown as Table 1. This inverse shows 154 sectors. The Special Industries and

# Table 1

CALIFORNIA 1976 — PAGE 1
154 SECTOR INVERSE — 25 MAR 79

COLUMN SUMS OF THE INVERSE AND THEIR RANKING

| | SECTOR | COLUMN SUM | | SECTOR | COLUMN SUM | RANK |
|---|---|---|---|---|---|---|
| 1 | DAIRIES | 2.48184 | 52 | MEAT PRODUCTS | 3.56779 | 1 |
| 2 | BROILERS, CHICKENS AND EGGS | 3.32097 | 2 | BROILERS, CHICKENS AND EGGS | 3.32097 | 2 |
| 3 | TURKEYS AND OTHER POULTRY | 3.15371 | 53 | DAIRY PRODUCTS | 3.18345 | 3 |
| 4 | CATTLE AND CALVES | 3.11000 | 154 | DUMMY INDUSTRIES | 3.17928 | 4 |
| 5 | HOGS | 2.95300 | 88 | PRIMARY NONFERROUS METAL PRODUCTS | 3.15546 | 5 |
| 6 | SHEEP, LAMBS, AND WOOL | 3.02326 | 3 | TURKEYS AND OTHER POULTRY | 3.15371 | 6 |
| 7 | MISC. LIVESTOCK | 2.88310 | 4 | CATTLE AND CALVES | 3.11000 | 7 |
| 8 | APIARY PRODUCTS | 3.02169 | 55 | GRAIN MILL PRODUCTS | 3.08686 | 8 |
| 9 | COTTON | 2.48511 | 6 | SHEEP, LAMBS, AND WOOL | 3.02326 | 9 |
| 10 | WHEAT | 2.27649 | 8 | APIARY PRODUCTS | 3.02169 | 10 |
| 11 | RICE | 2.24356 | 76 | CLEANING AND TOILET PREPARATIONS | 2.95114 | 11 |
| 12 | BARLEY | 2.34763 | 113 | MOTOR VEHICLES | 2.88654 | 12 |
| 13 | CORN | 2.31900 | 7 | MISC. LIVESTOCK | 2.88310 | 13 |
| 14 | HAY AND PASTURE | 2.31013 | 54 | CANNED AND FROZEN FOODS | 2.88118 | 14 |
| 15 | OATS | 2.39560 | 72 | AGRICULTURAL CHEMICALS | 2.86530 | 15 |
| 16 | SORGHUM GRAIN | 2.30298 | 57 | SUGAR | 2.86400 | 16 |
| 17 | GRASS SEED | 2.03366 | 18 | FOOD, FEED GRAINS, NEC | 2.84881 | 17 |
| 18 | FOOD, FEED GRAINS, NEC | 2.84981 | 140 | ADVERTISING | 2.82335 | 18 |
| 19 | TOBACCO | 1.00000 | 74 | PLASTICS MATERIALS AND SYNTHETIC FIBERS | 2.81918 | 19 |
| 20 | WALNUTS | 1.65939 | 116 | OTHER TRANSPORTATION EQUIPMENT | 2.80204 | 20 |
| 21 | ALMONDS | 1.81653 | 62 | TEXTILE PRODUCTS | 2.78572 | 21 |
| 22 | NONCITRUS FRUITS | 2.01475 | 77 | PAINTS AND ALLIED PRODUCTS | 2.78474 | 22 |
| 23 | CITRUS FRUITS | 2.03592 | 104 | SERVICE INDUSTRY MACHINES | 2.76692 | 23 |
| 24 | FRUIT AND TREE NUTS, NEC | 1.85016 | 73 | GUM AND WOOD CHEMICALS | 2.76151 | 24 |
| 25 | VEGETABLES | 1.94161 | 90 | HEATING APPARATUS AND PLUMBING FIXTURES | 2.74484 | 25 |
| 26 | DRIED BEANS | 2.00131 | 89 | METAL CONTAINERS | 2.70700 | 26 |
| 27 | DRIED PEAS | 1.00000 | 91 | FABRICATED STRUCTURAL STEEL | 2.70156 | 27 |
| 28 | MELONS | 1.54028 | 60 | MISC FOOD PRODUCTS | 2.70063 | 28 |
| 29 | SUGAR BEETS | 1.81914 | 143 | MOTION PICTURES | 2.67508 | 29 |
| 30 | HOPS | 1.97615 | 56 | CONFECTIONARY PRODUCTS | 2.65078 | 30 |
| 31 | POTATOES | 2.12122 | 96 | ENGINES, TURBINES AND GENERATORS | 2.63360 | 31 |
| 32 | SWEET POTATOES | 1.68401 | 80 | LEATHER TANNING AND PRODUCTS | 2.61333 | 32 |
| 33 | VEGETABLES + SUGAR, NEC | 1.00000 | 71 | INDUSTRIAL CHEMICALS | 2.61229 | 33 |
| 34 | SAFFLOWER | 2.07811 | 64 | MILLWORK, PLYWOOD + OTHER WOOD PRODUCTS | 2.61209 | 34 |
| 35 | OIL CROPS, NEC | 1.00000 | 130 | WATER AND SANITARY SERVICES | 2.59660 | 35 |
| 36 | GREENHOUSE AND NURSERY PRODUCTS | 1.76549 | 97 | FARM MACHINERY | 2.58268 | 36 |
| 37 | FORESTRY AND FISHERY PRODUCTS | 2.15885 | 95 | OTHER FABRICATED METAL PRODUCTS | 2.56738 | 37 |
| 38 | AGRIC., FORESTRY, FISHERY SERV | 2.19149 | 107 | HOUSEHOLD APPLIANCES | 2.56713 | 38 |
| 39 | METALS MINING | 1.96265 | 85 | WOODEN CONTAINERS | 2.55994 | 39 |
| 40 | COAL MINING | 1.00000 | 68 | PAPER + PAPERBOARD PRODUCTS | 2.54668 | 40 |
| 41 | CRUDE PETROLEUM | 1.81306 | 78 | PETROLEUM REFINING AND RELATED PRODUCTS | 2.54001 | 41 |
| 42 | NATURAL GAS + N.G. LIQUIDS | 2.18996 | 79 | RUBBER AND PLASTICS PRODUCTS | 2.51944 | 42 |
| 43 | STONE + CLAY MIN + QUARRY | 1.99333 | 63 | LOGGING CAMPS + SAWMILLS | 2.51637 | 43 |
| 44 | CHEM + FERT MINERAL MIN | 1.79366 | 66 | HOUSEHOLD FURNITURE | 2.50937 | 44 |
| 45 | NEW CONSTRUCT, RESIDENT | 2.28293 | 109 | RADIO AND TV RECEIVING SETS | 2.49702 | 45 |
| 46 | NEW CONSTRUCT, NONRESIDENT | 2.31407 | 9 | COTTON | 2.48511 | 46 |
| 47 | NEW CONSTRUCT, PUBLIC UTILITY | 2.39149 | 114 | AIRCRAFT | 2.48698 | 47 |
| 48 | NEW CONSTRUCT, HIGHWAYS | 2.09076 | 1 | DAIRIES | 2.48184 | 48 |
| 49 | NEW CONSTRUCT, ALL OTHER | 2.02638 | 93 | METAL STAMPINGS | 2.48105 | 49 |
| 50 | MAINT. AND REPAIR CONSTRUCTION | 1.81240 | 56 | BAKERY PRODUCTS | 2.46578 | 50 |
| 51 | ORDNANCE + GUIDED MISSILES | 2.29311 | 98 | CONSTRUCTION + MATERIAL HANDLING EQUIP | 2.46320 | 51 |
| 52 | MEAT PRODUCTS | 3.56779 | 67 | OFFICE FURNITURE AND FIXTURES | 2.46064 | 52 |
| 53 | DAIRY PRODUCTS | 3.18345 | 86 | BLAST FURNACES AND BASIC STEEL PRODUCTS | 2.44925 | 53 |
| 54 | CANNED AND FROZEN FOODS | 2.89118 | 122 | WATER TRANSPORATATION | 2.44291 | 54 |
| 55 | GRAIN MILL PRODUCTS | 3.08696 | 87 | IRON AND STEEL FOUNDRIES AND FORGINGS | 2.42907 | 55 |

Table 1 - Cont.

CALIFORNIA 1976 — PAGE 2
154 SECTOR INVERSE — 25 MAR 79

COLUMN SUMS OF THE INVERSE AND THEIR RANKING

| | SECTOR | COLUMN SUM | | SECTOR | COLUMN SUM | RANK |
|---|---|---|---|---|---|---|
| 56 | BAKERY PRODUCTS | 2.46578 | 100 | SPECIAL INDUSTRIAL MACHINERY | 2.42205 | 56 |
| 57 | SUGAR | 2.66400 | 101 | GENERAL INDUSTRIAL MACHINERY | 2.41044 | 57 |
| 58 | CONFECTIONARY PRODUCTS | 2.65078 | 119 | JEWELRY, SPORTING GOODS, ETC. | 2.40259 | 58 |
| 59 | BEVERAGES AND FLAVORINGS | 2.24541 | 103 | COMPUTERS AND OFFICE EQUIPMENT | 2.40001 | 59 |
| 60 | MISC FOOD PRODUCTS | 2.77063 | 15 | OATS | 2.39560 | 60 |
| 61 | TOBACCO MANUFACTURERS | 1.00000 | 47 | NEW CONSTRUCT, PUBLIC UTILITY | 2.39149 | 61 |
| 62 | TEXTILE PRODUCTS | 2.78572 | 115 | SHIP AND BOAT BUILDING AND REPAIRING | 2.37436 | 62 |
| 63 | LOGGING CAMPS + SAWMILLS | 2.91437 | 5 | HOGS | 2.35000 | 63 |
| 64 | MILLWORK, PLYWOOD + OTHER WOOD PRODUCTS | 2.61209 | 12 | BARLEY | 2.34763 | 64 |
| 65 | WOODEN CONTAINERS | 2.55494 | 112 | MISC ELECTRICAL PRODUCTS | 2.34028 | 65 |
| 66 | HOUSEHOLD FURNITURE | 2.50927 | 13 | CORN | 2.31900 | 66 |
| 67 | OFFICE FURNITURE AND FIXTURES | 2.46364 | 46 | NEW CONSTRUCT, NONRESIDENT | 2.31407 | 67 |
| 68 | PAPER + PAPERBOARD PRODUCTS | 2.54068 | 14 | HAY AND PASTURE | 2.31013 | 68 |
| 69 | NEWSPAPERS | 1.88882 | 16 | SORGHUM GRAIN | 2.30296 | 69 |
| 70 | OTHER PRINTING AND PUBLISHING | 2.17496 | 117 | CLOCKS AND SCIENTIFIC EQUIPMENT | 2.30204 | 70 |
| 71 | INDUSTRIAL CHEMICALS | 2.61229 | 75 | DRUGS | 2.29756 | 71 |
| 72 | AGRICULTURAL CHEMICALS | 2.86330 | 51 | ORDNANCE + GUIDED MISSILES | 2.29311 | 72 |
| 73 | GUM AND WOOD CHEMICALS | 2.76151 | 92 | SCREW MACHINE PRODUCTS | 2.29073 | 73 |
| 74 | PLASTICS MATERIALS AND SYNTHETIC FIBERS | 2.81918 | 45 | NEW CONSTRUCT, RESIDENT | 2.28283 | 74 |
| 75 | DRUGS | 2.29756 | 10 | WHEAT | 2.27669 | 75 |
| 76 | CLEANING AND TOILET PREPARATIONS | 2.95114 | 54 | CUTLERY, HAND TOOLS AND GENERAL HARDWARE | 2.27315 | 76 |
| 77 | PAINTS AND ALLIED PRODUCTS | 2.78474 | 128 | ELECTRIC COMPANIES AND SYSTEMS | 2.25803 | 77 |
| 78 | PETROLEUM REFINING AND RELATED PRODUCTS | 2.54051 | 99 | METAL WORKING MACHINERY | 2.25263 | 78 |
| 79 | RUBBER AND PLASTICS PRODUCTS | 2.51944 | 85 | MISC STONE AND CLAY PRODUCTS | 2.24861 | 79 |
| 80 | LEATHER TANNING AND PRODUCTS | 2.61333 | 59 | BEVERAGES AND FLAVORINGS | 2.24543 | 80 |
| 81 | GLASS | 1.96210 | 106 | ELECTRICAL INDUSTRIAL APPARATUS | 2.24511 | 81 |
| 82 | CEMENT AND CONCRETE PRODUCTS | 2.16745 | 11 | RICE | 2.24356 | 82 |
| 83 | STRUCTURAL CLAY PRODUCTS | 1.93446 | 42 | NATURAL GAS + N.G. LIQUIDS | 2.18986 | 83 |
| 84 | POTTERY AND RELATED PRODUCTS | 1.76613 | 70 | OTHER PRINTING AND PUBLISHING | 2.17496 | 84 |
| 85 | MISC STONE AND CLAY PRODUCTS | 2.24861 | 108 | ELECTRIC LIGHTING AND WIRING | 2.17334 | 85 |
| 86 | BLAST FURNACES AND BASIC STEEL PRODUCTS | 2.44929 | 111 | ELECTRONIC COMPONENTS | 2.17065 | 86 |
| 87 | IRON AND STEEL FOUNDRIES AND FORGINGS | 2.42507 | 37 | FORESTRY AND FISHERY PRODUCTS | 2.16685 | 87 |
| 88 | PRIMARY NONFERROUS METAL PRODUCTS | 2.15546 | 82 | CEMENT AND CONCRETE PRODUCTS | 2.16745 | 88 |
| 89 | METAL CONTAINERS | 2.70700 | 105 | ELECTRIC TRANSMISSION EQUIPMENT | 2.13306 | 89 |
| 90 | HEATING APPARATUS AND PLUMBING FIXTURES | 2.74484 | 102 | MACHINE SHOP PRODUCTS | 2.12458 | 90 |
| 91 | FABRICATED STRUCTURAL STEEL | 2.70156 | 31 | POTATOES | 2.12122 | 91 |
| 92 | SCREW MACHINE PRODUCTS | 2.29073 | 38 | AGRIC., FORESTRY, FISHERY SERV | 2.10149 | 92 |
| 93 | METAL STAMPINGS | 2.48105 | 48 | NEW CONSTRUCT, HIGHWAYS | 2.09076 | 93 |
| 94 | CUTLERY, HAND TOOLS AND GENERAL HARDWARE | 2.27319 | 127 | RADIO AND TELEVISION BROADCASTING | 2.08923 | 94 |
| 95 | OTHER FABRICATED METAL PRODUCTS | 2.56738 | 34 | SAFFLOWER | 2.07813 | 95 |
| 96 | ENGINES, TURBINES AND GENERATORS | 2.63300 | 134 | INSURANCE | 2.04860 | 96 |
| 97 | FARM MACHINERY | 2.58268 | 23 | CITRUS FRUITS | 2.03692 | 97 |
| 98 | CONSTRUCTION + MATERIAL HANDLING EQUIP | 2.46320 | 17 | GRASS SEED | 2.03366 | 98 |
| 99 | METAL WORKING MACHINERY | 2.25263 | 49 | NEW CONSTRUCT, ALL OTHER | 2.02638 | 99 |
| 100 | SPECIAL INDUSTRIAL MACHINERY | 2.42205 | 137 | HOTELS AND LODGING PLACES | 2.01910 | 100 |
| 101 | GENERAL INDUSTRIAL MACHINERY | 2.41044 | 142 | AUTOMOBILE REPAIR | 2.01778 | 101 |
| 102 | MACHINE SHOP PRODUCTS | 2.12458 | 22 | NONCITRUS FRUITS | 2.01475 | 102 |
| 103 | COMPUTERS AND OFFICE EQUIPMENT | 2.40000 | 26 | DRIED BEANS | 2.00131 | 103 |
| 104 | SERVICE INDUSTRY MACHINES | 2.76092 | 43 | STONE + CLAY MIN + QUARRY | 1.98333 | 104 |
| 105 | ELECTRIC TRANSMISSION EQUIPMENT | 2.13306 | 129 | GAS COMPANIES AND SYSTEMS | 1.98263 | 105 |
| 106 | ELECTRICAL INDUSTRIAL APPARATUS | 2.24511 | 30 | HOPS | 1.97615 | 106 |
| 107 | HOUSEHOLD APPLIANCES | 2.56713 | 113 | COMMUNICATION EQUIPMENT | 1.96434 | 107 |
| 108 | ELECTRIC LIGHTING AND WIRING | 2.17334 | 81 | GLASS | 1.96310 | 108 |
| 109 | RADIO AND TV RECEIVING SETS | 2.49702 | 133 | BANKING AND FINANCIAL INTERMEDIARIES | 1.96258 | 109 |
| 110 | COMMUNICATION EQUIPMENT | 1.96434 | 39 | METALS MINING | 1.96265 | 110 |

Table 1 - Cont.

CALIFORNIA 1976 PAGE 3
L54 SECTOR INVERSE 25 MAR 79

COLUMN SUMS OF THE INVERSE AND THEIR RANKING

| SECTOR | | COLUMN SUM | | SECTOR | COLUMN SUM | RANK |
|---|---|---|---|---|---|---|
| 111 | ELECTRONIC COMPONENTS | 2.17365 | 123 | AIR TRANSPORTATION | 1.95327 | 111 |
| 112 | MISC ELECTRICAL PRODUCTS | 2.34028 | 28 | MELONS | 1.94828 | 112 |
| 113 | MOTOR VEHICLES | 2.88654 | 152 | STATE AND LOCAL GOVT ENTERPRISES | 1.94302 | 113 |
| 114 | AIRCRAFT | 2.40698 | 25 | VEGETABLES | 1.94161 | 114 |
| 115 | SHIP AND BOAT BUILDING AND REPAIRING | 2.37436 | 83 | STRUCTURAL CLAY PRODUCTS | 1.93446 | 115 |
| 116 | OTHER TRANSPORTATION EQUIPMENT | 2.80204 | 69 | NEWSPAPERS | 1.88862 | 116 |
| 117 | CLOCKS AND SCIENTIFIC EQUIPMENT | 2.33204 | 120 | LOCAL TRANSIT AND INTERCITY BUSES | 1.87307 | 117 |
| 118 | JEWELRY, SPORTING GOODS, ETC. | 2.40299 | 24 | FRUIT AND TREE NUTS, NEC | 1.85046 | 118 |
| 119 | RAILROADS | 1.81841 | 20 | WALNUTS | 1.85039 | 119 |
| 120 | LOCAL TRANSIT AND INTERCITY BUSES | 1.87307 | 144 | AMUSEMENT AND RECREATION SERVICES | 1.82898 | 120 |
| 121 | TRUCK TRANSPORTATION | 1.69688 | 29 | SUGAR BEETS | 1.81514 | 121 |
| 122 | WATER TRANSPORTATION | 2.44291 | 119 | RAILROADS | 1.81841 | 122 |
| 123 | AIR TRANSPORTATION | 1.95327 | 21 | ALMONDS | 1.81690 | 123 |
| 124 | PIPELINE TRANSPORTATION | 1.77969 | 41 | CRUDE PETROLEUM | 1.81306 | 124 |
| 125 | TRANSPORTATION SERVICES | 1.36084 | 50 | MAIN. AND REPAIR CONSTRUCTION | 1.81240 | 125 |
| 126 | COMMUNICATION, EXCEPT RADIO AND TV | 1.28282 | 138 | PERSONAL AND REPAIR SERVICES | 1.79904 | 126 |
| 127 | RADIO AND TELEVISION BROADCASTING | 2.08923 | 44 | CHEM + FERT MINERAL MIN | 1.79365 | 127 |
| 128 | ELECTRIC COMPANIES AND SYSTEMS | 2.25803 | 124 | PIPELINE TRANSPORTATION | 1.77969 | 128 |
| 129 | GAS COMPANIES AND SYSTEMS | 1.98263 | 146 | HOSPITALS | 1.77917 | 129 |
| 130 | WATER AND SANITARY SERVICES | 2.55660 | 64 | POTTERY AND RELATED PRODUCTS | 1.76613 | 130 |
| 131 | WHOLESALE TRADE | 1.54476 | 36 | GREENHOUSE AND NURSERY PRODUCTS | 1.75549 | 131 |
| 132 | RETAIL TRADE | 1.33613 | 147 | OTHER MEDICAL SERVICES | 1.73090 | 132 |
| 133 | BANKING AND FINANCIAL INTERMEDIARIES | 1.96298 | 139 | MISCELLANEOUS BUSINESS SERVICES | 1.70040 | 133 |
| 134 | INSURANCE | 2.04863 | 121 | TRUCK TRANSPORTATION | 1.69688 | 134 |
| 135 | OWNER OCCUPIED REAL ESTATE | 1.11634 | 32 | SWEET POTATOES | 1.68401 | 135 |
| 136 | REAL ESTATE | 1.51563 | 148 | EDUCATIONAL SERVICES | 1.57413 | 136 |
| 137 | HOTELS AND LODGING PLACES | 2.01510 | 131 | WHOLESALE TRADE | 1.54476 | 137 |
| 138 | PERSONAL AND REPAIR SERVICES | 1.79904 | 149 | NONPROFIT ORGANIZATIONS | 1.52742 | 138 |
| 139 | MISCELLANEOUS BUSINESS SERVICES | 1.70040 | 136 | REAL ESTATE | 1.51563 | 139 |
| 140 | ADVERTISING | 2.82339 | 151 | OTHER FEDERAL GOVT ENTERPRISES | 1.40585 | 140 |
| 141 | MISC PROFESSIONAL SERVICES | 1.43679 | 141 | MISC PROFESSIONAL SERVICES | 1.43979 | 141 |
| 142 | AUTOMOBILE REPAIR | 2.01778 | 145 | DOCTORS AND DENTISTS | 1.42571 | 142 |
| 143 | MOTION PICTURES | 2.67509 | 125 | TRANSPORTATION SERVICES | 1.36084 | 143 |
| 144 | AMUSEMENT AND RECREATION SERVICES | 1.82898 | 132 | RETAIL TRADE | 1.33613 | 144 |
| 145 | DOCTORS AND DENTISTS | 1.42571 | 150 | POST OFFICE | 1.29161 | 145 |
| 146 | HOSPITALS | 1.77917 | 126 | COMMUNICATION EXCEPT RADIO AND TV | 1.28282 | 146 |
| 147 | OTHER MEDICAL SERVICES | 1.73090 | 135 | OWNER OCCUPIED REAL ESTATE | 1.11634 | 147 |
| 148 | EDUCATIONAL SERVICES | 1.57413 | 33 | VEGETABLES + SUGAR, NEC | 1.00000 | 148 |
| 149 | NONPROFIT ORGANIZATIONS | 1.52742 | 35 | OIL CROPS, NEC | 1.00000 | 149 |
| 150 | POST OFFICE | 1.29161 | 40 | COAL MINING | 1.00000 | 150 |
| 151 | OTHER FEDERAL GOVT ENTERPRISES | 1.40585 | 27 | DRIED PEAS | 1.00000 | 151 |
| 152 | STATE AND LOCAL GOVT ENTERPRISES | 1.94302 | 19 | TOBACCO | 1.00000 | 152 |
| 153 | NONCOMPETITIVE IMPORTS | 1.00000 | 153 | NONCOMPETITIVE IMPORTS | 1.00000 | 153 |
| 154 | DUMMY INDUSTRIES | 3.17928 | 61 | TOBACCO MANUFACTURERS | 1.00000 | 154 |

END OF DATA

Government Industry are not included in the Leontief Inverse since, as noted above, they are null except for the value added entries.

The entries in Table 1 show that a number of the agricultural sectors have large output multipliers which indicate that they are highly interrelated with other sectors of the economy. Those sectors with the smallest output multipliers interact the least with other sectors in the economy.

(ii) The Air Basin Models

(a) Overview

A map showing the California Air Basins is presented as Figure 5. In the present study four principal air basins were selected for analysis. These are:

San Diego

South Coast

San Joaquin

San Francisco Bay Area

In the majority of cases the air basins are drawn along county boundaries. The exceptions require that county economic data be apportioned into subcounty areas. This is a non-trivial undertaking since the county is the basic economic unit for which secondary source data are prepared.

The regional components of the Department of Water Resources Multiregional Input-Output model for the State of California are the twelve

Figure 5

State of California
AIR RESOURCES BOARD


June, 1977

hydrologic basins. These basins are shown in Figure 6. For purposes of structuring the Air Basin input-output models the Department of Water Resources data on final demands and gross output were used, where possible, with certain modifications.

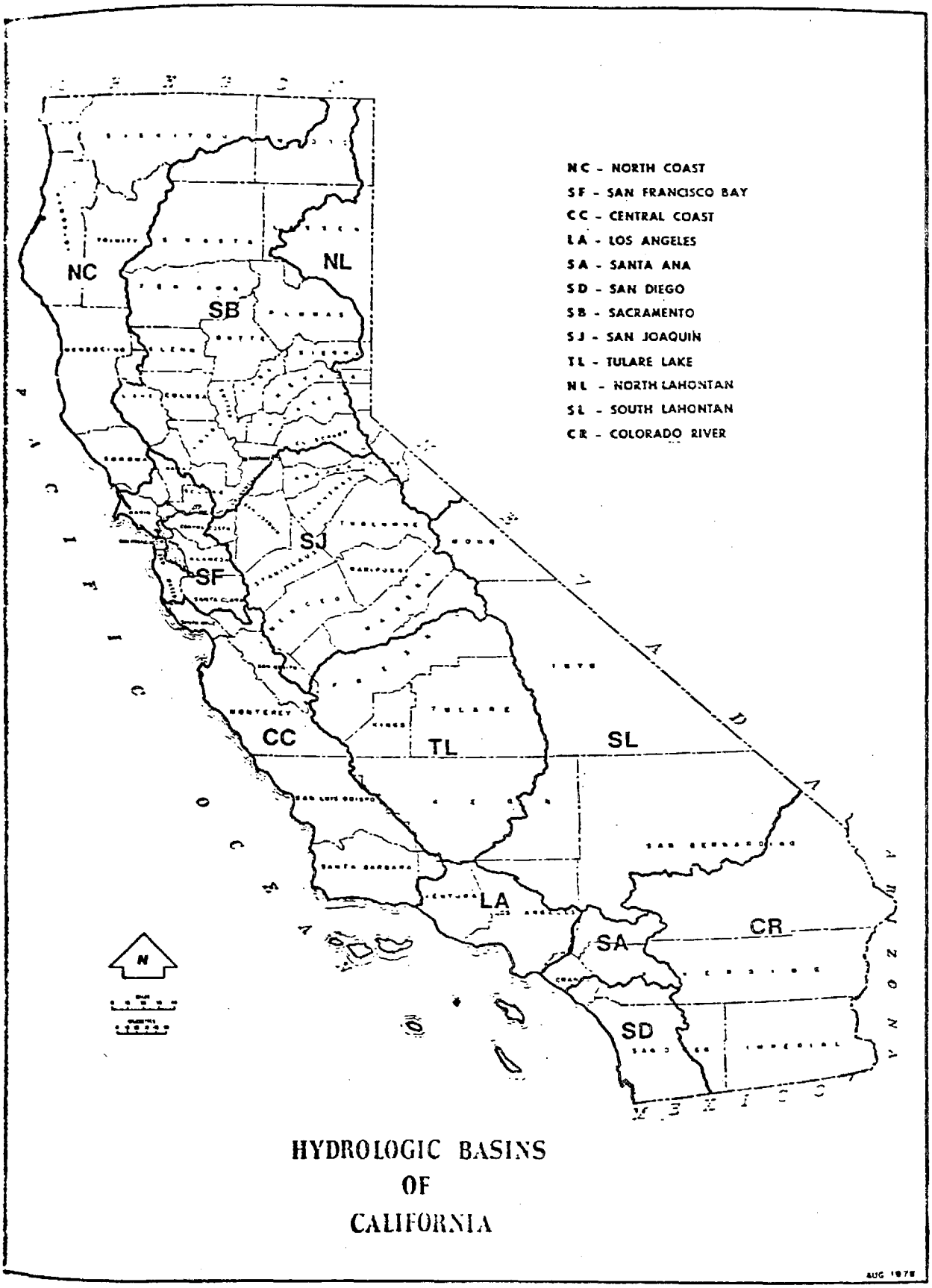
a) The data on final demands and gross outputs for the San Francisco Bay hydrologic basin were taken to be adequately representative of the air basin boundaries and were used without modification to structure the San Francisco Air Basin Model.

b) The Department of Water Resources data prepared for the Tulare Lake Basin were modified by adding the demands and outputs for the four counties: Madera, Merced, Stanislaus and San Joaquin in order to prepare the San Joaquin Valley Air Basin Model.

c) The Department of Water Resources data for the Los Angeles and Santa Ana hydrologic basins were added together and the Ventura county data were then subtracted from this in order to develop the South Coast Air Basin Model.

d) Since San Diego County is coincident with the San Diego Air Basin the County data were used to develop the Air Basin Model.

Figure 6


NC - NORTH COAST
SF - SAN FRANCISCO BAY
CC - CENTRAL COAST
LA - LOS ANGELES
SA - SANTA ANA
SD - SAN DIEGO
SB - SACRAMENTO
SJ - SAN JOAQUIN
TL - TULARE LAKE
NL - NORTH LAHONTAN
SL - SOUTH LAHONTAN
CR - COLORADO RIVER
NC
NL
SB
SJ
SF
CC
TL
SL
LA
SA
CR
SD
N
HYDROLOGIC BASINS
OF
CALIFORNIA

(b) The San Diego Air Basin

Gross County Product for San Diego County in 1976 was estimated at $12.1 billion or 6% of the Statewide total. Exports were $4.5 billion and imports were $6.3 billion. The Air Basin Input-Output Model is shown as Appendix 2.

Of a possible 147 active sectors present at the state level, the San Diego County economy has only 122 of these. The sectors not present in the county economy are:

1. Sheep, Lambs, and Wool
2. Misc. Livestock
3. Cotton
4. Rice
5. Corn
6. Oats
7. Sorghum Grain
8. Grass Seed
9. Food, Feed Grains, NEC
10. Walnuts
11. Almonds
12. Fruit and Tree Nuts, NEC
13. Melons
14. Sugar Beets
15. Hops
16. Sweet Potatoes
17. Safflower
18. Metal Mining

19. Crude Petroleum

20. Natural Gas + N.G. Liquids

21. Chem. + Fertilizer, Mineral Mining

22. Sugar

23. Metal Containers

24. Fabricated Structural Steel

25. Pipeline Transportation

The output multipliers for the county economy are shown in Table 2.

(c) South Coast

The South Coast Air Basin Gross Product for 1976 is estimated at $91.2 billion with imports of $24.4 billion and exports totaling $31.9 billion. The Gross Product of this basin comprises about 49% of the State total. The flow table for the Air Basin is shown as Appendix 3.

Of a possible 147 industries present at the state level 141 are present in the economy of the South Coast Air Basin. The industries not present are:

1. Rice

2. Sorghum Grain

3. Food, Feed Grains, NEC

4. Fruit and Tree Nuts, NEC

5. Hops

6. Safflower

The output multipliers for the economy are shown in Table 3.

Table 2

SAN DIEGO 1976 — PAGE 1
1x2 SECTOR INVERSE — 26 MAR 79

COLUMN SUMS OF THE INVERSE AND THEIR RANKING

| | SECTOR | COLUMN SUM | | SECTOR | COLUMN SUM | RANK |
|---|---|---|---|---|---|---|
| 1 | DAIRIES | 1.17002 | 99 | WATER AND SANITARY SERVICES | 2.21038 | 1 |
| 2 | BROILERS, CHICKENS AND EGGS | 1.31769 | 109 | ADVERTISING | 2.07483 | 2 |
| 3 | TURKEYS AND OTHER POULTRY | 1.26921 | 112 | MOTION PICTURES | 2.03027 | 3 |
| 4 | CATTLE AND CALVES | 1.17725 | 122 | DUMMY INDUSTRIES | 1.99839 | 4 |
| 5 | HOGS | 1.11557 | 79 | RADIO AND TV RECEIVING SETS | 1.78084 | 5 |
| 6 | APIARY PRODUCTS | 1.23190 | 94 | AIRCRAFT | 1.77094 | 6 |
| 7 | WHEAT | 1.41266 | 73 | COMPUTERS AND OFFICE EQUIPMENT | 1.76548 | 7 |
| 8 | BARLEY | 1.49712 | 96 | RADIO AND TELEVISION BROADCASTING | 1.71220 | 8 |
| 9 | HAY AND PASTURE | 1.49304 | 26 | CANNED AND FROZEN FOODS | 1.71190 | 9 |
| 10 | NONCITRUS FRUITS | 1.43316 | 102 | BANKING AND FINANCIAL INTERMEDIARIES | 1.69698 | 10 |
| 11 | CITRUS FRUITS | 1.45597 | 48 | CLEANING AND TOILET PREPARATIONS | 1.66524 | 11 |
| 12 | VEGETABLES | 1.42815 | 123 | INSURANCE | 1.62680 | 12 |
| 13 | DRIED BEANS | 1.44448 | 106 | HOTELS AND LODGING PLACES | 1.58014 | 13 |
| 14 | POTATOES | 1.40811 | 27 | DAIRY PRODUCTS | 1.57521 | 14 |
| 15 | GREENHOUSE AND NURSERY PRODUCTS | 1.36837 | 25 | ORDNANCE + GUIDED MISSILES | 1.56121 | 15 |
| 16 | FORESTRY AND FISHERY PRODUCTS | 1.35374 | 121 | STATE AND LOCAL GOVT ENTERPRISES | 1.55659 | 16 |
| 17 | AGRIC., FORESTRY, FISHERY SERV | 1.21390 | 56 | PLASTICS MATERIALS AND SYNTHETIC FIBERS | 1.54639 | 17 |
| 18 | STONE + CLAY MIN + QUARRY | 1.41093 | 87 | COMMUNICATIONS EQUIPMENT | 1.54179 | 18 |
| 19 | NEW CONSTRUCT, RESIDENT | 1.32396 | 47 | DRUGS | 1.53076 | 19 |
| 20 | NEW CONSTRUCT, NONRESIDENT | 1.31936 | 81 | ELECTRONIC COMPONENTS | 1.52351 | 20 |
| 21 | NEW CONSTRUCT, PUBLIC UTILITY | 1.26239 | 90 | LOCAL TRANSIT AND INTERCITY BUSES | 1.51900 | 21 |
| 22 | NEW CONSTRUCT, HIGHWAYS | 1.33732 | 49 | PAINTS AND ALLIED PRODUCTS | 1.49928 | 22 |
| 23 | NEW CONSTRUCT, ALL OTHER | 1.27773 | 8 | BARLEY | 1.49712 | 23 |
| 24 | MAIN. AND REPAIR CONSTRUCTION | 1.26823 | 44 | AGRICULTURAL CHEMICALS | 1.49391 | 24 |
| 25 | ORDNANCE + GUIDED MISSILES | 1.56121 | 9 | HAY AND PASTURE | 1.49304 | 25 |
| 26 | MEAT PRODUCTS | 1.31717 | 45 | GUM AND WOOD CHEMICALS | 1.49205 | 26 |
| 27 | DAIRY PRODUCTS | 1.57521 | 54 | CEMENT AND CONCRETE PRODUCTS | 1.48987 | 27 |
| 28 | CANNED AND FROZEN FOODS | 1.71190 | 64 | ENGINES, TURBINES AND GENERATORS | 1.48799 | 28 |
| 29 | GRAIN MILL PRODUCTS | 1.28959 | 42 | OTHER PRINTING AND PUBLISHING | 1.47889 | 29 |
| 30 | BAKERY PRODUCTS | 1.27133 | 82 | WATER TRANSPORTATION | 1.46852 | 30 |
| 31 | CONFECTIONARY PRODUCTS | 1.34733 | 67 | CLOCKS AND SCIENTIFIC EQUIPMENT | 1.46697 | 31 |
| 32 | BEVERAGES AND FLAVORINGS | 1.33629 | 11 | CITRUS FRUITS | 1.45597 | 32 |
| 33 | MISC FOOD PRODUCTS | 1.41036 | 35 | LOGGING CAMPS + SAWMILLS | 1.45242 | 33 |
| 34 | TEXTILE PRODUCTS | 1.42301 | 13 | DRIED BEANS | 1.44448 | 34 |
| 35 | LOGGING CAMPS + SAWMILLS | 1.45242 | 10 | NONCITRUS FRUITS | 1.44316 | 35 |
| 36 | MILLWORK, PLYWOOD + OTHER WOOD PRODUCTS | 1.44196 | 67 | FARM MACHINERY | 1.44101 | 36 |
| 37 | WOODEN CONTAINERS | 1.42925 | 43 | INDUSTRIAL CHEMICALS | 1.43783 | 37 |
| 38 | HOUSEHOLD FURNITURE | 1.41909 | 12 | VEGETABLES | 1.42815 | 38 |
| 39 | OFFICE FURNITURE AND FIXTURES | 1.38435 | 113 | AMUSEMENT AND RECREATION SERVICES | 1.42551 | 39 |
| 40 | PAPER + PAPERBOARD PRODUCTS | 1.27929 | 34 | TEXTILE PRODUCTS | 1.42081 | 40 |
| 41 | NEWSPAPERS | 1.32468 | 7 | WHEAT | 1.41266 | 41 |
| 42 | OTHER PRINTING AND PUBLISHING | 1.47889 | 10 | STONE + CLAY MIN + QUARRY | 1.41093 | 42 |
| 43 | INDUSTRIAL CHEMICALS | 1.43783 | 37 | MISC FOOD PRODUCTS | 1.41036 | 43 |
| 44 | AGRICULTURAL CHEMICALS | 1.49391 | 24 | POTATOES | 1.40811 | 44 |
| 45 | GUM AND WOOD CHEMICALS | 1.49205 | 55 | STRUCTURAL CLAY PRODUCTS | 1.49729 | 45 |
| 46 | PLASTICS MATERIALS AND SYNTHETIC FIBERS | 1.54639 | 53 | AIR TRANSPORTATION | 1.40062 | 46 |
| 47 | ENGINES | 1.53076 | 77 | MISC STONE AND CLAY PRODUCTS | 1.39193 | 47 |
| 48 | CLEANING AND TOILET PREPARATIONS | 1.66524 | 75 | ELECTRIC TRANSMISSION EQUIPMENT | 1.37398 | 48 |
| 49 | PAINTS AND ALLIED PRODUCTS | 1.49928 | 15 | GREENHOUSE AND NURSERY PRODUCTS | 1.36837 | 49 |
| 50 | PETROLEUM REFINING AND RELATED PRODUCTS | 1.31953 | 70 | ELECTRICAL INDUSTRIAL APPARATUS | 1.36696 | 50 |
| 51 | RUBBER AND PLASTICS PRODUCTS | 1.33272 | 116 | OTHER MEDICAL SERVICES | 1.36590 | 51 |
| 52 | LEATHER TANNING AND PRODUCTS | 1.29972 | 59 | IRON AND STEEL FOUNDRIES AND FORGINGS | 1.36586 | 52 |
| 53 | GLASS | 1.31776 | 89 | RAILROADS | 1.36330 | 53 |
| 54 | CEMENT AND CONCRETE PRODUCTS | 1.48987 | 126 | MISCELLANEOUS BUSINESS SERVICES | 1.36115 | 54 |
| 55 | STRUCTURAL CLAY PRODUCTS | 1.49729 | 28 | CONSTRUCTION + MATERIAL HANDLING EQUIP | 1.36100 | 55 |

Table 2 - Cont.

SAN DIEGO 1976 PAGE 2
L22 SECTOR INVERSE 26 MAR 79

COLUMN SUMS OF THE INVERSE AND THEIR RANKING

| | SECTOR | COLUMN SUM | | SECTOR | COLUMN SUM | RANK |
|---|---|---|---|---|---|---|
| 56 | POTTERY AND RELATED PRODUCTS | 1.26774 | 70 | SPECIAL INDUSTRIAL MACHINERY | 1.35524 | 56 |
| 57 | MISC STONE AND CLAY PRODUCTS | 1.39193 | 16 | FORESTRY AND FISHERY PRODUCTS | 1.35374 | 57 |
| 58 | BLAST FURNACES AND BASIC STEEL PRODUCTS | 1.34870 | 117 | EDUCATIONAL SERVICES | 1.35277 | 58 |
| 59 | IRON AND STEEL FOUNDRIES AND FORGINGS | 1.36986 | 67 | SHIP AND BOAT BUILDING AND REPAIRING | 1.35266 | 59 |
| 60 | PRIMARY NONFERROUS METAL PRODUCTS | 1.27379 | 115 | HOSPITALS | 1.35094 | 60 |
| 61 | HEATING APPARATUS AND PLUMBING FIXTURES | 1.32811 | 58 | BLAST FURNACES AND BASIC STEEL PRODUCTS | 1.34870 | 61 |
| 62 | SCREW MACHINE PRODUCTS | 1.26117 | 31 | CONFECTIONARY PRODUCTS | 1.34730 | 62 |
| 63 | METAL STAMPINGS | 1.23046 | 77 | HOUSEHOLD APPLIANCES | 1.34324 | 63 |
| 64 | CUTLERY, HAND TOOLS AND GENERAL HARDWARE | 1.27988 | 107 | PERSONAL AND REPAIR SERVICES | 1.34095 | 64 |
| 65 | OTHER FABRICATED METAL PRODUCTS | 1.27744 | 22 | NEW CONSTRUCT, HIGHWAYS | 1.33732 | 65 |
| 66 | ENGINES, TURBINES AND GENERATORS | 1.28799 | 111 | AUTOMOBILE REPAIR | 1.33720 | 66 |
| 67 | FARM MACHINERY | 1.23931 | 32 | BEVERAGES AND FLAVORINGS | 1.33629 | 67 |
| 68 | CONSTRUCTION & MATERIAL HANDLING EQUIP | 1.36193 | 118 | NONPROFIT ORGANIZATIONS | 1.33374 | 68 |
| 69 | METAL WORKING MACHINERY | 1.32838 | 91 | RUBBER AND PLASTICS PRODUCTS | 1.33272 | 69 |
| 70 | SPECIAL INDUSTRIAL MACHINERY | 1.35524 | 69 | METAL WORKING MACHINERY | 1.32838 | 70 |
| 71 | GENERAL INDUSTRIAL MACHINERY | 1.32341 | 61 | HEATING APPARATUS AND PLUMBING FIXTURES | 1.32811 | 71 |
| 72 | MACHINE SHOP PRODUCTS | 1.32474 | 72 | MACHINE SHOP PRODUCTS | 1.32474 | 72 |
| 73 | COMPUTERS AND OFFICE EQUIPMENT | 1.26343 | 41 | NEWSPAPERS | 1.32468 | 73 |
| 74 | SERVICE INDUSTRY MACHINES | 1.31294 | 19 | NEW CONSTRUCT, RESIDENT | 1.32396 | 74 |
| 75 | ELECTRIC TRANSMISSION EQUIPMENT | 1.37390 | 71 | GENERAL INDUSTRIAL MACHINERY | 1.32341 | 75 |
| 76 | ELECTRICAL INDUSTRIAL APPARATUS | 1.30696 | 68 | JEWELRY, SPORTING GOODS, ETC. | 1.32245 | 76 |
| 77 | HOUSEHOLD APPLIANCES | 1.34324 | 50 | PETROLEUM REFINING AND RELATED PRODUCTS | 1.31953 | 77 |
| 78 | ELECTRIC LIGHTING AND WIRING | 1.25593 | 29 | NEW CONSTRUCT, NONRESIDENT | 1.31936 | 78 |
| 79 | RADIO AND TV RECEIVING SETS | 1.28284 | 38 | HOUSEHOLD FURNITURE | 1.31909 | 79 |
| 80 | COMMUNICATION EQUIPMENT | 1.24129 | 2 | BROILERS, CHICKENS AND EGGS | 1.31749 | 80 |
| 81 | ELECTRONIC COMPONENTS | 1.32351 | 26 | MEAT PRODUCTS | 1.31717 | 81 |
| 82 | MISC ELECTRICAL PRODUCTS | 1.27811 | 74 | SERVICE INDUSTRY MACHINES | 1.31294 | 82 |
| 83 | MOTOR VEHICLES | 1.28583 | 117 | MISC PROFESSIONAL SERVICES | 1.31212 | 83 |
| 84 | AIRCRAFT | 1.27099 | 53 | GLASS | 1.31076 | 84 |
| 85 | SHIP AND BOAT BUILDING AND REPAIRING | 1.35266 | 60 | OTHER TRANSPORTATION EQUIPMENT | 1.30991 | 85 |
| 86 | OTHER TRANSPORTATION EQUIPMENT | 1.30991 | 125 | REAL ESTATE | 1.30514 | 86 |
| 87 | CLOCKS AND SCIENTIFIC EQUIPMENT | 1.30697 | 39 | OFFICE FURNITURE AND FIXTURES | 1.30436 | 87 |
| 88 | JEWELRY, SPORTING GOODS, ETC. | 1.32245 | 52 | LEATHER TANNING AND PRODUCTS | 1.29472 | 88 |
| 89 | RAILROADS | 1.30357 | 3 | TURKEYS AND OTHER POULTRY | 1.28921 | 89 |
| 90 | LOCAL TRANSIT AND INTERCITY BUSES | 1.25193 | 83 | MOTOR VEHICLES | 1.28583 | 90 |
| 91 | TRUCK TRANSPORTATION | 1.27051 | 29 | GRAIN MILL PRODUCTS | 1.28549 | 91 |
| 92 | WATER TRANSPORTATION | 1.30452 | 100 | WHOLESALE TRADE | 1.28289 | 92 |
| 93 | AIR TRANSPORTATION | 1.30062 | 97 | ELECTRIC COMPANIES AND SYSTEMS | 1.28294 | 93 |
| 94 | TRANSPORTATION SERVICES | 1.25465 | 64 | CUTLERY, HAND TOOLS AND GENERAL HARDWARE | 1.27988 | 94 |
| 95 | COMMUNICATION EXCEPT RADIO AND TV | 1.17426 | 40 | PAPER & PAPERBOARD PRODUCTS | 1.27959 | 95 |
| 96 | RADIO AND TELEVISION BROADCASTING | 1.18220 | 82 | MISC ELECTRICAL PRODUCTS | 1.27811 | 96 |
| 97 | ELECTRIC COMPANIES AND SYSTEMS | 1.28284 | 23 | NEW CONSTRUCT, ALL OTHER | 1.27771 | 97 |
| 98 | GAS COMPANIES AND SYSTEMS | 1.19694 | 65 | OTHER FABRICATED METAL PRODUCTS | 1.27744 | 98 |
| 99 | WATER AND SANITARY SERVICES | 2.21938 | 60 | PRIMARY NONFERROUS METAL PRODUCTS | 1.27379 | 99 |
| 100 | WHOLESALE TRADE | 1.28289 | 33 | BAKERY PRODUCTS | 1.27130 | 100 |
| 101 | RETAIL TRADE | 1.20109 | 91 | TRUCK TRANSPORTATION | 1.27051 | 101 |
| 102 | BANKING AND FINANCIAL INTERMEDIARIES | 1.09698 | 56 | POTTERY AND RELATED PRODUCTS | 1.26774 | 102 |
| 103 | INSURANCE | 1.02887 | 21 | NEW CONSTRUCT, PUBLIC UTILITY | 1.26239 | 103 |
| 104 | OWNER OCCUPIED REAL ESTATE | 1.04323 | 62 | SCREW MACHINE PRODUCTS | 1.26117 | 104 |
| 105 | REAL ESTATE | 1.30514 | 70 | ELECTRIC LIGHTING AND WIRING | 1.25593 | 105 |
| 106 | HOTELS AND LODGING PLACES | 1.14814 | 99 | TRANSPORTATION SERVICES | 1.25465 | 106 |
| 107 | PERSONAL AND REPAIR SERVICES | 1.34095 | 114 | DOCTORS AND DENTISTS | 1.25372 | 107 |
| 108 | MISCELLANEOUS BUSINESS SERVICES | 1.36115 | 36 | MILLWORK, PLYWOOD & OTHER WOOD PRODUCTS | 1.24096 | 108 |
| 109 | ADVERTISING | 2.57483 | 5 | APPAREL PRODUCTS | 1.23158 | 109 |
| 110 | MISC PROFESSIONAL SERVICES | 1.31212 | 83 | METAL STAMPINGS | 1.23046 | 110 |

Table 2 - Cont.

SAN DIEGO 1976 PAGE 3
122 SECTOR INVERSE 26 MAR 79

COLUMN SUMS OF THE INVERSE AND THEIR RANKING

| | SECTOR | COLUMN SUM | RANK | SECTOR | COLUMN SUM | RANK |
|---|---|---|---|---|---|---|
| 111 | AUTOMOBILE REPAIR | 1.33729 | 37 | WOODEN CONTAINERS | 1.22925 | 111 |
| 112 | MOTION PICTURES | 2.03027 | 122 | OTHER FEDERAL GOVT ENTERPRISES | 1.22915 | 112 |
| 113 | AMUSEMENT AND RECREATION SERVICES | 1.42551 | 17 | AGRIC., FORESTRY, FISHERY SERV | 1.21390 | 113 |
| 114 | DOCTORS AND DENTISTS | 1.25372 | 24 | MAIN. AND REPAIR CONSTRUCTION | 1.20820 | 114 |
| 115 | HOSPITALS | 1.35055 | 101 | RETAIL TRADE | 1.20189 | 115 |
| 116 | OTHER MEDICAL SERVICES | 1.36597 | 96 | GAS COMPANIES AND SYSTEMS | 1.19694 | 116 |
| 117 | EDUCATIONAL SERVICES | 1.35277 | 4 | CATTLE AND CALVES | 1.17725 | 117 |
| 118 | NONPROFIT ORGANIZATIONS | 1.33374 | 95 | COMMUNICATION EXCEPT RADIO AND TV | 1.17426 | 118 |
| 119 | POST OFFICE | 1.15035 | 1 | DAIRIES | 1.17092 | 119 |
| 120 | OTHER FEDERAL GOVT ENTERPRISES | 1.22915 | 119 | POST OFFICE | 1.15035 | 120 |
| 121 | STATE AND LOCAL GOVT ENTERPRISES | 1.54650 | 5 | HOGS | 1.11557 | 121 |
| 122 | COMPY INVESTMTES | 1.99839 | 124 | OWNER OCCUPIED REAL ESTATE | 1.04820 | 122 |

END OF DATA

# Table 3

LOS ANGELES 1976
141 SECTOR INVERSE



COLUMN SUMS OF THE INVERSE AND THEIR RANKING

| | SECTOR | COLUMN SUM | | SECTOR | COLUMN SUM | RANK |
|---|---|---|---|---|---|---|
| 1 | DAIRIES | 1.42457 | 131 | MOTION PICTURES | 2.46172 | 1 |
| 2 | BROILERS, CHICKENS AND EGGS | 1.96294 | 141 | DUMMY INDUSTRIES | 2.45720 | 2 |
| 3 | TURKEYS AND OTHER POULTRY | 1.86509 | 118 | WATER AND SANITARY SERVICES | 2.33120 | 3 |
| 4 | CATTLE AND CALVES | 1.29267 | 124 | ADVERTISING | 2.26200 | 4 |
| 5 | HOGS | 1.26162 | 64 | CLEANING AND TOILET PREPARATIONS | 2.24720 | 5 |
| 6 | SHEEP, LAMBS, AND WOOL | 1.39339 | 43 | CANNED AND FROZEN FOODS | 2.12255 | 6 |
| 7 | MISC. LIVESTOCK | 1.54423 | 102 | AIRCRAFT | 2.11766 | 7 |
| 8 | APIARY PRODUCTS | 1.54311 | 92 | SERVICE INDUSTRY MACHINES | 2.11636 | 8 |
| 9 | COTTON | 1.97495 | 76 | PRIMARY NONFERROUS METAL PRODUCTS | 2.10990 | 9 |
| 10 | WHEAT | 1.59992 | 71 | HEATING APPARATUS AND PLUMBING FIXTURES | 2.08705 | 10 |
| 11 | BARLEY | 1.70773 | 50 | TEXTILE PRODUCTS | 2.01421 | 11 |
| 12 | CORN | 1.70369 | 101 | MOTOR VEHICLES | 2.01223 | 12 |
| 13 | HAY AND PASTURE | 1.73611 | 110 | WATER TRANSPORTATION | 2.01114 | 13 |
| 14 | OATS | 1.68171 | 97 | RADIO AND TV RECEIVING SETS | 2.00740 | 14 |
| 15 | GRASS SEED | 1.61107 | 91 | COMPUTERS AND OFFICE EQUIPMENT | 2.00457 | 15 |
| 16 | WALNUTS | 1.57228 | 95 | HOUSEHOLD APPLIANCES | 1.98627 | 16 |
| 17 | ALMONDS | 1.55374 | 9 | COTTON | 1.97585 | 17 |
| 18 | CITRUS FRUITS | 1.60929 | 104 | OTHER TRANSPORTATION EQUIPMENT | 1.96895 | 18 |
| 19 | DECIDUOUS FRUITS | 1.60237 | 2 | BROILERS, CHICKENS AND EGGS | 1.96294 | 19 |
| 20 | VEGETABLES | 1.63799 | 79 | FABRICATED STRUCTURAL STEEL | 1.93044 | 20 |
| 21 | DRIED BEANS | 1.62950 | 83 | SPECIAL INDUSTRIAL MACHINERY | 1.92025 | 21 |
| 22 | MELONS | 1.64368 | 84 | ENGINES, TURBINES AND GENERATORS | 1.90685 | 22 |
| 23 | SUGAR BEETS | 1.53143 | 115 | RADIO AND TELEVISION BROADCASTING | 1.90274 | 23 |
| 24 | POTATOES | 1.58209 | 122 | INSURANCE | 1.89997 | 24 |
| 25 | SWEET POTATOES | 1.61669 | 35 | NEW CONSTRUCT, NONRESIDENT | 1.89248 | 25 |
| 26 | GREENHOUSE AND NURSERY PRODUCTS | 1.63507 | 45 | CONSTRUCTION + MATERIAL HANDLING EQUIP | 1.87759 | 26 |
| 27 | FORESTRY AND FISHERY PRODUCTS | 1.61215 | 89 | GENERAL INDUSTRIAL MACHINERY | 1.87214 | 27 |
| 28 | AGRIC., FORESTRY, FISHERY SERV | 1.23365 | 60 | AGRICULTURAL CHEMICALS | 1.87035 | 28 |
| 29 | METALS MINING | 1.46030 | 3 | TURKEYS AND OTHER POULTRY | 1.86509 | 29 |
| 30 | CRUDE PETROLEUM | 1.49302 | 63 | DRUGS | 1.86446 | 30 |
| 31 | NATURAL GAS + N.G. LIQUIDS | 1.55323 | 135 | CLOCKS AND SCIENTIFIC EQUIPMENT | 1.86420 | 31 |
| 32 | STONE + CLAY MIN + QUARRY | 1.61399 | 85 | FARM MACHINERY | 1.86229 | 32 |
| 33 | GOLD + FERT MINERAL MIN | 1.49512 | 36 | NEW CONSTRUCT, PUBLIC UTILITY | 1.86056 | 33 |
| 34 | NEW CONSTRUCT, RESIDENT | 1.75706 | 59 | INDUSTRIAL CHEMICALS | 1.85512 | 34 |
| 35 | NEW CONSTRUCT, NONRESIDENT | 1.49264 | 65 | PAPERS AND ALLIED PRODUCTS | 1.85195 | 35 |
| 36 | NEW CONSTRUCT, PUBLIC UTILITY | 1.86054 | 55 | OFFICE FURNITURE AND FIXTURES | 1.85003 | 36 |
| 37 | NEW CONSTRUCT, HIGHWAYS | 1.71772 | 68 | LEATHER TANNING AND PRODUCTS | 1.84303 | 37 |
| 38 | NEW CONSTRUCT, ALL OTHER | 1.66776 | 40 | ORDNANCE + GUIDED MISSILES | 1.84256 | 38 |
| 39 | MAINT. AND REPAIR CONSTRUCTION | 1.54627 | 61 | GUM AND WOOD CHEMICALS | 1.84267 | 39 |
| 40 | ORDNANCE + GUIDED MISSILES | 1.84256 | 116 | ELECTRIC COMPANIES AND SYSTEMS | 1.84134 | 40 |
| 41 | MEAT PRODUCTS | 1.35303 | 49 | MISC FOOD PRODUCTS | 1.84098 | 41 |
| 42 | DAIRY PRODUCTS | 1.50475 | 106 | JEWELRY, SPORTING GOODS, ETC. | 1.83795 | 42 |
| 43 | CANNED AND FROZEN FOODS | 2.12255 | 83 | OTHER FABRICATED METAL PRODUCTS | 1.83760 | 43 |
| 44 | GRAIN MILL PRODUCTS | 1.74109 | 77 | METAL CONTAINERS | 1.82949 | 44 |
| 45 | BAKERY PRODUCTS | 1.74506 | 130 | MISC ELECTRICAL PRODUCTS | 1.80404 | 45 |
| 46 | SUGAR | 1.15433 | 94 | HOUSEHOLD FURNITURE | 1.80231 | 46 |
| 47 | CONFECTIONARY PRODUCTS | 1.76742 | 87 | METAL WORKING MACHINERY | 1.80056 | 47 |
| 48 | BEVERAGES AND FLAVORINGS | 1.83450 | 121 | BANKING AND FINANCIAL INTERMEDIARIES | 1.79280 | 48 |
| 49 | MISC FOOD PRODUCTS | 1.84098 | 59 | OTHER PRINTING AND PUBLISHING | 1.78950 | 49 |
| 50 | TEXTILE PRODUCTS | 2.01421 | 62 | PLASTICS MATERIALS AND SYNTHETIC FIBERS | 1.78505 | 50 |
| 51 | LOGGING CAMPS + SAWMILLS | 1.43665 | 125 | HOTELS AND LODGING PLACES | 1.78467 | 51 |
| 52 | MILLWORK, PLYWOOD + OTHER WOOD PRODUCTS | 1.52364 | 75 | IRON AND STEEL FOUNDRIES AND FORGINGS | 1.78228 | 52 |
| 53 | WOODEN CONTAINERS | 1.49326 | 103 | SHIP AND BOAT BUILDING AND REPAIRING | 1.77634 | 53 |
| 54 | HOUSEHOLD FURNITURE | 1.80231 | 47 | CONFECTIONARY PRODUCTS | 1.76742 | 54 |
| 55 | OFFICE FURNITURE AND FIXTURES | 1.85003 | 53 | ELECTRONIC COMPONENTS | 1.76066 | 55 |

# Table 3 - Cont.



COLUMN SUMS OF THE INVERSE AND THEIR RANKING

| | SECTOR | COLUMN SUM | | SECTOR | COLUMN SUM | RANK |
|---|---|---|---|---|---|---|
| 56 | PAPER + PAPERBOARD PRODUCTS | 1.74911 | 45 | BAKERY PRODUCTS | 1.76006 | 56 |
| 57 | NEWSPAPERS | 1.55971 | 94 | ELECTRICAL INDUSTRIAL APPARATUS | 1.75922 | 57 |
| 53 | OTHER PRINTING AND PUBLISHING | 1.78950 | 82 | CUTLERY, HAND TOOLS AND GENERAL HARDWARE | 1.75254 | 58 |
| 59 | INDUSTRIAL CHEMICALS | 1.85512 | 56 | PAPER + PAPERBOARD PRODUCTS | 1.74911 | 59 |
| 60 | AGRICULTURAL CHEMICALS | 1.87035 | 34 | NEW CONSTRUCT, RESIDENT | 1.74706 | 60 |
| 61 | GUM AND WOOD CHEMICALS | 1.84267 | 93 | ELECTRIC TRANSMISSION EQUIPMENT | 1.74188 | 61 |
| 62 | PLASTICS MATERIALS AND SYNTHETIC FIBERS | 1.78505 | 96 | ELECTRIC LIGHTING AND WIRING | 1.74122 | 62 |
| 63 | DRUGS | 1.86646 | 44 | GRAIN MILL PRODUCTS | 1.74108 | 63 |
| 64 | CLEANING AND TOILET PREPARATIONS | 2.24720 | 13 | HAY AND PASTURE | 1.73611 | 64 |
| 65 | PAINTS AND ALLIED PRODUCTS | 1.85155 | 73 | MISC STONE AND CLAY PRODUCTS | 1.72229 | 65 |
| 66 | PETROLEUM REFINING AND RELATED PRODUCTS | 1.69668 | 140 | STATE AND LOCAL GOVT ENTERPRISES | 1.71934 | 66 |
| 67 | RUBBER AND PLASTICS PRODUCTS | 1.70155 | 37 | NEW CONSTRUCT, HIGHWAYS | 1.71772 | 67 |
| 68 | LEATHER TANNING AND PRODUCTS | 1.84303 | 90 | MACHINE SHOP PRODUCTS | 1.71704 | 68 |
| 69 | GLASS | 1.80596 | 11 | BARLEY | 1.70973 | 69 |
| 70 | CEMENT AND CONCRETE PRODUCTS | 1.65600 | 81 | METAL STAMPINGS | 1.70603 | 70 |
| 71 | STRUCTURAL CLAY PRODUCTS | 1.56302 | 49 | BEVERAGES AND FLAVORINGS | 1.70460 | 71 |
| 72 | POTTERY AND RELATED PRODUCTS | 1.47397 | 12 | CORN | 1.70369 | 72 |
| 73 | MISC STONE AND CLAY PRODUCTS | 1.72229 | 67 | RUBBER AND PLASTICS PRODUCTS | 1.70155 | 73 |
| 74 | BLAST FURNACES AND BASIC STEEL PRODUCTS | 1.66687 | 103 | LOCAL TRANSIT AND INTERCITY BUSES | 1.70104 | 74 |
| 75 | IRON AND STEEL FOUNDRIES AND FORGINGS | 1.78220 | 66 | PETROLEUM REFINING AND RELATED PRODUCTS | 1.69668 | 75 |
| 76 | PRIMARY NONFERROUS METAL PRODUCTS | 2.10390 | 19 | CITRUS FRUITS | 1.69287 | 76 |
| 77 | METAL CONTAINERS | 1.92949 | 14 | OATS | 1.68871 | 77 |
| 78 | HEATING APPARATUS AND PLUMBING FIXTURES | 2.38705 | 111 | AIR TRANSPORTATION | 1.68112 | 78 |
| 79 | FABRICATED STRUCTURAL STEEL | 1.93044 | 130 | AUTOMOBILE REPAIR | 1.68232 | 79 |
| 80 | SCREW MACHINE PRODUCTS | 1.68128 | 18 | NONCITRUS FRUITS | 1.68029 | 80 |
| 81 | METAL STAMPINGS | 1.70603 | 80 | SCREW MACHINE PRODUCTS | 1.68128 | 81 |
| 82 | CUTLERY, HAND TOOLS AND GENERAL HARDWARE | 1.75254 | 93 | COMMUNICATION EQUIPMENT | 1.67039 | 82 |
| 83 | OTHER FABRICATED METAL PRODUCTS | 1.83760 | 74 | BLAST FURNACES AND BASIC STEEL PRODUCTS | 1.66687 | 83 |
| 84 | ENGINES, TURBINES AND GENERATORS | 1.90695 | 70 | CEMENT AND CONCRETE PRODUCTS | 1.65600 | 84 |
| 85 | FARM MACHINERY | 1.86223 | 22 | PECANS | 1.64369 | 85 |
| 86 | CONSTRUCTION + MATERIAL HANDLING EQUIP | 1.87759 | 38 | NEW CONSTRUCT, ALL OTHER | 1.64276 | 86 |
| 87 | METAL WORKING MACHINERY | 1.89054 | 20 | VEGETABLES | 1.63790 | 87 |
| 88 | SPECIAL INDUSTRIAL MACHINERY | 1.92125 | 27 | FORESTRY AND FISHERY PRODUCTS | 1.61215 | 88 |
| 89 | GENERAL INDUSTRIAL MACHINERY | 1.87214 | 21 | DRIED BEANS | 1.62650 | 89 |
| 90 | MACHINE SHOP PRODUCTS | 1.71704 | 32 | STONE + CLAY MIN + QUARRY | 1.61399 | 90 |
| 91 | COMPUTERS AND OFFICE EQUIPMENT | 2.03457 | 15 | GRASS SEED | 1.61107 | 91 |
| 92 | SERVICE INDUSTRY MACHINES | 2.11436 | 69 | GLASS | 1.60596 | 92 |
| 93 | ELECTRIC TRANSMISSION EQUIPMENT | 1.74188 | 10 | WHEAT | 1.59082 | 93 |
| 94 | ELECTRICAL INDUSTRIAL APPARATUS | 1.75922 | 24 | POTATOES | 1.58209 | 94 |
| 95 | HOUSEHOLD APPLIANCES | 1.99627 | 126 | PERSONAL AND REPAIR SERVICES | 1.58006 | 95 |
| 96 | ELECTRIC LIGHTING AND WIRING | 1.74122 | 16 | WALNUTS | 1.57228 | 96 |
| 97 | RADIO AND TV RECEIVING SETS | 2.00740 | 42 | DAIRY PRODUCTS | 1.56475 | 97 |
| 98 | COMMUNICATION EQUIPMENT | 1.67039 | 71 | STRUCTURAL CLAY PRODUCTS | 1.56302 | 98 |
| 99 | ELECTRONIC COMPONENTS | 1.76066 | 57 | NEWSPAPERS | 1.55971 | 99 |
| 100 | MISC ELECTRICAL PRODUCTS | 1.83304 | 107 | RAILROADS | 1.55521 | 100 |
| 101 | MOTOR VEHICLES | 2.01223 | 31 | NATURAL GAS + N.G. LIQUIDS | 1.55323 | 101 |
| 102 | AIRCRAFT | 2.11766 | 17 | ALMONDS | 1.55074 | 102 |
| 103 | SHIP AND BOAT BUILDING AND REPAIRING | 1.77634 | 109 | TRUCK TRANSPORTATION | 1.54747 | 103 |
| 104 | OTHER TRANSPORTATION EQUIPMENT | 1.96195 | 7 | MISC. LIVESTOCK | 1.54623 | 104 |
| 105 | CLOCKS AND SCIENTIFIC EQUIPMENT | 1.86420 | 39 | MAIN. AND REPAIR CONSTRUCTION | 1.54527 | 105 |
| 106 | JEWELRY, SPORTING GOODS, ETC. | 1.83795 | 134 | HOSPITALS | 1.54425 | 106 |
| 107 | RAILROADS | 1.55521 | 8 | APIARY PRODUCTS | 1.54311 | 107 |
| 108 | LOCAL TRANSIT AND INTERCITY BUSES | 1.70104 | 23 | SUGAR BEETS | 1.53843 | 108 |
| 109 | TRUCK TRANSPORTATION | 1.54747 | 132 | AMUSEMENT AND RECREATION SERVICES | 1.52621 | 109 |
| 110 | WATER TRANSPORTATION | 2.01114 | 52 | MILLWORK, PLYWOOD + OTHER WOOD PRODUCTS | 1.52394 | 110 |

# Table 3 - Cont.



COLUMN SUMS OF THE INVERSE AND THEIR RANKING

| | SECTOR | COLUMN SUM | | SECTOR | COLUMN SUM | RANK |
|---|---|---|---|---|---|---|
| 111 | AIR TRANSPORTATION | 1.68312 | 112 | PIPELINE TRANSPORTATION | 1.52356 | 111 |
| 112 | PIPELINE TRANSPORTATION | 1.52356 | 127 | MISCELLANEOUS BUSINESS SERVICES | 1.52219 | 112 |
| 113 | TRANSPORTATION SERVICES | 1.30387 | 135 | OTHER MEDICAL SERVICES | 1.51697 | 113 |
| 114 | COMMUNICATION EXCEPT RADIO AND TV | 1.20957 | 26 | GREENHOUSE AND NURSERY PRODUCTS | 1.50307 | 114 |
| 115 | RADIO AND TELEVISION BROADCASTING | 1.40274 | 30 | CRUDE PETROLEUM | 1.49082 | 115 |
| 116 | ELECTRIC COMPANIES AND SYSTEMS | 1.84134 | 33 | CHEM + FERT MINERAL MIN | 1.48512 | 116 |
| 117 | GAS COMPANIES AND SYSTEMS | 1.23464 | 72 | POTTERY AND RELATED PRODUCTS | 1.47397 | 117 |
| 118 | WATER AND SANITARY SERVICES | 2.33120 | 29 | METALS MINING | 1.46039 | 118 |
| 119 | WHOLESALE TRADE | 1.41275 | 53 | METAL CONTAINERS | 1.45326 | 119 |
| 120 | RETAIL TRADE | 1.25574 | 136 | EDUCATIONAL SERVICES | 1.44349 | 120 |
| 121 | BANKING AND FINANCIAL INTERMEDIARIES | 1.79740 | 51 | LOGGING CAMPS + SAWMILLS | 1.43665 | 121 |
| 122 | INSURANCE | 1.89997 | 1 | DAIRIES | 1.42457 | 122 |
| 123 | OWNER OCCUPIED REAL ESTATE | 1.05991 | 25 | SWEET POTATOES | 1.41668 | 123 |
| 124 | REAL ESTATE | 1.40154 | 119 | WHOLESALE TRADE | 1.40275 | 124 |
| 125 | HOTELS AND LODGING PLACES | 1.78467 | 124 | REAL ESTATE | 1.40154 | 125 |
| 126 | PERSONAL AND REPAIR SERVICES | 1.59306 | 137 | NONPROFIT ORGANIZATIONS | 1.40154 | 126 |
| 127 | MISCELLANEOUS BUSINESS SERVICES | 1.52219 | 5 | SHEEP, LAMBS, AND WOOL | 1.39539 | 127 |
| 128 | ADVERTISING | 2.26700 | 41 | MEAT PRODUCTS | 1.35393 | 128 |
| 129 | MISC PROFESSIONAL SERVICES | 1.34116 | 133 | DOCTORS AND DENTISTS | 1.34946 | 129 |
| 130 | AUTOMOBILE REPAIR | 1.68232 | 129 | MISC PROFESSIONAL SERVICES | 1.34016 | 130 |
| 131 | MOTION PICTURES | 2.46172 | 46 | SUGAR | 1.34613 | 131 |
| 132 | AMUSEMENT AND RECREATION SERVICES | 1.52121 | 113 | TRANSPORTATION SERVICES | 1.30387 | 132 |
| 133 | DOCTORS AND DENTISTS | 1.34345 | 4 | CATTLE AND CALVES | 1.29267 | 133 |
| 134 | HOSPITALS | 1.44425 | 139 | OTHER FEDERAL GOVT ENTERPRISES | 1.28998 | 134 |
| 135 | OTHER MEDICAL SERVICES | 1.51697 | 28 | AGRIC., FORESTRY, FISHERY SERV | 1.28065 | 135 |
| 136 | EDUCATIONAL SERVICES | 1.44040 | 5 | HOGS | 1.26162 | 136 |
| 137 | NONPROFIT ORGANIZATIONS | 1.40354 | 120 | RETAIL TRADE | 1.25574 | 137 |
| 138 | POST OFFICE | 1.29002 | 117 | GAS COMPANIES AND SYSTEMS | 1.23464 | 138 |
| 139 | OTHER FEDERAL GOVT ENTERPRISES | 1.28998 | 133 | POST OFFICE | 1.20902 | 139 |
| 140 | STATE AND LOCAL GOVT ENTERPRISES | 1.71234 | 114 | COMMUNICATION EXCEPT RADIO AND TV | 1.20957 | 140 |
| 141 | DUMMY INDUSTRIES | 2.45720 | 123 | OWNER OCCUPIED REAL ESTATE | 1.05991 | 141 |

END OF DATA

(d) San Joaquin Air Basin

The San Joaquin Air Basin consists of: San Joaquin, Stanislaus, Merced, Madera, Fresno, Tulare, Kings and portions of Kern County. The Gross Product for the air basin economy is estimated at $14.0 billion with imports of $10.1 billion and exports totalling $6.9 billion. The Basin economy accounted for some 7% of Gross State Product.

Sectors not present in the San Joaquin economy are:

1. Hops
2. Household Appliances

The output multipliers are shown in Table 4.

# Table 4

SAM JOAQUIN 1978
193 SECTOR INVERSE

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COLUMN SUMS OF THE INVERSE AND THEIR RANKING

| | SECTOR | COLUMN SUM | | SECTOR | COLUMN SUM | RANK |
|---|---|---|---|---|---|---|
| 1 | DAIRIES | 1.86283 | 47 | DAIRY PRODUCTS | 2.59719 | 1 |
| 2 | BROILERS, CHICKENS AND EGGS | 2.27731 | 46 | MEAT PRODUCTS | 2.40012 | 2 |
| 3 | TURKEYS AND OTHER POULTRY | 2.16365 | 51 | SUGAR | 2.35800 | 3 |
| 4 | CATTLE AND CALVES | 2.25516 | 2 | BROILERS, CHICKENS AND EGGS | 2.27731 | 4 |
| 5 | HOGS | 1.63899 | 132 | ADVERTISING | 2.27263 | 5 |
| 6 | SHEEP, LAMBS, AND WOOL | 2.08442 | 4 | CATTLE AND CALVES | 2.25516 | 6 |
| 7 | MISC. LIVESTOCK | 1.97147 | 49 | GRAIN MILL PRODUCTS | 2.19169 | 7 |
| 8 | APIARY PRODUCTS | 2.14173 | 122 | WATER AND SANITARY SERVICES | 2.10375 | 8 |
| 9 | COTTON | 1.77721 | 3 | TURKEYS AND OTHER POULTRY | 2.16365 | 9 |
| 10 | WHEAT | 1.75091 | 8 | APIARY PRODUCTS | 2.14173 | 10 |
| 11 | RICE | 1.68724 | 6 | SHEEP, LAMBS, AND WOOL | 2.08442 | 11 |
| 12 | BARLEY | 1.77851 | 48 | CANNED AND FROZEN FOODS | 1.98597 | 12 |
| 13 | CORN | 1.72002 | 7 | MISC. LIVESTOCK | 1.97147 | 13 |
| 14 | HAY AND PASTURE | 1.73210 | 52 | CONFECTIONARY PRODUCTS | 1.95787 | 14 |
| 15 | OATS | 1.67556 | 50 | BAKERY PRODUCTS | 1.92576 | 15 |
| 16 | SORGHUM GRAIN | 1.73583 | 145 | DUMMY INDUSTRIES | 1.87257 | 16 |
| 17 | GRASS SEED | 1.56960 | 65 | AGRICULTURAL CHEMICALS | 1.86648 | 17 |
| 18 | FOOD, FEED GRAINS, NEC | 1.80901 | 1 | DAIRIES | 1.86283 | 18 |
| 19 | WALNUTS | 1.46689 | 54 | MISC FOOD PRODUCTS | 1.85297 | 19 |
| 20 | ALMONDS | 1.44750 | 120 | ELECTRIC COMPANIES AND SYSTEMS | 1.84152 | 20 |
| 21 | DECIDUOUS FRUITS | 1.52403 | 71 | PETROLEUM REFINING AND RELATED PRODUCTS | 1.83649 | 21 |
| 22 | CITRUS FRUITS | 1.53396 | 10 | FOOD, FEED GRAINS, NEC | 1.80901 | 22 |
| 23 | FRUIT AND TREE NUTS, NEC | 1.46307 | 64 | INDUSTRIAL CHEMICALS | 1.78593 | 23 |
| 24 | VEGETABLES | 1.47598 | 12 | BARLEY | 1.77851 | 24 |
| 25 | DRIED BEANS | 1.52760 | 9 | COTTON | 1.77721 | 25 |
| 26 | MELONS | 1.47701 | 81 | PRIMARY NONFERROUS METAL PRODUCTS | 1.75866 | 26 |
| 27 | SUGAR BEETS | 1.44794 | 10 | WHEAT | 1.75091 | 27 |
| 28 | POTATOES | 1.64177 | 57 | MILLWORK, PLYWOOD + OTHER WOOD PRODUCTS | 1.74316 | 28 |
| 29 | SWEET POTATOES | 1.34561 | 16 | SORGHUM GRAIN | 1.73583 | 29 |
| 30 | SAFFLOWER | 1.59517 | 58 | WOODEN CONTAINERS | 1.73416 | 30 |
| 31 | GREENHOUSE AND NURSERY PRODUCTS | 1.38428 | 14 | HAY AND PASTURE | 1.73210 | 31 |
| 32 | FORESTRY AND FISHERY PRODUCTS | 1.54009 | 114 | WATER TRANSPORTATION | 1.73071 | 32 |
| 33 | AGRIC., FORESTRY, FISHERY SERV | 1.66635 | 67 | PLASTICS MATERIALS AND SYNTHETIC FIBERS | 1.72593 | 33 |
| 34 | METALS MINING | 1.33363 | 13 | CORN | 1.72002 | 34 |
| 35 | CRUDE PETROLEUM | 1.31779 | 66 | GUM AND WOOD CHEMICALS | 1.65403 | 35 |
| 36 | NATURAL GAS + N.G. LIQUIDS | 1.57863 | 69 | CLEANING AND TOILET PREPARATIONS | 1.69124 | 36 |
| 37 | STONE + CLAY MIN + QUARRY | 1.47463 | 11 | RICE | 1.68724 | 37 |
| 38 | CHEM + FERT MINERAL MIN | 1.39637 | 53 | BEVERAGES AND FLAVORINGS | 1.67963 | 38 |
| 39 | NEW CONSTRUCT, RESIDENT | 1.58929 | 15 | OATS | 1.67556 | 39 |
| 40 | NEW CONSTRUCT, NONRESIDENT | 1.46317 | 61 | PAPER + PAPERBOARD PRODUCTS | 1.66946 | 40 |
| 41 | NEW CONSTRUCT, PUBLIC UTILITY | 1.47017 | 75 | CEMENT AND CONCRETE PRODUCTS | 1.66328 | 41 |
| 42 | NEW CONSTRUCT, HIGHWAYS | 1.54455 | 70 | PAINTS AND ALLIED PRODUCTS | 1.64660 | 42 |
| 43 | NEW CONSTRUCT, ALL OTHER | 1.41455 | 28 | POTATOES | 1.64177 | 43 |
| 44 | MAINT. AND REPAIR CONSTRUCTION | 1.25968 | 5 | HOGS | 1.63899 | 44 |
| 45 | ORDNANCE + GUIDED MISSILES | 1.34608 | 63 | OTHER PRINTING AND PUBLISHING | 1.62916 | 45 |
| 46 | MEAT PRODUCTS | 2.40012 | 135 | MOTION PICTURES | 1.61425 | 46 |
| 47 | DAIRY PRODUCTS | 2.59719 | 30 | SAFFLOWER | 1.59517 | 47 |
| 48 | CANNED AND FROZEN FOODS | 1.98597 | 33 | AGRIC., FORESTRY, FISHERY SERV | 1.58935 | 48 |
| 49 | GRAIN MILL PRODUCTS | 2.19169 | 39 | NEW CONSTRUCT, RESIDENT | 1.58929 | 49 |
| 50 | BAKERY PRODUCTS | 1.92576 | 112 | LOCAL TRANSIT AND INTERCITY BUSES | 1.58434 | 50 |
| 51 | SUGAR | 2.35800 | 36 | NATURAL GAS + N.G. LIQUIDS | 1.57863 | 51 |
| 52 | CONFECTIONARY PRODUCTS | 1.95787 | 59 | HOUSEHOLD FURNITURE | 1.57424 | 52 |
| 53 | BEVERAGES AND FLAVORINGS | 1.67963 | 17 | GRASS SEED | 1.56960 | 53 |
| 54 | MISC FOOD PRODUCTS | 1.85297 | 144 | STATE AND LOCAL GOVT ENTERPRISES | 1.56455 | 54 |
| 55 | TEXTILE PRODUCTS | 1.54250 | 108 | OTHER TRANSPORTATION EQUIPMENT | 1.55976 | 55 |

# Table 4 - Cont.



1963 JUTLOOK 1976
185 SECTOR INVERSE

COLUMN SUMS OF THE INVERSE AND THEIR RANKING

| | SECTOR | COLUMN SUM | | SECTOR | COLUMN SUM | RANK |
|---|---|---|---|---|---|---|
| 56 | LOGGING CAMPS + SAWMILLS | 1.42233 | 42 | NEW CONSTRUCT, HIGHWAYS | 1.54455 | 56 |
| 57 | MILLWORK, PLYWOOD + OTHER WOOD PRODUCTS | 1.74386 | 55 | TEXTILE PRODUCTS | 1.54250 | 57 |
| 58 | WOODEN CONTAINERS | 1.73415 | 32 | FORESTRY AND FISHERY PRODUCTS | 1.54099 | 58 |
| 59 | HOUSEHOLD FURNITURE | 1.57424 | 22 | CITRUS FRUITS | 1.53396 | 59 |
| 60 | OFFICE FURNITURE AND FIXTURES | 1.46800 | 25 | DRIED BEANS | 1.52760 | 60 |
| 61 | PAPER + PAPERBOARD PRODUCTS | 1.66946 | 129 | HOTELS AND LODGING PLACES | 1.52540 | 61 |
| 62 | NEWSPAPERS | 1.43520 | 21 | NONCITRUS FRUITS | 1.52403 | 62 |
| 63 | OTHER PRINTING AND PUBLISHING | 1.62916 | 126 | INSURANCE | 1.51785 | 63 |
| 64 | INDUSTRIAL CHEMICALS | 1.78593 | 78 | MISC STONE AND CLAY PRODUCTS | 1.51371 | 64 |
| 65 | AGRICULTURAL CHEMICALS | 1.80748 | 60 | DRUGS | 1.50696 | 65 |
| 66 | SOAP AND ROOM CHEMICALS | 1.69403 | 119 | RADIO AND TELEVISION BROADCASTING | 1.49792 | 66 |
| 67 | PLASTICS MATERIALS AND SYNTHETIC FIBERS | 1.72553 | 73 | LEATHER TANNING AND PRODUCTS | 1.49262 | 67 |
| 68 | DRUGS | 1.50696 | 60 | OFFICE FURNITURE AND FIXTURES | 1.48800 | 68 |
| 69 | CLEANING AND TOILET PREPARATIONS | 1.69124 | 82 | METAL CONTAINERS | 1.48252 | 69 |
| 70 | PAINTS AND ALLIED PRODUCTS | 1.64660 | 125 | BANKING AND FINANCIAL INTERMEDIARIES | 1.48238 | 70 |
| 71 | PETROLEUM REFINING AND RELATED PRODUCTS | 1.83649 | 26 | MELONS | 1.47701 | 71 |
| 72 | RUBBER AND PLASTICS PRODUCTS | 1.42343 | 24 | VEGETABLES | 1.47598 | 72 |
| 73 | LEATHER TANNING AND PRODUCTS | 1.49262 | 37 | STONE + CLAY MIN + QUARRY | 1.47463 | 73 |
| 74 | GLASS | 1.46955 | 115 | AIR TRANSPORTATION | 1.47054 | 74 |
| 75 | CEMENT AND CONCRETE PRODUCTS | 1.66328 | 41 | NEW CONSTRUCT, PUBLIC UTILITY | 1.47017 | 75 |
| 76 | STRUCTURAL CLAY PRODUCTS | 1.41715 | 111 | RAILROADS | 1.46973 | 76 |
| 77 | PLASTICS AND ALLIED PRODUCTS | 1.32626 | 79 | BLAST FURNACES AND BASIC STEEL PRODUCTS | 1.46956 | 77 |
| 78 | MISC STONE AND CLAY PRODUCTS | 1.51371 | 74 | GLASS | 1.46955 | 78 |
| 79 | BLAST FURNACES AND BASIC STEEL PRODUCTS | 1.46956 | 19 | WALNUTS | 1.46618 | 79 |
| 80 | IRON AND STEEL FOUNDRIES AND FORGINGS | 1.46115 | 40 | NEW CONSTRUCT, NONRESIDENT | 1.46317 | 80 |
| 81 | PRIMARY NONFERROUS METAL PRODUCTS | 1.75866 | 23 | FRUIT AND TREE NUTS, NEC | 1.46307 | 81 |
| 82 | METAL CONTAINERS | 1.48252 | 80 | IRON AND STEEL FOUNDRIES AND FORGINGS | 1.46115 | 82 |
| 83 | HEATING APPARATUS AND PLUMBING FIXTURES | 1.44411 | 101 | RADIO AND TV RECEIVING SETS | 1.46092 | 83 |
| 84 | FABRICATED STRUCTURAL STEEL | 1.39995 | 96 | COMPUTERS AND OFFICE EQUIPMENT | 1.46050 | 84 |
| 85 | SPECIAL MACHINE PRODUCTS | 1.36337 | 110 | JEWELRY, SPORTING GOODS, ETC. | 1.46011 | 85 |
| 86 | METAL STAMPINGS | 1.38110 | 27 | SUGAR BEETS | 1.44734 | 86 |
| 87 | CUTLERY, HAND TOOLS AND GENERAL HARDWARE | 1.38216 | 20 | ALMONDS | 1.44750 | 87 |
| 88 | OTHER FABRICATED METAL PRODUCTS | 1.44454 | 88 | OTHER FABRICATED METAL PRODUCTS | 1.44454 | 88 |
| 89 | ENGINES, TURBINES AND GENERATORS | 1.39326 | 83 | HEATING APPARATUS AND PLUMBING FIXTURES | 1.44411 | 89 |
| 90 | FARM MACHINERY | 1.39155 | 62 | NEWSPAPERS | 1.43520 | 90 |
| 91 | CONSTRUCTION + MATERIAL HANDLING EQUIP | 1.35791 | 113 | TRUCK TRANSPORTATION | 1.43015 | 91 |
| 92 | METAL WORKING MACHINERY | 1.33269 | 72 | RUBBER AND PLASTICS PRODUCTS | 1.42343 | 92 |
| 93 | SPECIAL INDUSTRIAL MACHINERY | 1.41176 | 56 | LOGGING CAMPS + SAWMILLS | 1.42233 | 93 |
| 94 | GENERAL INDUSTRIAL MACHINERY | 1.38390 | 76 | STRUCTURAL CLAY PRODUCTS | 1.41715 | 94 |
| 95 | MACHINE SHOP PRODUCTS | 1.41401 | 43 | NEW CONSTRUCT, ALL OTHER | 1.41455 | 95 |
| 96 | COMPUTERS AND OFFICE EQUIPMENT | 1.46050 | 104 | MISC ELECTRICAL PRODUCTS | 1.41411 | 96 |
| 97 | SERVICE INDUSTRY MACHINES | 1.37505 | 95 | MACHINE SHOP PRODUCTS | 1.41401 | 97 |
| 98 | ELECTRIC TRANSMISSION EQUIPMENT | 1.34950 | 93 | SPECIAL INDUSTRIAL MACHINERY | 1.41176 | 98 |
| 99 | ELECTRICAL INDUSTRIAL APPARATUS | 1.35473 | 136 | AMUSEMENT AND RECREATION SERVICES | 1.41010 | 99 |
| 100 | ELECTRIC LIGHTING AND WIRING | 1.37855 | 103 | ELECTRONIC COMPONENTS | 1.40694 | 100 |
| 101 | RADIO AND TV RECEIVING SETS | 1.46092 | 105 | MOTOR VEHICLES | 1.40136 | 101 |
| 102 | COMMUNICATION EQUIPMENT | 1.28512 | 84 | FABRICATED STRUCTURAL STEEL | 1.39995 | 102 |
| 103 | ELECTRONIC COMPONENTS | 1.40694 | 38 | CHEM + FERT MINERAL MIN | 1.39837 | 103 |
| 104 | MISC ELECTRICAL PRODUCTS | 1.41411 | 134 | AUTOMOBILE REPAIR | 1.39761 | 104 |
| 105 | MOTOR VEHICLES | 1.40136 | 109 | CLOCKS AND SCIENTIFIC EQUIPMENT | 1.39566 | 105 |
| 106 | AIRCRAFT | 1.34590 | 89 | ENGINES, TURBINES AND GENERATORS | 1.39326 | 106 |
| 107 | SHIP AND BOAT BUILDING AND REPAIRING | 1.35537 | 90 | FARM MACHINERY | 1.39155 | 107 |
| 108 | OTHER TRANSPORTATION EQUIPMENT | 1.35976 | 116 | PIPELINE TRANSPORTATION | 1.38700 | 108 |
| 109 | CLOCKS AND SCIENTIFIC EQUIPMENT | 1.39566 | 31 | GREENHOUSE AND NURSERY PRODUCTS | 1.38428 | 109 |
| 110 | JEWELRY, SPORTING GOODS, ETC. | 1.46011 | 94 | GENERAL INDUSTRIAL MACHINERY | 1.38390 | 110 |

# Table 4 - Cont.



COLUMN SUMS OF THE INVERSE AND THEIR RANKING

| | SECTOR | COLUMN SUM | | SECTOR | COLUMN SUM | RANK |
|---|---|---|---|---|---|---|
| 111 | WATERWORKS | 1.46973 | 138 | HOSPITALS | 1.38309 | 111 |
| 112 | LOCAL TRANSIT AND INTERCITY BUSES | 1.50494 | 87 | CUTLERY, HAND TOOLS AND GENERAL HARDWARE | 1.30216 | 112 |
| 113 | TRUCK TRANSPORTATION | 1.43015 | 86 | METAL STAMPINGS | 1.30118 | 113 |
| 114 | WATER TRANSPORTATION | 1.73071 | 97 | SERVICE INDUSTRY MACHINES | 1.37905 | 114 |
| 115 | AIR TRANSPORTATION | 1.47054 | 100 | ELECTRIC LIGHTING AND WIRING | 1.37695 | 115 |
| 116 | PIPELINE TRANSPORTATION | 1.38703 | 139 | OTHER MEDICAL SERVICES | 1.37005 | 116 |
| 117 | TRANSPORTATION SERVICES | 1.16039 | 45 | ORDNANCE & GUIDED MISSILES | 1.36608 | 117 |
| 118 | COMMUNICATION EXCEPT RADIO AND TV | 1.14750 | 85 | SCREW MACHINE PRODUCTS | 1.36337 | 118 |
| 119 | RADIO AND TELEVISION BROADCASTING | 1.46792 | 91 | CONSTRUCTION & MATERIAL HANDLING EQUIP | 1.35791 | 119 |
| 120 | ELECTRIC COMPANIES AND SYSTEMS | 1.34152 | 107 | SHIP AND BOAT BUILDING AND REPAIRING | 1.35537 | 120 |
| 121 | GAS COMPANIES AND SYSTEMS | 1.34611 | 99 | ELECTRICAL INDUSTRIAL APPARATUS | 1.35473 | 121 |
| 122 | WATER AND SANITARY SERVICES | 2.10375 | 106 | AIRCRAFT | 1.34990 | 122 |
| 123 | WHOLESALE TRADE | 1.27309 | 29 | SWEET POTATOES | 1.34961 | 123 |
| 124 | RETAIL TRADE | 1.16562 | 98 | ELECTRIC TRANSMISSION EQUIPMENT | 1.34950 | 124 |
| 125 | BANKING AND FINANCIAL INTERMEDIARIES | 1.48238 | 121 | GAS COMPANIES AND SYSTEMS | 1.34611 | 125 |
| 126 | INSURANCE | 1.51785 | 34 | METALS MINING | 1.33350 | 126 |
| 127 | OWNER OCCUPIED REAL ESTATE | 1.06807 | 92 | METAL WORKING MACHINERY | 1.33265 | 127 |
| 128 | REAL ESTATE | 1.28379 | 77 | POTTERY AND RELATED PRODUCTS | 1.32628 | 128 |
| 129 | HOTELS AND LODGING PLACES | 1.52540 | 140 | EDUCATIONAL SERVICES | 1.32197 | 129 |
| 130 | PERSONAL AND REPAIR SERVICES | 1.30710 | 35 | CRUDE PETROLEUM | 1.31770 | 130 |
| 131 | MISCELLANEOUS BUSINESS SERVICES | 1.30373 | 130 | PERSONAL AND REPAIR SERVICES | 1.30710 | 131 |
| 132 | ADVERTISING | 2.27263 | 131 | MISCELLANEOUS BUSINESS SERVICES | 1.30373 | 132 |
| 133 | MISC PROFESSIONAL SERVICES | 1.24021 | 44 | MAIN. AND REPAIR CONSTRUCTION | 1.29660 | 133 |
| 134 | AUTOMOTIVE REPAIR | 1.39761 | 141 | NONPROFIT ORGANIZATIONS | 1.29751 | 134 |
| 135 | MOTION PICTURES | 1.61425 | 102 | COMMUNICATION EQUIPMENT | 1.28512 | 135 |
| 136 | AMUSEMENT AND RECREATION SERVICES | 1.41038 | 129 | REAL ESTATE | 1.29379 | 136 |
| 137 | DOCTORS AND DENTISTS | 1.22446 | 123 | WHOLESALE TRADE | 1.27309 | 137 |
| 138 | HOSPITALS | 1.38309 | 133 | MISC PROFESSIONAL SERVICES | 1.24021 | 138 |
| 139 | OTHER MEDICAL SERVICES | 1.37005 | 137 | DOCTORS AND DENTISTS | 1.22446 | 139 |
| 140 | EDUCATIONAL SERVICES | 1.32197 | 117 | TRANSPORTATION SERVICES | 1.16039 | 140 |
| 141 | NONPROFIT ORGANIZATIONS | 1.29751 | 143 | OTHER FEDERAL GOVT ENTERPRISES | 1.16876 | 141 |
| 142 | POST OFFICE | 1.13062 | 124 | RETAIL TRADE | 1.16562 | 142 |
| 143 | OTHER FEDERAL GOVT ENTERPRISES | 1.16876 | 118 | COMMUNICATION EXCEPT RADIO AND TV | 1.14750 | 143 |
| 144 | STATE AND LOCAL GOVT ENTERPRISES | 1.56455 | 142 | POST OFFICE | 1.13062 | 144 |
| 145 | DUMMY INDUSTRIES | 1.87257 | 127 | OWNER OCCUPIED REAL ESTATE | 1.06807 | 145 |

END OF DATA

(e) San Francisco Bay

The San Francisco Bay Air Basin economy consists essentially of the nine counties: San Mateo, Santa Clara, Alameda, Contra Costa, San Francisco, Marin, Napa, and the western and southern portions of Solano and Sonoma counties respectively.

Gross County Product is estimated at $45.6 billion with imports of $15.2 billion and exports of $14.4 billion. This basin accounted for approximately 29% of California State Product.

Sectors not present in the Bay Area economy are:

1. Cotton
2. Rice
3. Grass Seed
4. Food, Feed Grains, NEC
5. Citrus Fruits
6. Fruit and Tree Nuts, NEC
7. Melons
8. Hops
9. Sweet Potatoes
10. Chem & Fertilizer, Mineral Mining

The output multipliers for the economy are shown in Table 5.

# Table 5

SAN FRANCISCO 1976
137 SECTOR INVERSE



COLUMN SUMS OF THE INVERSE AND THEIR RANKING

| | SECTOR | COLUMN SUM | | SECTOR | COLUMN SUM | RANK |
|---|---|---|---|---|---|---|
| 1 | OILSEEDS | 1.31651 | 127 | MOTION PICTURES | 2.47121 | 1 |
| 2 | BROILERS, CHICKENS AND EGGS | 1.73551 | 137 | DUMMY INDUSTRIES | 2.46190 | 2 |
| 3 | TURKEYS AND OTHER POULTRY | 1.66259 | 42 | SUGAR | 2.21435 | 3 |
| 4 | CATTLE AND CALVES | 1.24597 | 60 | CLEANING AND TOILET PREPARATIONS | 2.17485 | 4 |
| 5 | HOGS | 1.19184 | 126 | ADVERTISING | 2.16550 | 5 |
| 6 | SHEEP, LAMBS, AND WOOL | 1.33252 | 114 | WATER AND SANITARY SERVICES | 2.14154 | 6 |
| 7 | MISC. LIVESTOCK | 1.39034 | 56 | AGRICULTURAL CHEMICALS | 2.11595 | 7 |
| 8 | APIARY PRODUCTS | 1.39112 | 58 | PLASTICS MATERIALS AND SYNTHETIC FIBERS | 2.03232 | 8 |
| 9 | WHEAT | 1.61626 | 87 | COMPUTERS AND OFFICE EQUIPMENT | 2.01989 | 9 |
| 10 | BARLEY | 1.74887 | 39 | CANNED AND FROZEN FOODS | 2.01839 | 10 |
| 11 | CORN | 1.73602 | 21 | PAINTS AND ALLIED PRODUCTS | 2.01408 | 11 |
| 12 | HAY AND PASTURE | 1.78095 | 93 | RADIO AND TV RECEIVING SETS | 2.01068 | 12 |
| 13 | OATS | 1.72629 | 43 | CONFECTIONARY PRODUCTS | 1.97057 | 13 |
| 14 | SORGHUM GRAIN | 1.76015 | 57 | GUM AND WOOD CHEMICALS | 1.96399 | 14 |
| 15 | WALNUTS | 1.58202 | 97 | MOTOR VEHICLES | 1.94039 | 15 |
| 16 | ALMONDS | 1.56143 | 106 | WATER TRANSPORTATION | 1.93670 | 16 |
| 17 | NONCITRUS FRUITS | 1.69279 | 119 | INSURANCE | 1.92435 | 17 |
| 18 | VEGETABLES | 1.63636 | 72 | PRIMARY NONFERROUS METAL PRODUCTS | 1.90610 | 18 |
| 19 | DRIED BEANS | 1.62073 | 80 | ENGINES, TURBINES AND GENERATORS | 1.90452 | 19 |
| 20 | SUGAR BEETS | 1.56180 | 111 | RADIO AND TELEVISION BROADCASTING | 1.89561 | 20 |
| 21 | POTATOES | 1.57006 | 55 | INDUSTRIAL CHEMICALS | 1.88763 | 21 |
| 22 | SAFFLOWER | 1.61231 | 81 | FARM MACHINERY | 1.88398 | 22 |
| 23 | GREENHOUSE AND NURSERY PRODUCTS | 1.44300 | 79 | HEATING APPARATUS AND PLUMBING FIXTURES | 1.86109 | 23 |
| 24 | FORESTRY AND FISHERY PRODUCTS | 1.54474 | 73 | METAL CONTAINERS | 1.84923 | 24 |
| 25 | AGRIC., FORESTRY, FISHERY SERV. | 1.22245 | 59 | DRUGS | 1.84450 | 25 |
| 26 | METALS MINING | 1.49501 | 75 | FABRICATED STRUCTURAL STEEL | 1.84446 | 26 |
| 27 | CRUDE PETROLEUM | 1.50471 | 84 | SPECIAL INDUSTRIAL MACHINERY | 1.83660 | 27 |
| 28 | NATURAL GAS + N.G. LIQUIDS | 1.42094 | 82 | CONSTRUCTION + MATERIAL HANDLING EQUIP | 1.82665 | 28 |
| 29 | STONE, CLAY, AND GLASS | 1.60562 | 117 | BANKING AND FINANCIAL INTERMEDIARIES | 1.81487 | 29 |
| 30 | NEW CONSTRUCT, RESIDENT | 1.65647 | 45 | MISC FOOD PRODUCTS | 1.80449 | 30 |
| 31 | NEW CONSTRUCT, NONRESIDENT | 1.79505 | 54 | OTHER PRINTING AND PUBLISHING | 1.80040 | 31 |
| 32 | NEW CONSTRUCT, PUBLIC UTILITY | 1.75393 | 44 | BEVERAGES AND FLAVORINGS | 1.79765 | 32 |
| 33 | NEW CONSTRUCT, HIGHWAYS | 1.69123 | 59 | SHIP AND BOAT BUILDING AND REPAIRING | 1.79182 | 33 |
| 34 | NEW CONSTRUCT, ALL OTHER | 1.59801 | 85 | GENERAL INDUSTRIAL MACHINERY | 1.78995 | 34 |
| 35 | MAINT. AND REPAIR CONSTRUCTION | 1.47835 | 103 | OTHER TRANSPORTATION EQUIPMENT | 1.78636 | 35 |
| 36 | ORDNANCE + GUIDED MISSILES | 1.72095 | 31 | NEW CONSTRUCT, NONRESIDENT | 1.78505 | 36 |
| 37 | MEAT PRODUCTS | 1.34417 | 101 | CLOCKS AND SCIENTIFIC EQUIPMENT | 1.78252 | 37 |
| 38 | DAIRY PRODUCTS | 1.57369 | 12 | HAY AND PASTURE | 1.78095 | 38 |
| 39 | CANNED AND FROZEN FOODS | 2.01839 | 65 | ELECTRONIC COMPONENTS | 1.76740 | 39 |
| 40 | GRAIN MILL PRODUCTS | 1.56015 | 88 | SERVICE INDUSTRY MACHINES | 1.76361 | 40 |
| 41 | BAKERY PRODUCTS | 1.59823 | 14 | SORGHUM GRAIN | 1.76015 | 41 |
| 42 | SUGAR | 2.21435 | 32 | NEW CONSTRUCT, PUBLIC UTILITY | 1.75393 | 42 |
| 43 | CONFECTIONERY PRODUCTS | 1.97057 | 79 | OTHER FABRICATED METAL PRODUCTS | 1.75049 | 43 |
| 44 | BEVERAGES AND FLAVORINGS | 1.79765 | 10 | BARLEY | 1.74887 | 44 |
| 45 | MISC FOOD PRODUCTS | 1.80449 | 71 | IRON AND STEEL FOUNDRIES AND FORGINGS | 1.74178 | 45 |
| 46 | TEXTILE PRODUCTS | 1.54400 | 121 | HOTELS AND LODGING PLACES | 1.74136 | 46 |
| 47 | LODGING CAMPS + SCHOOLS | 1.29725 | 82 | PAPER + PAPERBOARD PRODUCTS | 1.74012 | 47 |
| 48 | MILLWORK, PLYWOOD + OTHER WOOD PRODUCTS | 1.51837 | 11 | CORN | 1.73602 | 48 |
| 49 | WOODEN CONTAINERS | 1.47261 | 2 | BROILERS, CHICKENS AND EGGS | 1.73551 | 49 |
| 50 | HOUSEHOLD FURNITURE | 1.55624 | 13 | OATS | 1.72629 | 50 |
| 51 | OFFICE FURNITURE AND FIXTURES | 1.66925 | 34 | ORDNANCE + GUIDED MISSILES | 1.72095 | 51 |
| 52 | PAPER + PAPERBOARD PRODUCTS | 1.74012 | 91 | HOUSEHOLD APPLIANCES | 1.71155 | 52 |
| 53 | NEWSPAPERS | 1.57375 | 98 | AIRCRAFT | 1.70210 | 53 |
| 54 | OTHER PRINTING AND PUBLISHING | 1.80040 | 41 | BAKERY PRODUCTS | 1.69823 | 54 |
| 55 | INDUSTRIAL CHEMICALS | 1.88763 | 136 | STATE AND LOCAL GOVT ENTERPRISES | 1.69573 | 55 |

Table 5 - Cont.

SAN FRANCISCO 1976 — PAGE 2
137 SECTOR INVERSE — 26 MAR 79

COLUMN SUMS OF THE INVERSE AND THEIR RANKING

| | SECTOR | COLUMN SUM | | SECTOR | COLUMN SUM | RANK |
|---|---|---|---|---|---|---|
| 56 | AGRICULTURAL CHEMICALS | 2.11595 | 17 | NONCITRUS FRUITS | 1.69279 | 56 |
| 57 | GUM AND WOOD CHEMICALS | 1.96399 | 33 | NEW CONSTRUCT, HIGHWAYS | 1.69123 | 57 |
| 58 | PLASTICS MATERIALS AND SYNTHETIC FIBERS | 2.03232 | 70 | BLAST FURNACES AND BASIC STEEL PRODUCTS | 1.68828 | 58 |
| 59 | DRUGS | 1.94453 | 66 | CEMENT AND CONCRETE PRODUCTS | 1.68823 | 59 |
| 60 | CLEANING AND TOILET PREPARATIONS | 2.17483 | 93 | ELECTRICAL INDUSTRIAL APPARATUS | 1.68812 | 60 |
| 61 | PAINTS AND ALLIED PRODUCTS | 2.01408 | 96 | COMMUNICATION EQUIPMENT | 1.68734 | 61 |
| 62 | PETROLEUM REFINING AND RELATED PRODUCTS | 1.50526 | 112 | ELECTRIC COMPANIES AND SYSTEMS | 1.68576 | 62 |
| 63 | RUBBER AND PLASTICS PRODUCTS | 1.56467 | 51 | OFFICE FURNITURE AND FIXTURES | 1.66925 | 63 |
| 64 | LEATHER TANNING AND PRODUCTS | 1.53811 | 83 | METAL WORKING MACHINERY | 1.66768 | 64 |
| 65 | GLASS | 1.49288 | 3 | TURKEYS AND OTHER POULTRY | 1.66259 | 65 |
| 66 | CEMENT AND CONCRETE PRODUCTS | 1.68823 | 96 | MISC ELECTRICAL PRODUCTS | 1.66224 | 66 |
| 67 | STRUCTURAL CLAY PRODUCTS | 1.42961 | 77 | METAL STAMPINGS | 1.66224 | 67 |
| 68 | POTTERY AND RELATED PRODUCTS | 1.40030 | 43 | GRAIN MILL PRODUCTS | 1.66016 | 68 |
| 69 | MISC STONE AND CLAY PRODUCTS | 1.66115 | 39 | NEW CONSTRUCT, RESIDENT | 1.65647 | 69 |
| 70 | BLAST FURNACES AND BASIC STEEL PRODUCTS | 1.68828 | 89 | ELECTRIC TRANSMISSION EQUIPMENT | 1.65527 | 70 |
| 71 | IRON AND STEEL FOUNDRIES AND FORGINGS | 1.74178 | 86 | MACHINE SHOP PRODUCTS | 1.64538 | 71 |
| 72 | PRIMARY NONFERROUS METAL PRODUCTS | 1.90610 | 18 | VEGETABLES | 1.63036 | 72 |
| 73 | METAL CONTAINERS | 1.94623 | 78 | CUTLERY, HAND TOOLS AND GENERAL HARDWARE | 1.62220 | 73 |
| 74 | HEATING APPARATUS AND PLUMBING FIXTURES | 1.96109 | 19 | DEFED POINS | 1.62079 | 74 |
| 75 | FABRICATED STRUCTURAL STEEL | 1.84446 | 104 | LOCAL TRANSIT AND INTERCITY BUSES | 1.62054 | 75 |
| 76 | SCREW MACHINE PRODUCTS | 1.62013 | 107 | AIR TRANSPORTATION | 1.62013 | 76 |
| 77 | METAL STAMPINGS | 1.66224 | 76 | SCREW MACHINE PRODUCTS | 1.62010 | 77 |
| 78 | CUTLERY, HAND TOOLS AND GENERAL HARDWARE | 1.62220 | 9 | WHEAT | 1.61726 | 78 |
| 79 | OTHER FABRICATED METAL PRODUCTS | 1.75049 | 126 | AUTOMOBILE REPAIR | 1.61498 | 79 |
| 80 | ENGINES, TURBINES AND GENERATORS | 1.90452 | 22 | SEEDLOWER | 1.61231 | 80 |
| 81 | FARM MACHINERY | 1.98339 | 29 | STONE + CLAY MIN + QUARRY | 1.60542 | 81 |
| 82 | CONSTRUCTION + MATERIAL HANDLING EQUIP | 1.82465 | 102 | JEWELRY, SPORTING GOODS, ETC. | 1.60357 | 82 |
| 83 | METAL WORKING MACHINERY | 1.66768 | 69 | MISC STONE AND CLAY PRODUCTS | 1.60115 | 83 |
| 84 | SPECIAL INDUSTRY MACHINERY | 1.83060 | 34 | NEW CONSTRUCT, ALL OTHER | 1.59871 | 84 |
| 85 | GENERAL INDUSTRIAL MACHINERY | 1.78005 | 50 | HOUSEHOLD FURNITURE | 1.59674 | 85 |
| 86 | MACHINE SHOP PRODUCTS | 1.64538 | 92 | ELECTRIC LIGHTING AND WIRING | 1.59570 | 86 |
| 87 | COMPUTERS AND OFFICE EQUIPMENT | 2.01989 | 15 | WEIGHTS | 1.58292 | 87 |
| 88 | SERVICE INDUSTRY MACHINES | 1.76341 | 53 | NEWSPAPERS | 1.57375 | 88 |
| 89 | ELECTRIC TRANSMISSION EQUIPMENT | 1.65527 | 88 | DAIRY PRODUCTS | 1.57369 | 89 |
| 90 | ELECTRICAL INDUSTRIAL APPARATUS | 1.68812 | 24 | POTATOES | 1.57096 | 90 |
| 91 | HOUSEHOLD APPLIANCES | 1.71155 | 64 | RUBBER AND PLASTICS PRODUCTS | 1.56467 | 91 |
| 92 | ELECTRIC LIGHTING AND WIRING | 1.59590 | 89 | SUGAR BEETS | 1.56180 | 92 |
| 93 | RADIO AND TV RECEIVING SETS | 2.01068 | 16 | ALMONDS | 1.56163 | 93 |
| 94 | COMMUNICATION EQUIPMENT | 1.68734 | 103 | RAILROADS | 1.54569 | 94 |
| 95 | ELECTRONIC COMPONENTS | 1.76740 | 24 | FORESTRY AND FISHERY PRODUCTS | 1.54474 | 95 |
| 96 | MISC ELECTRICAL PRODUCTS | 1.66224 | 66 | TEXTILE PRODUCTS | 1.54400 | 96 |
| 97 | MOTOR VEHICLES | 1.94039 | 54 | LEATHER TANNING AND PRODUCTS | 1.53811 | 97 |
| 98 | AIRCRAFT | 1.70210 | 105 | TRUCK TRANSPORTATION | 1.51903 | 98 |
| 99 | SHIP AND BOAT BUILDING AND REPAIRING | 1.79102 | 48 | MILLWORK, PLYWOOD + OTHER WOOD PRODUCTS | 1.51837 | 99 |
| 100 | OTHER TRANSPORTATION EQUIPMENT | 1.78736 | 128 | AMUSEMENT AND RECREATION SERVICES | 1.51615 | 100 |
| 101 | CLOCKS AND SCIENTIFIC EQUIPMENT | 1.78252 | 62 | PETROLEUM REFINING AND RELATED PRODUCTS | 1.50526 | 101 |
| 102 | JEWELRY, SPORTING GOODS, ETC. | 1.60357 | 130 | HOSPITALS | 1.50498 | 102 |
| 103 | RAILROADS | 1.54569 | 27 | CRUDE PETROLEUM | 1.50471 | 103 |
| 104 | LOCAL TRANSIT AND INTERCITY BUSES | 1.62054 | 122 | PERSONAL AND REPAIR SERVICES | 1.49779 | 104 |
| 105 | TRUCK TRANSPORTATION | 1.51903 | 108 | PIPELINE TRANSPORTATION | 1.49677 | 105 |
| 106 | WATER TRANSPORTATION | 1.93670 | 28 | METALS MINING | 1.49501 | 106 |
| 107 | AIR TRANSPORTATION | 1.62013 | 65 | GLASS | 1.49288 | 107 |
| 108 | PIPELINE TRANSPORTATION | 1.49677 | 124 | MISCELLANEOUS BUSINESS SERVICES | 1.48829 | 108 |
| 109 | TRANSPORTATION SERVICES | 1.31259 | 131 | OTHER MEDICAL SERVICES | 1.48574 | 109 |
| 110 | COMMUNICATION EXCEPT RADIO AND TV | 1.21116 | 35 | MAIN. AND REPAIR CONSTRUCTION | 1.47806 | 110 |

Table 5 - Cont.

SAN FRANCISCO 1976 PAGE 3
137 SECTOR INVERSE 26 MAR 79

COLUMN SUMS OF THE INVERSE AND THEIR RANKING

| | SECTOR | COLUMN SUM | RANK | SECTOR | COLUMN SUM | RANK |
|---|---|---|---|---|---|---|
| 111 | RADIO AND TELEVISION BROADCASTING | 1.08861 | 49 | WOODEN CONTAINERS | 1.47261 | 111 |
| 112 | ELECTRIC COMPANIES AND SYSTEMS | 1.60576 | 23 | GREENHOUSE AND NURSERY PRODUCTS | 1.44300 | 112 |
| 113 | GAS COMPANIES AND SYSTEMS | 1.24101 | 132 | EDUCATIONAL SERVICES | 1.44010 | 113 |
| 114 | WATER AND SANITARY SERVICES | 2.14154 | 67 | STRUCTURAL CLAY PRODUCTS | 1.42961 | 114 |
| 115 | WHOLESALE TRADE | 1.39072 | 29 | MOTOR FUELS & N.G. LIQUIDS | 1.42094 | 115 |
| 116 | RETAIL TRADE | 1.24975 | 133 | NONPROFIT ORGANIZATIONS | 1.40311 | 116 |
| 117 | BANKING AND FINANCIAL INTERMEDIARIES | 1.41497 | 69 | POTTERY AND RELATED PRODUCTS | 1.40030 | 117 |
| 118 | INSURANCE | 1.92436 | 7 | MISC. LIVESTOCK | 1.39834 | 118 |
| 119 | OWNER OCCUPIED REAL ESTATE | 1.05946 | 120 | REAL ESTATE | 1.39163 | 119 |
| 120 | REAL ESTATE | 1.39163 | 115 | WHOLESALE TRADE | 1.39072 | 120 |
| 121 | HOTELS AND LODGING PLACES | 1.74136 | 9 | POULTRY PRODUCTS | 1.38112 | 121 |
| 122 | PERSONAL AND REPAIR SERVICES | 1.49779 | 125 | MISC PROFESSIONAL SERVICES | 1.35826 | 122 |
| 123 | MISCELLANEOUS BUSINESS SERVICES | 1.48829 | 37 | MEAT PRODUCTS | 1.34417 | 123 |
| 124 | ADVERTISING | 2.16550 | 6 | SHEEP, LAMBS, AND WOOL | 1.33292 | 124 |
| 125 | MISC PROFESSIONAL SERVICES | 1.35826 | 129 | DOCTORS AND DENTISTS | 1.33167 | 125 |
| 126 | AUTOMOBILE REPAIR | 1.61488 | 1 | DAIRIES | 1.31651 | 126 |
| 127 | MOTION PICTURES | 2.47121 | 109 | TRANSPORTATION SERVICES | 1.31259 | 127 |
| 128 | AMUSEMENT AND RECREATION SERVICES | 1.51615 | 47 | LOGGING CAMPS & SAWMILLS | 1.29725 | 128 |
| 129 | DOCTORS AND DENTISTS | 1.33167 | 135 | OTHER FEDERAL GOVT ENTERPRISES | 1.27296 | 129 |
| 130 | HOSPITALS | 1.53498 | 116 | RETAIL TRADE | 1.24975 | 130 |
| 131 | OTHER MEDICAL SERVICES | 1.48574 | 4 | CATTLE AND CALVES | 1.24597 | 131 |
| 132 | EDUCATIONAL SERVICES | 1.44010 | 113 | GAS COMPANIES AND SYSTEMS | 1.24101 | 132 |
| 133 | NONPROFIT ORGANIZATIONS | 1.40311 | 25 | AGRIC., FORESTRY, FISHERY SERV | 1.22245 | 133 |
| 134 | POST OFFICE | 1.20266 | 110 | COMMUNICATION EXCEPT RADIO AND TV | 1.21116 | 134 |
| 135 | OTHER FEDERAL GOVT ENTERPRISES | 1.27296 | 134 | POST OFFICE | 1.20266 | 135 |
| 136 | STATE AND LOCAL GOVT ENTERPRISES | 1.69573 | 5 | HOGS | 1.19184 | 136 |
| 137 | DUMMY INDUSTRIES | 2.46180 | 119 | OWNER OCCUPIED REAL ESTATE | 1.05946 | 137 |

END OF DATA

## 9. Basic Emissions Data for Use with the Input-Output Models

### (i) Overview

At the outset of the project, it was anticipated that the California State Air Resources Board emissions inventory data might not provide detail for every sector of the proposed input-output models. With this in mind the more generalized air pollution data sources were reviewed to cover such an eventuality. Moreover, it was realized that emissions data for the combustion of fuels, by fuel type, could be derived for the majority of the input-output sectors at least on a statewide basis.

### (ii) Strategic Environmental Assessment System

The United States Environmental Protection Agency has sponsored the development of the Strategic Environmental Assessment System (SEAS) (36). A copy of the model description and printout of the data were obtained from the Project Officer in Washington, D.C. Module Number 7 of the National Economic Modules is titled National Residuals: estimates of annual tonnage of air, water, and land pollution from stationary sources on a nationwide basis. The regional module Number 10 is designated Regionalization: Regionalization of national economic, pollutant and abatement cost data.

After a comprehensive review of the available SEAS data was carried out, it was concluded that the detail was insufficient for use with the California input-output Air Basin Models.

(iii) EPA Bulletin AP 42 Data

Copies of Bulletin AP 42, "Compilation of Air Pollutant Emissions Factors" Parts A and B (37) were obtained from the U.S. Environmental Protection Agency. The Bulletin provides emission data for a complete range of industrial processes and the service and transportation industries. Each of the industries covered in the Bulletin is defined by complete process descriptions. However, no Standard Industrial Classification (SIC) codes are assigned to the industry descriptions.

These data were reviewed and the industry descriptions in the 1972 SIC code manual (38) were compared with the process descriptions given in Bulletin AP 42. In this manner four digit SIC codes were assigned to each industrial process described. The emission data are given in tons of pollutant per ton of product output (or other physical measure i.e. barrels, etc.) The emission factors in tons were thus assembled by four-digit SIC codes.

Mr. Werner Schink, State of California, Department of Water Resources, provided a set of conversion factors obtained from the U.S. Department of Transportation which could be used to convert the dollar value of product in 1976 dollars to tons of physical product for each input-output sector, thus permitting the direct application of the AP 42 factors to input-output sector data. These final conversions were not made since the Air Resources Board emission inventory computer tapes became available to the project and it seemed more appropriate to exploit these primary data to the fullest

before resorting to the use of the more generalized Bulletin AP 42 data.

(iv) Fuel Combustion Data

In developing the statewide input-output model, the data for the energy sectors were regionalized on the basis of energy use data available for California.

The California Energy Resources Conservation and Development Commission (ERCDC) sponsored a study relating to potential energy shortages (39). This study, prepared by Arthur D. Little, Incorporated, Cambridge, Massachusetts, provided detailed energy use in California by fuel type for each economic sector. The estimates of fuel use by 4-digit SIC in the manufacturing sectors were based on national average use data modified to California totals on the fuel supply side. These data were updated from 1975 to 1976 and then further disaggregated to give additional detail for all sectors of the input-output model. This was accomplished by means of a series of BTU conversion factors available for each fuel type.

By converting fuel type to BTU's the total BTU energy requirements of a given sector could be maintained while the average input by fuel type could be adjusted to meet California totals for major sectors. Coal is not used in California except by the steel industry. Similarly, oil and natural gas use by individual industries based on national averages could be adjusted to agree with the known California supply totals for these industries. In this way the national average BTU inputs were adjusted to conform to the California fuel use pattern for the base year. Fuel types and conversion factors are given in Table 6 presented below.

Table 6

| Fuel Type | BTU's Per Unit | Conversion Factor |
|---|---|---|
| 1. Gasoline | $5.25 \times 10^6$ BTU/BBL | 42 Gal/BBL |
| 2. Kerosine (jet fuel) | $5.76 \times 10^6$ BTU/BBL | " |
| 3. Distillate | $5.825 \times 10^6$ BTU/BBL | " |
| 4. Residual Oil | $6.28 \times 10^6$ BTU/BBL | " |
| 5. Coke | $21.2 \times 10^6$ BTU/Ton | Ø |
| 6. Other Refined Oil Products | $6.1 \times 10^6$ BTU/BBL | 42 Gal/BBL |
| 7. Natural Gas | 1,032 BTU/Cu. ft. | Ø |
| 8. Liquid Petroleum Gas | $4.011 \times 10^6$ BTU/BBL | 42 Gal/BBL |
| 9. Electricity | Ø | Ø |
| 10. Coal | $26.2 \times 10^6$ BTU/Ton | Ø |

The fuel use estimates for each input-output sector of the statewide model were subsequently used to derive the total emissions of the five critical pollutants for each sector.

Data from the National Emission Data System (NEDS) (Appendix C, Bulletin AP 42) were selected from the Source Classification Codes and Emissions Factor listings. These factors are shown in Table 7. The factors were used to convert the fuel use estimates by sector to total emissions. The converted data were arrayed by input-output sector and could be compared with the emissions inventory tape data.

Table 7

| Fuel Type | Unit | Pounds Emitted per Unit | | | | |
|---|---|---|---|---|---|---|
| | | Part | $So_x$ | $No_x$ | HC | CO |
| 1. Gasoline | 1000 Gal. Burned | 6.50 | 5.30 | 102. | 161. | 3940 |
| 2. Kerosine | 1000 " | | 6.20 | | | |
| 3. Distillate | 1000 " | 33.5 | 144. | 469. | 37.5 | 102 |
| 4. Residual Oil | 1000 " | | 159. | | | |
| 5. Coke | Per Ton Burned | 2.00 | 38.0 | 15.0 | .2 | 2.0 |
| 6. Other R.O.P. | 1000 Gal. Burned | 5.00 | 140. | 67.8 | 5.51 | 15.4 |
| 7. Nat. Gas | $10^6$ Cu. Ft. | 14.0 | 940. | 413. | 42.0 | 115. |
| 8. L.P.G. | 1000 Gal. Burned | 1.75 | 86.5 | 11.7 | .30 | 1.55 |
| 9. Electricity | Ø | | | Ø | | |
| 10. Coal | Ton Burned | 5.00 | 38.0 | 15.0 | .30 | 1.50 |

(v) California Air Resources Board Emissions Inventory Data

In July of 1978 the Air Resources Board provided two computer tapes containing the emissions inventory data for 1976. The tapes contained approximately 44,000 records of variable length in an heirarchical structure. The data related to some 6,000 individual California firms. Among the relevant data for the current study the tapes provided the name and address, County and Air Quality Control Region of each firm. The 4-Digit Standard Industrial Classification codes were provided for each minor product. Total employment for each establishment was also given. Pollutant outputs for each of the five critical pollutants emitted were supplied in tons per year for each SIC code.

(vi) Air Basin Summary Emissions Data

The Air Basin Summary Emissions Data were provided by the Air Resources Board for each of the fourteen California Air Basins. These summary sheets provided estimates by major category of the level of pollutant output for the five critical pollutants in tons per day. Estimates for several years were furnished. A typical data sheet is shown as Table 8.

TABLE 8

SAN DIEGO AIR BASIN SUMMARY
PARTICULATE MATTER EMISSIONS (TONS PER AVG DAY)

| STATIONARY SOURCES | INVENTORY YEAR 1972 | 1975 | 1980 | 1985 | 1990 | 1995 |
|---|---|---|---|---|---|---|
| PETROLEUM | | | | | | |
| PRODUCTION | | | | | | |
| REFINING | | | | | | |
| MARKETING | | | | | | |
| SUBTOTAL | | | | | | |
| ORGANIC SOLVENT USERS | | | | | | |
| SURFACE COATING | | | | | | |
| DRY CLEANING | | | | | | |
| DEGREASING | | | | | | |
| OTHER | | | | | | |
| SUBTOTAL | | | | | | |
| CHEMICAL | | | | | | |
| METALLURGICAL | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 | 0.3 |
| MINERAL | 17.1 | 19.4 | 22.4 | 25.7 | 29.5 | 33.4 |
| FOOD AND AG PROCESSING | 1.5 | 1.6 | 1.8 | 2.0 | 2.2 | 2.4 |
| PESTICIDES | | | | | | |
| WOOD PROCESSING | | | | | | |
| COMBUSTION OF FUELS | | | | | | |
| POWER PLANTS | 5.0 | 8.5 | 14.4 | 14.4 | 14.1 | 12.2 |
| OTHER INDUSTRIAL | 0.5 | 0.6 | 0.8 | 0.9 | 1.1 | 1.3 |
| DOMESTIC AND COMMERCIAL | 0.7 | 0.7 | 0.8 | 0.9 | 1.0 | 1.1 |
| ORCHARD HEATERS | | | | | | |
| SUBTOTAL | 6.2 | 9.8 | 16.0 | 16.2 | 16.2 | 14.6 |
| WASTE BURNING | | | | | | |
| AGRICULTURAL DEBRIS | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| FOREST MANAGEMENT | | | | | | |
| RANGE IMPROVEMENT | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| DUMPS | | | | | | |
| CONICAL BURNERS | | | | | | |
| INCINERATORS | | | | | | |
| OTHER | | | | | | |
| SUBTOTAL | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.3 |
| MISCELLANEOUS AREA SOURCES | | | | | | |
| WILD FIRES | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| STRUCTURAL FIRES | 3.0 | 3.4 | 3.8 | 4.3 | 4.7 | 5.2 |
| FARMING OPERATIONS | 3.9 | 4.1 | 4.5 | 4.6 | 4.8 | 5.2 |
| CONSTR. AND DEMOL. | 59.7 | 67.8 | 83.4 | 99.7 | 119 | 142 |
| UNPAVED ROADS | 14.2 | 14.2 | 14.2 | 14.2 | 14.2 | 14.2 |
| UTILITY EQUIP: MOWERS, ETC | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 |
| SUBTOTAL | 81.9 | 90.5 | 107 | 124 | 144 | 167 |
| TOTAL, STATIONARY | 107 | 122 | 148 | 168 | 192 | 218 |
| MOBILE SOURCES | | | | | | |
| MOTOR VEHICLES-ON ROAD | | | | | | |
| LIGHT-DUTY PASSENGER | 8.4 | 8.9 | 6.8 | 6.5 | 7.3 | 8.1 |
| LIGHT-DUTY GAS TRUCKS | 1.3 | 1.6 | 1.3 | 1.3 | 1.5 | 1.8 |
| MEDIUM-DUTY GAS TRUCKS | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| HEAVY-DUTY GAS TRUCKS | 0.8 | 1.0 | 1.4 | 1.3 | 1.1 | 1.1 |
| HEAVY-DUTY DIESEL TRUCKS | 1.4 | 1.7 | 2.3 | 2.8 | 3.3 | 3.9 |
| MOTORCYCLES | | | | | | |
| SUBTOTAL | 12.1 | 13.4 | 12.0 | 12.2 | 13.5 | 15.1 |
| JET AIRCRAFT | 3.9 | 4.4 | 5.0 | 5.6 | 6.2 | 6.8 |
| PISTON AIRCRAFT | | | | | | |
| RAILROADS | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 |
| SHIPS | 0.8 | 0.9 | 1.1 | 1.2 | 1.3 | 1.5 |
| OTHER OFF-ROAD VEH | 1.0 | 1.2 | 1.3 | 1.5 | 1.6 | 1.8 |
| TOTAL MOBILE SOURCES | 18.0 | 20.0 | 19.5 | 20.6 | 22.8 | 25.3 |
| TOTAL, ALL SOURCES | 125 | 142 | 167 | 189 | 215 | 244 |

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## 10. Developing the Emission Coefficients for Input-Output Sectors - Statewide Model

### (i) Preparing the Emissions Inventory Tape Data

The emissions inventory data tapes were converted to a fixed length record format and the relevant pieces of information on SIC codes, employment, firm name and address, county, air quality control region, and pollutant discharges were extracted and written on a separate computer tape. These data were flagged where potential problems were apparent i.e. missing SIC codes, incomplete or missing pollutant codes. These problem entries were inspected and where possible obvious additions or corrections were made. In some instances only two or three digit SIC codes were punched. The correct four-digit SIC codes could be inferred by the name of the firm or by its principal product code. Where pollutant codes appeared to be obviously mispunched they were compared with other firms within the same SIC category to determine the proper codes. The corrected data were re-entered into the tape for further processing.

A map of the SIC codes for each input-output sector was established and the four-digit SIC codes of the emissions inventory data were bridged or mapped into the sectors of the statewide model. When this task was complete the pollutant data could be sorted into, or allocated, to the appropriate input-output sector on the basis of the identifying SIC codes.

### (ii) Selective Merging with Fuel Combustion Data

When the pollutant data from the emissions inventory tapes had been bridged into the input-output sectors of the statewide model the results were inspected and any sectors which remained at zero were noted. The

pollutants for those sectors were then established on the basis of the fuel combustion emissions data derived as described in 5(iv) above. These entries were selectively merged with the emissions inventory data to form a basic set of pollutant data for each sector of the statewide model. This merging was undertaken for the agricultural sectors and for several of the trade and service sectors. Sector 135 "Owner Occupied Real Estate" remains null in terms of pollutants. This is due to the fact that no fuel use was allocated to this sector in the processing matrix. Fuel purchases for household use were treated as a final demand.

(iii) Air Basin Summary Emissions Data

The Air Basin Summary Emissions Data as prepared by the California Air Resources Board are designed to provide an overall control estimate for the pollutants of each of the major sectors of the air basins.

(iv) Adjusting the Data Sets

The Air Basin Summary Emissions data were keypunched for each of the fourteen air basins and summed to yield a statewide emissions control total for the relevant sectors of the input-output model. The 22 major categories of the Air Basin Summary Data were bridged to the 152 productive input-output sectors as shown in Table 9.

The Air Basin Summary Data were then used as controls to proportionally adjust the merged emissions inventory data and fuel combustion data by sectors thus bringing the two data sets into overall agreement. The follow-

# Table 9

## Relation of Economic Categories to I/O Table Sectors

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ECONOMIC CATEGORY = 1 PETROLEUM PRODUCTION | | | | | | | | | | |
| I/O TABLE SECTORS = | 41 | 42 | | | | | | | | |
| ECONOMIC CATEGORY = 2 PETROLEUM REFINING | | | | | | | | | | |
| I/O TABLE SECTORS = | 78 | | | | | | | | | |
| ECONOMIC CATEGORY = 3 PETROLEUM MARKETING | | | | | | | | | | |
| I/O TABLE SECTORS = | 131 | 132 | | | | | | | | |
| ECONOMIC CATEGORY = 4 ORGANIC SOLVENT USE - SURFACE COATING | | | | | | | | | | |
| I/O TABLE SECTORS = | 138 | 142 | | | | | | | | |
| ECONOMIC CATEGORY = 5 ORGANIC SOLVENT USE- DRY CLEANING | | | | | | | | | | |
| I/O TABLE SECTORS = | 138 | | | | | | | | | |
| ECONOMIC CATEGORY = 6 ORGANIC SOLVENT USE -DEGREASING | | | | | | | | | | |
| I/O TABLE SECTORS = | 124 | 125 | 115 | 142 | | | | | | |
| ECONOMIC CATEGORY = 7 CHEMICAL PRODUCTION | | | | | | | | | | |
| I/O TABLE SECTORS = | 73 | 74 | 75 | 76 | 77 | 71 | 79 | 80 | | |
| ECONOMIC CATEGORY = 8 METALLURGICAL PROCESSES | | | | | | | | | | |
| I/O TABLE SECTORS = | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 |
| | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 51 | | |
| ECONOMIC CATEGORY = 9 MINERALS PRODUCTION | | | | | | | | | | |
| I/O TABLE SECTORS = | 81 | 82 | 83 | 84 | 85 | 39 | 40 | 43 | 44 | |
| ECONOMIC CATEGORY = 10 FOOD AND AGRICULTURE PROCESSING | | | | | | | | | | |
| I/O TABLE SECTORS = | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 |
| | 62 | | | | | | | | | |
| ECONOMIC CATEGORY = 11 PESTICIDES PRODUCTION | | | | | | | | | | |
| I/O TABLE SECTORS = | 72 | | | | | | | | | |
| ECONOMIC CATEGORY = 12 WOOD PROCESSSING | | | | | | | | | | |
| I/O TABLE SECTORS = | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | | |
| ECONOMIC CATEGORY = 13 COMBUSTION OF FUELS IN ORCHARD HEATERS | | | | | | | | | | |
| I/O TABLE SECTORS = | 20 | 21 | 22 | 23 | 24 | | | | | |
| ECONOMIC CATEGORY = 14 FARMING OPERATIONS | | | | | | | | | | |
| I/O TABLE SECTORS = | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | | |
| ECONOMIC CATEGORY = 15 CONSTRUCTION AND DEMOLITION | | | | | | | | | | |
| I/O TABLE SECTORS = | 45 | 46 | 47 | 48 | 49 | 50 | | | | |
| ECONOMIC CATEGORY = 16 OTHER ORGANIC SOLVENT USE | | | | | | | | | | |
| I/O TABLE SECTORS = | 74 | 75 | 76 | 77 | | | | | | |
| ECONOMIC CATEGORY = 17 COMBUSTION OF FUELS IN MISC. INDUSTRIES | | | | | | | | | | |
| I/O TABLE SECTORS = | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 |
| | 113 | 114 | 116 | 117 | 118 | 133 | 134 | 135 | 136 | 137 |
| | 139 | 140 | 141 | 143 | 144 | 145 | 146 | 147 | 148 | 149 |
| | 150 | 151 | 152 | 126 | 127 | 129 | 130 | | | |
| ECONOMIC CATEGORY = 18 COMBUSTION OF FUELS IN POWER PLANTS | | | | | | | | | | |
| I/O TABLE SECTORS = | 128 | | | | | | | | | |
| ECONOMIC CATEGORY = 19 TRANSPORTATION FUEL USE IN TRUCKS AND BUSES | | | | | | | | | | |
| I/O TABLE SECTORS = | 120 | 121 | | | | | | | | |
| ECONOMIC CATEGORY = 20 AIRCRAFT | | | | | | | | | | |
| I/O TABLE SECTORS = | 123 | | | | | | | | | |
| ECONOMIC CATEGORY = 21 RAILROADS | | | | | | | | | | |
| I/O TABLE SECTORS = | 119 | | | | | | | | | |
| ECONOMIC CATEGORY = 22 SHIPS | | | | | | | | | | |
| I/O TABLE SECTORS = | 122 | | | | | | | | | |

ing exception is noted.

In certain cases the Air Basin Summary Data showed zero entries where the emissions inventory data had entries present. In these cases the zero control of the summary data was ignored and the emissions inventory data were entered. The overall emissions totals were then adjusted proportionally to bring the totals for the input-output sectors and the air basin summary totals into agreement. In all cases the grand totals of the air basin summary emissions sheets were taken as limiting.

(v) Forming the Statewide Emission Coefficients for Input-Output Sectors

When the input-output sector emission data were adjusted to agree with the overall totals provided by the sums of the air basin summary data for the fourteen air basins, the total levels of each of the five pollutants in tons were divided by the gross output or production level in millions of dollars for each sector.

The coefficients were thus calculated in tons of pollutant for each of the 5 critical pollutants per million dollars of product output for each of the 152 productive sectors of the model. These statewide pollutant coefficients are shown in Table 10.

Table 10

POLLUTION COEFFICIENTS IN TONS PER MILLION DOLLARS OF PRODUCTION

| CALIFORNIA I/O TABLE SECTORS | PART. | SOX | NOX | HC | CO |
|---|---|---|---|---|---|
| 1 DAIRIES | 8.620625 | 2.229085 | 5.016844 | .004679 | 5.925510 |
| 2 BROILERS, CHICKENS AND EGGS | 1.720504 | 1.575402 | 1.190188 | .001727 | 4.691657 |
| 3 TURKEYS AND OTHER POULTRY | .359425 | .623003 | .247604 | .071885 | .662939 |
| 4 CATTLE AND CALVES | 4.322647 | 1.169855 | 2.506463 | .003878 | 6.982937 |
| 5 HOGS | 1.595238 | .333333 | .833333 | .214286 | 2.357143 |
| 6 SHEEP, LAMBS, AND WOOL | 2.757009 | 1.121495 | 1.464174 | 1.012461 | 15.716511 |
| 7 MISC. LIVESTOCK | 15.465116 | 4.069767 | 8.720930 | 2.558140 | 28.372093 |
| 8 APIARY PRODUCTS | 1.139896 | 0. | .414508 | .984456 | 16.632124 |
| 9 COTTON | 12.590698 | 2.304032 | 7.197573 | .009516 | 14.026407 |
| 10 WHEAT | 10.622896 | 1.868687 | 6.043771 | .004209 | 11.022727 |
| 11 RICE | 19.865772 | 3.557047 | 11.250763 | .006101 | 7.565589 |
| 12 BARLEY | 15.401003 | 2.731830 | 8.796992 | .006266 | 16.033835 |
| 13 CORN | 40.206704 | 6.854749 | 22.905028 | .033520 | 53.089385 |
| 14 HAY AND PASTURE | 6.679502 | 1.386215 | 3.865999 | .006418 | 12.854576 |
| 15 OATS | 20.571429 | 3.642857 | 11.857143 | 2.357143 | 21.785714 |
| 16 SORGHUM GRAIN | 24.908257 | 4.266055 | 14.197248 | .022936 | 41.399083 |
| 17 GRASS SEED | 4.796748 | 1.002710 | 2.899729 | .867209 | 10.243902 |
| 18 FOOD, FEED GRAINS, NEC | 55.000000 | 10.000000 | 32.500000 | 7.500000 | 70.000000 |
| 19 TOBACCO | 0. | 0. | 0. | 0. | 0. |
| 20 WALNUTS | 12.126277 | 2.070566 | 6.898793 | .009285 | 25.849582 |
| 21 ALMONDS | 8.076285 | 1.647319 | 4.643449 | .016584 | 25.494748 |
| 22 NONCITRUS FRUITS | 4.648765 | .832282 | 2.667458 | .005934 | 10.914621 |
| 23 CITRUS FRUITS | 2.529700 | .489168 | 1.465176 | .002329 | 9.415327 |
| 24 FRUIT AND TREE NUTS, NEC | 20.000000 | 1.818182 | 6.363636 | 2.727273 | 24.545455 |
| 25 VEGETABLES | 6.792695 | 1.132829 | 3.896419 | .007847 | 16.518048 |
| 26 DRIED BEANS | 1.284672 | .233577 | .759124 | .919708 | 15.459854 |
| 27 DRIED PEAS | 0. | 0. | 0. | 0. | 0. |
| 28 MELONS | 4.328231 | .688776 | 2.491497 | .008503 | 16.836735 |
| 29 SUGAR BEETS | 13.687269 | 2.419440 | 7.797147 | .015848 | 15.404120 |
| 30 HOPS | 0. | 0. | 0. | 0. | 1.333333 |
| 31 POTATOES | 7.623656 | 1.387097 | 4.290323 | .860215 | 7.623656 |
| 32 SWEET POTATOES | 2.513966 | .335196 | 1.061453 | .223464 | 1.787709 |
| 33 VEGETABLES + SUGAR, NEC | 0. | 0. | 0. | 0. | 0. |
| 34 SAFFLOWER | 4.682540 | .820106 | 2.539683 | .476190 | 3.862434 |
| 35 OIL CROPS, NEC | 0. | 0. | 0. | 0. | 0. |
| 36 GREENHOUSE AND NURSERY PRODUCTS | 3.143477 | 8.677572 | 3.772172 | .001971 | 1.052424 |
| 37 FORESTRY AND FISHERY PRODUCTS | 44.855430 | 7.145236 | 25.825518 | .066596 | 143.093401 |
| 38 AGRIC., FORESTRY, FISHERY SERV | 25.441049 | 0. | .063144 | .002310 | .006160 |
| 39 METALS MINING | 9.537755 | 3.403514 | 3.387684 | .007915 | .427418 |
| 40 COAL MINING | 0. | 0. | 0. | 0. | 0. |
| 41 CRUDE PETROLEUM | 3.830655 | .550780 | .339778 | 56.863851 | .064898 |
| 42 NATURAL GAS + N.G. LIQUIDS | .041920 | 0. | .041920 | 20.603647 | .014971 |
| 43 STONE + CLAY MIN + QUARRY | 89.770462 | .233429 | .658951 | .002432 | .145893 |
| 44 CHEM + FERT MINERAL MIN | 86.480509 | 0. | 2.833840 | .027647 | .131324 |
| 45 NEW CONSTRUCT, RESIDENT | 1.136928 | .331430 | 1.209714 | .631714 | 9.251941 |
| 46 NEW CONSTRUCT, NONRESIDENT | .006342 | 0. | .004628 | .003085 | 0. |
| 47 NEW CONSTRUCT, PUBLIC UTILITY | 6.530745 | 2.083531 | 6.799518 | 1.143368 | 8.297005 |
| 48 NEW CONSTRUCT, HIGHWAYS | .084180 | 0. | 0. | .050972 | 0. |
| 49 NEW CONSTRUCT, ALL OTHER | .461673 | 0. | .001958 | .328508 | 0. |
| 50 MAIN. AND REPAIR CONSTRUCTION | .047818 | 0. | .001316 | .032244 | .000219 |
| 51 ORDNANCE + GUIDED MISSILES | .016373 | .151175 | .070130 | .006276 | .002456 |
| 52 MEAT PRODUCTS | .097482 | .005416 | 0. | .010470 | 0. |
| 53 DAIRY PRODUCTS | .121206 | .003687 | .000461 | .002765 | .006913 |
| 54 CANNED AND FROZEN FOODS | .157641 | .064692 | .001434 | .027971 | .042889 |
| 55 GRAIN MILL PRODUCTS | 12.519020 | .023464 | .001422 | .027730 | .027730 |

Table 10 - Cont.

| | PART. | SOX | NOX | HC | CO |
|---|---|---|---|---|---|
| 56 BAKERY PRODUCTS | .186317 | .020994 | 0. | .000875 | .000875 |
| 57 SUGAR | 3.904869 | 1.309122 | .014998 | .989876 | .162837 |
| 58 CONFECTIONARY PRODUCTS | 6.611655 | .349243 | .003424 | 2.639869 | .037663 |
| 59 BEVERAGES AND FLAVORINGS | .040622 | .016587 | .000339 | .003385 | .001354 |
| 60 MISC FOOD PRODUCTS | .672645 | .051782 | .009368 | .247981 | .397342 |
| 61 TOBACCO MANUFACTURERS | 0. | 0. | 0. | 0. | 0. |
| 62 TEXTILE PRODUCTS | .100230 | .024998 | .000238 | .216172 | .007618 |
| 63 LOGGING CAMPS + SAWMILLS | 5.546309 | .518553 | .059648 | .266973 | 2.737558 |
| 64 MILLWORK, PLYWOOD + OTHER WOOD PRODUCTS | 1.332463 | 1.148887 | .011718 | .084813 | .117176 |
| 65 WOODEN CONTAINERS | .048239 | 0. | 0. | .067535 | 0. |
| 66 HOUSEHOLD FURNITURE | .159309 | 0. | 0. | .247175 | 0. |
| 67 OFFICE FURNITURE AND FIXTURES | .180765 | .014122 | 0. | .207598 | .001412 |
| 68 PAPER + PAPERBOARD PRODUCTS | .661900 | .793718 | .016873 | .089987 | .456265 |
| 69 NEWSPAPERS | .003819 | .016233 | .001910 | .002865 | .001910 |
| 70 OTHER PRINTING AND PUBLISHING | .015117 | .017805 | .000672 | .110523 | .001344 |
| 71 INDUSTRIAL CHEMICALS | 3.668761 | 10.677433 | 2.571117 | .126566 | .563192 |
| 72 AGRICULTURAL CHEMICALS | .524896 | 3.872941 | 2.388558 | 36.571132 | .143359 |
| 73 GUM AND WOOD CHEMICALS | 17.838478 | 25.765452 | .921190 | 19.460665 | 323.757229 |
| 74 PLASTICS MATERIALS AND SYNTHETIC FIBERS | 1.443013 | .008002 | 1.242965 | 64.498146 | .034675 |
| 75 DRUGS | .409858 | .035468 | .580632 | 69.632442 | .049919 |
| 76 CLEANING AND TOILET PREPARATIONS | 1.054182 | .002845 | .157203 | .950328 | .009959 |
| 77 PAINTS AND ALLIED PRODUCTS | .115358 | 0. | .010815 | 1.274949 | 0. |
| 78 PETROLEUM REFINING AND RELATED PRODUCTS | .264044 | 3.061326 | 1.314723 | 4.849889 | 3.444942 |
| 79 RUBBER AND PLASTICS PRODUCTS | 1.322067 | .449286 | .176457 | 2.972955 | .015949 |
| 80 LEATHER TANNING AND PRODUCTS | .097677 | 0. | .048838 | .160469 | .003488 |
| 81 GLASS | 9.388302 | .797980 | 2.192166 | .149703 | .643070 |
| 82 CEMENT AND CONCRETE PRODUCTS | 50.836070 | 9.358253 | 15.592317 | .144042 | 3.372013 |
| 83 STRUCTURAL CLAY PRODUCTS | 21.318664 | .645779 | 7.884876 | .127561 | 2.375827 |
| 84 POTTERY AND RELATED PRODUCTS | 1.086133 | .042098 | .143134 | .117875 | 0. |
| 85 MISC STONE AND CLAY PRODUCTS | 13.741236 | .633981 | 1.814927 | .034807 | 16.754512 |
| 86 BLAST FURNACES AND BASIC STEEL PRODUCTS | 2.764276 | 11.399613 | 2.286267 | .227444 | 41.396387 |
| 87 IRON AND STEEL FOUNDRIES AND FORGINGS | 3.621395 | .387132 | .269522 | .044104 | 13.922035 |
| 88 PRIMARY NONFERROUS METAL PRODUCTS | .259919 | .537914 | .160502 | .011531 | .026802 |
| 89 METAL CONTAINERS | .289863 | .017211 | .190223 | .240949 | .066125 |
| 90 HEATING APPARATUS AND PLUMBING FIXTURES | .103313 | 0. | .007125 | .053438 | .007125 |
| 91 FABRICATED STRUCTURAL STEEL | .103380 | .002461 | .006400 | .030522 | 0. |
| 92 SCREW MACHINE PRODUCTS | 0. | 0. | 0. | .013064 | 0. |
| 93 METAL STAMPINGS | .518069 | 0. | 1.295172 | .033972 | .464988 |
| 94 CUTLERY, HAND TOOLS AND GENERAL HARDWARE | .073601 | .007830 | .037583 | .059507 | .305365 |
| 95 OTHER FABRICATED METAL PRODUCTS | .125829 | .023165 | .046857 | .057913 | .055281 |
| 96 ENGINES, TURBINES AND GENERATORS | .050077 | 0. | .004552 | .015934 | .117227 |
| 97 FARM MACHINERY | .024602 | 0. | 0. | .013668 | 0. |
| 98 CONSTRUCTION + MATERIAL HANDLING EQUIP | .138381 | 0. | .025535 | .023063 | .070838 |
| 99 METAL WORKING MACHINERY | .019358 | .038716 | .005807 | .007743 | .002904 |
| 100 SPECIAL INDUSTRIAL MACHINERY | .071065 | .068735 | .026795 | .026795 | 0. |
| 101 GENERAL INDUSTRIAL MACHINERY | .011279 | 0. | .003471 | .011279 | 0. |
| 102 MACHINE SHOP PRODUCTS | .011864 | 0. | 0. | .003650 | 0. |
| 103 COMPUTERS AND OFFICE EQUIPMENT | 1.971799 | 0. | .000356 | .001778 | 0. |
| 104 SERVICE INDUSTRY MACHINES | .078296 | .140933 | .630285 | .183996 | .003915 |
| 105 ELECTRIC TRANSMISSION EQUIPMENT | .011944 | 0. | 0. | .014115 | 0. |
| 106 ELECTRICAL INDUSTRIAL APPARATUS | .047616 | .001642 | .029555 | .045974 | 0. |
| 107 HOUSEHOLD APPLIANCES | .087734 | 0. | .070753 | .650931 | 0. |
| 108 ELECTRIC LIGHTING AND WIRING | .060533 | 0. | 0. | .198893 | 0. |
| 109 RADIO AND TV RECEIVING SETS | .016878 | 0. | .004603 | .070579 | 0. |
| 110 COMMUNICATION EQUIPMENT | .005376 | .013116 | .035263 | .015051 | 0. |
| 111 ELECTRONIC COMPONENTS | .039692 | .007145 | .047366 | .192903 | 0. |
| 112 MISC ELECTRICAL PRODUCTS | .316811 | .006741 | .002247 | .040444 | 0. |
| 113 MOTOR VEHICLES | .081471 | .002839 | .037131 | 1.805895 | .000655 |
| 114 AIRCRAFT | .017994 | .012508 | .053652 | .152728 | .000658 |
| 115 SHIP AND BOAT BUILDING AND REPAIRING | .086110 | .006624 | .043528 | 28.679302 | 0. |
| 116 OTHER TRANSPORTATION EQUIPMENT | .057832 | 0. | .008897 | .147917 | 0. |
| 117 CLOCKS AND SCIENTIFIC EQUIPMENT | .017836 | .011772 | .023187 | .362073 | 0. |

Table 10 - Cont.

| | | PART. | SOX | NOX | HC | CO |
|---|---|---|---|---|---|---|
| 118 | JEWELRY, SPORTING GOODS, ETC. | 1.029252 | .125731 | .446745 | .223373 | .001338 |
| 119 | RAILROADS | 2.202032 | 3.684284 | 23.551268 | 9.680669 | 10.596570 |
| 120 | LOCAL TRANSIT AND INTERCITY BUSES | 5.821285 | 5.113224 | 49.580775 | 82.692942 | 1186.447811 |
| 121 | TRUCK TRANSPORTATION | 8.295922 | 7.382476 | 70.286246 | 70.327131 | 269.630507 |
| 122 | WATER TRANSPORTATION | 1.164477 | 12.025803 | 6.692737 | 1.204586 | 2.429894 |
| 123 | AIR TRANSPORTATION | 2.846873 | .639332 | 4.486792 | 12.093364 | 42.777499 |
| 124 | PIPELINE TRANSPORTATION | .014098 | .028197 | .155082 | 224.319752 | .056394 |
| 125 | TRANSPORTATION SERVICES | .002259 | .128773 | .056479 | .103922 | .015814 |
| 126 | COMMUNICATION EXCEPT RADIO AND TV | .046638 | .225644 | .566167 | .126710 | .702651 |
| 127 | RADIO AND TELEVISION BROADCASTING | .017831 | .518301 | .353063 | .011888 | .035663 |
| 128 | ELECTRIC COMPANIES AND SYSTEMS | 5.661698 | 21.430376 | 19.529639 | 1.019663 | 2.581649 |
| 129 | GAS COMPANIES AND SYSTEMS | 0. | .000575 | .013598 | .010150 | 0. |
| 130 | WATER AND SANITARY SERVICES | 5.235291 | 12.681979 | 9.566179 | .517267 | .925549 |
| 131 | WHOLESALE TRADE | .103337 | .003030 | .275866 | 11.326046 | .004258 |
| 132 | RETAIL TRADE | .002474 | 0. | .004124 | .478644 | .000165 |
| 133 | BANKING AND FINANCIAL INTERMEDIARIES | .065653 | .648870 | .875878 | .108911 | .568287 |
| 134 | INSURANCE | 0. | 0. | .000158 | .000158 | 0. |
| 135 | OWNER OCCUPIED REAL ESTATE | 0. | 0. | 0. | 0. | 0. |
| 136 | REAL ESTATE | .143790 | .262626 | 1.612788 | .420086 | 2.356400 |
| 137 | HOTELS AND LODGING PLACES | .003057 | 0. | .113122 | .000764 | 0. |
| 138 | PERSONAL AND REPAIR SERVICES | .009028 | .016972 | .011917 | 9.646399 | .001806 |
| 139 | MISCELLANEOUS BUSINESS SERVICES | .010520 | .000277 | .004429 | .003599 | .000185 |
| 140 | ADVERTISING | .000860 | 0. | 0. | .003441 | 0. |
| 141 | MISC PROFESSIONAL SERVICES | .009651 | .014223 | .065697 | .002201 | 0. |
| 142 | AUTOMOBILE REPAIR | .032994 | .000303 | .000605 | 7.161819 | .005751 |
| 143 | MOTION PICTURES | .001328 | .005312 | .009961 | .008411 | 0. |
| 144 | AMUSEMENT AND RECREATION SERVICES | .004368 | 0. | .031013 | .002621 | 0. |
| 145 | DOCTORS AND DENTISTS | .058746 | .043370 | .640690 | .180182 | 1.015246 |
| 146 | HOSPITALS | .074719 | .290766 | .420050 | .004424 | .000983 |
| 147 | OTHER MEDICAL SERVICES | .132162 | 2.324424 | 2.060529 | .102125 | .414080 |
| 148 | EDUCATIONAL SERVICES | .177143 | .463869 | 1.483637 | .025002 | .001596 |
| 149 | NONPROFIT ORGANIZATIONS | .015790 | .029258 | .091954 | .005109 | .000464 |
| 150 | POST OFFICE | .078853 | .210565 | .909847 | .220963 | 1.233926 |
| 151 | OTHER FEDERAL GOVT ENTERPRISES | .655583 | .403839 | 1.444905 | .870614 | .039335 |
| 152 | STATE AND LOCAL GOVT ENTERPRISES | 2.977226 | 34.128567 | 40.657391 | 3.700092 | 18.307857 |
| 153 | NONCOMPETITIVE IMPORTS | 0. | 0. | 0. | 0. | 0. |
| 154 | DUMMY INDUSTRIES | 0. | 0. | 0. | 0. | 0. |
| 155 | GOVERNMENT INDUSTRY | 0. | 0. | 0. | 0. | 0. |
| 156 | SPECIAL INDUSTRIES | 0. | 0. | 0. | 0. | 0. |
| 157 | TOTAL INTERMEDIATE INPUTS | 0. | 0. | 0. | 0. | 0. |
| 158 | EMPLOYEE COMPENSATION | 0. | 0. | 0. | 0. | 0. |
| 159 | PROFIT TYPE INCOME | 0. | 0. | 0. | 0. | 0. |
| 160 | NET INTEREST | 0. | 0. | 0. | 0. | 0. |
| 161 | INDIRECT BUSINESS TAXES | 0. | 0. | 0. | 0. | 0. |
| 162 | CAPITAL CONSUMPTION ALLOWANCES | 0. | 0. | 0. | 0. | 0. |
| 163 | TOTAL VALUE ADDED | 0. | 0. | 0. | 0. | 0. |
| 164 | GROSS INPUT = GROSS OUTPUT | 0. | 0. | 0. | 0. | 0. |

11. Developing the Emission Coefficients for Air Basins

(i) The Emissions Inventory Data

For the statewide model the emissions inventory data were relatively complete in terms of SIC code coverage. For those sectors where no basic emissions data were available, recourse could be made to the fuel combustion data derived for input-output sectors.

At the air basin level the basic emissions inventory data became rather sparse and the fuel combustion data by sector were not available. In view of this a procedure for estimating pollutant levels by detailed sector based on statewide averages had to be devised.

A computer program was written to sort the emissions inventory data into input-output sectors by air basin. As an example, the emissions inventory array for the five pollutants for the San Diego air basin is shown as Table 11. The columns of the array are totaled for each of the five pollutants, permitting a comparison with the totals of the air basin summary data.

(ii) The Air Basin Summary Emissions Data

The summary emissions data for each of the 22 economic categories of the air basins were converted to tons per year. These data are shown in Table 12 along with the basin totals for each pollutant. When the totals of the summary data of Table 12 are compared with the totals of Table 11 it is seen that only 1% of the CO emission is covered by the emissions inventory data along with some 15% of the particulates. Similarly only 27% of the NOx emissions are covered. Approximately 67% of the SOx emissions are covered by the inventory data.

Table 11

EMISSIONS INVENTORY DATA IN TONS/YEAR SAN DIEGO AIR BASIN

| | PART. | SOX | NOX | HC | CO |
|---|---|---|---|---|---|
| 1 DAIRIES | 0 | 0 | 0 | 0 | 0 |
| 2 BROILERS, CHICKENS AND EGGS | 0 | 0 | 0 | 0 | 0 |
| 3 TURKEYS AND OTHER POULTRY | 0 | 0 | 0 | 0 | 0 |
| 4 CATTLE AND CALVES | 0 | 0 | 0 | 0 | 0 |
| 5 HOGS | 0 | 0 | 0 | 0 | 0 |
| 6 SHEEP, LAMBS, AND WOOL | 0 | 0 | 0 | 0 | 0 |
| 7 MISC. LIVESTOCK | 0 | 0 | 0 | 0 | 0 |
| 8 APIARY PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 9 COTTON | 0 | 0 | 0 | 0 | 0 |
| 10 WHEAT | 0 | 0 | 0 | 0 | 0 |
| 11 RICE | 0 | 0 | 0 | 0 | 0 |
| 12 BARLEY | 0 | 0 | 0 | 0 | 0 |
| 13 CORN | 0 | 0 | 0 | 0 | 0 |
| 14 HAY AND PASTURE | 0 | 0 | 0 | 0 | 0 |
| 15 OATS | 0 | 0 | 0 | 0 | 0 |
| 16 SORGHUM GRAIN | 0 | 0 | 0 | 0 | 0 |
| 17 GRASS SEED | 0 | 0 | 0 | 0 | 0 |
| 18 FOOD, FEED GRAINS, NEC | 0 | 0 | 0 | 0 | 0 |
| 19 TOBACCO | 0 | 0 | 0 | 0 | 0 |
| 20 WALNUTS | 0 | 0 | 0 | 0 | 0 |
| 21 ALMONDS | 0 | 0 | 0 | 0 | 0 |
| 22 NONCITRUS FRUITS | 0 | 0 | 0 | 0 | 0 |
| 23 CITRUS FRUITS | 0 | 0 | 0 | 0 | 0 |
| 24 FRUIT AND TREE NUTS, NEC | 0 | 0 | 0 | 0 | 0 |
| 25 VEGETABLES | 0 | 0 | 0 | 0 | 0 |
| 26 DRIED BEANS | 0 | 0 | 0 | 0 | 0 |
| 27 DRIED PEAS | 0 | 0 | 0 | 0 | 0 |
| 28 MELONS | 0 | 0 | 0 | 0 | 0 |
| 29 SUGAR BEETS | 0 | 0 | 0 | 0 | 0 |
| 30 HOPS | 0 | 0 | 0 | 0 | 0 |
| 31 POTATOES | 0 | 0 | 0 | 0 | 0 |
| 32 SWEET POTATOES | 0 | 0 | 0 | 0 | 0 |
| 33 VEGETABLES + SUGAR, NEC | 0 | 0 | 0 | 0 | 0 |
| 34 SAFFLOWER | 0 | 0 | 0 | 0 | 0 |
| 35 OIL CROPS, NEC | 0 | 0 | 0 | 0 | 0 |
| 36 GREENHOUSE AND NURSERY PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 37 FORESTRY AND FISHERY PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 38 AGRIC., FORESTRY, FISHERY SERV | 0 | 0 | 0 | 0 | 0 |
| 39 METALS MINING | 0 | 0 | 0 | 0 | 0 |
| 40 COAL MINING | 0 | 0 | 0 | 0 | 0 |
| 41 CRUDE PETROLEUM | 0 | 0 | 0 | 0 | 0 |
| 42 NATURAL GAS + N.G. LIQUIDS | 0 | 0 | 0 | 0 | 0 |
| 43 STONE + CLAY MIN + QUARRY | 4036 | 0 | 13 | 0 | 0 |
| 44 CHEM + FERT MINERAL MIN | 0 | 0 | 0 | 0 | 0 |
| 45 NEW CONSTRUCT, RESIDENT | 0 | 0 | 0 | 0 | 0 |
| 46 NEW CONSTRUCT, NONRESIDENT | 0 | 0 | 0 | 0 | 0 |
| 47 NEW CONSTRUCT, PUBLIC UTILITY | 0 | 0 | 0 | 0 | 0 |
| 48 NEW CONSTRUCT, HIGHWAYS | 0 | 0 | 0 | 0 | 0 |
| 49 NEW CONSTRUCT, ALL OTHER | 0 | 0 | 0 | 4 | 0 |
| 50 MAIN. AND REPAIR CONSTRUCTION | 0 | 0 | 0 | 1 | 0 |
| 51 ORDNANCE + GUIDED MISSILES | 0 | 0 | 19 | 136 | 0 |
| 52 MEAT PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 53 DAIRY PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 54 CANNED AND FROZEN FOODS | 0 | 0 | 0 | 0 | 0 |
| 55 GRAIN MILL PRODUCTS | 32 | 0 | 0 | 0 | 0 |
| 56 BAKERY PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 57 SUGAR | 0 | 0 | 0 | 0 | 0 |
| 58 CONFECTIONARY PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 59 BEVERAGES AND FLAVORINGS | 0 | 0 | 0 | 0 | 0 |
| 60 MISC FOOD PRODUCTS | 0 | 0 | 0 | 0 | 0 |

Table 11 - Cont.

| | PART. | SOX | NOX | HC | CO |
|---|---|---|---|---|---|
| 61 TOBACCO MANUFACTURERS | 0 | 0 | 0 | 0 | 0 |
| 62 TEXTILE PRODUCTS | 0 | 0 | 0 | 12 | 0 |
| 63 LOGGING CAMPS + SAWMILLS | 0 | 0 | 0 | 0 | 0 |
| 64 MILLWORK, PLYWOOD + OTHER WOOD PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 65 WOODEN CONTAINERS | 0 | 0 | 0 | 0 | 0 |
| 66 HOUSEHOLD FURNITURE | 0 | 0 | 0 | 399 | 0 |
| 67 OFFICE FURNITURE AND FIXTURES | 0 | 0 | 0 | 9 | 0 |
| 68 PAPER + PAPERBOARD PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 69 NEWSPAPERS | 0 | 0 | 0 | 0 | 0 |
| 70 OTHER PRINTING AND PUBLISHING | 0 | 0 | 0 | 0 | 0 |
| 71 INDUSTRIAL CHEMICALS | 31 | 0 | 0 | 0 | 0 |
| 72 AGRICULTURAL CHEMICALS | 0 | 0 | 0 | 0 | 0 |
| 73 GUM AND WOOD CHEMICALS | 0 | 0 | 0 | 3 | 0 |
| 74 PLASTICS MATERIALS AND SYNTHETIC FIBERS | 0 | 0 | 0 | 0 | 0 |
| 75 DRUGS | 46 | 211 | 267 | 4122 | 10 |
| 76 CLEANING AND TOILET PREPARATIONS | 0 | 0 | 0 | 0 | 0 |
| 77 PAINTS AND ALLIED PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 78 PETROLEUM REFINING AND RELATED PRODUCTS | 9 | 0 | 0 | 0 | 0 |
| 79 RUBBER AND PLASTICS PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 80 LEATHER TANNING AND PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 81 GLASS | 0 | 0 | 0 | 20 | 0 |
| 82 CEMENT AND CONCRETE PRODUCTS | 65 | 0 | 3 | 0 | 0 |
| 83 STRUCTURAL CLAY PRODUCTS | 19 | 0 | 0 | 0 | 0 |
| 84 POTTERY AND RELATED PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 85 MISC STONE AND CLAY PRODUCTS | 4 | 0 | 0 | 0 | 0 |
| 86 BLAST FURNACES AND BASIC STEEL PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 87 IRON AND STEEL FOUNDRIES AND FORGINGS | 0 | 0 | 0 | 0 | 0 |
| 88 PRIMARY NONFERROUS METAL PRODUCTS | 0 | 0 | 0 | 86 | 0 |
| 89 METAL CONTAINERS | 0 | 0 | 0 | 54 | 0 |
| 90 HEATING APPARATUS AND PLUMBING FIXTURES | 0 | 0 | 0 | 0 | 0 |
| 91 FABRICATED STRUCTURAL STEEL | 0 | 0 | 0 | 0 | 0 |
| 92 SCREW MACHINE PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 93 METAL STAMPINGS | 0 | 0 | 0 | 10 | 0 |
| 94 CUTLERY, HAND TOOLS AND GENERAL HARDWARE | 0 | 0 | 0 | 0 | 0 |
| 95 OTHER FABRICATED METAL PRODUCTS | 0 | 0 | 0 | 120 | 0 |
| 96 ENGINES, TURBINES AND GENERATORS | 0 | 0 | 5 | 309 | 67 |
| 97 FARM MACHINERY | 0 | 0 | 0 | 0 | 0 |
| 98 CONSTRUCTION + MATERIAL HANDLING EQUIP | 0 | 0 | 0 | 20 | 0 |
| 99 METAL WORKING MACHINERY | 0 | 0 | 0 | 0 | 0 |
| 100 SPECIAL INDUSTRIAL MACHINERY | 0 | 0 | 0 | 0 | 0 |
| 101 GENERAL INDUSTRIAL MACHINERY | 0 | 0 | 0 | 0 | 0 |
| 102 MACHINE SHOP PRODUCTS | 9 | 0 | 0 | 53 | 0 |
| 103 COMPUTERS AND OFFICE EQUIPMENT | 0 | 0 | 0 | 11 | 0 |
| 104 SERVICE INDUSTRY MACHINES | 0 | 0 | 0 | 7 | 0 |
| 105 ELECTRIC TRANSMISSION EQUIPMENT | 0 | 0 | 0 | 0 | 0 |
| 106 ELECTRICAL INDUSTRIAL APPARATUS | 0 | 0 | 0 | 0 | 0 |
| 107 HOUSEHOLD APPLIANCES | 0 | 0 | 0 | 0 | 0 |
| 108 ELECTRIC LIGHTING AND WIRING | 0 | 0 | 0 | 0 | 0 |
| 109 RADIO AND TV RECEIVING SETS | 0 | 0 | 0 | 0 | 0 |
| 110 COMMUNICATION EQUIPMENT | 0 | 0 | 0 | 0 | 0 |
| 111 ELECTRONIC COMPONENTS | 0 | 0 | 0 | 515 | 0 |
| 112 MISC ELECTRICAL PRODUCTS | 0 | 0 | 0 | 0 | 0 |
| 113 MOTOR VEHICLES | 0 | 0 | 0 | 0 | 0 |
| 114 AIRCRAFT | 3 | 14 | 110 | 1170 | 103 |
| 115 SHIP AND BOAT BUILDING AND REPAIRING | 7 | 0 | 2 | 825 | 0 |
| 116 OTHER TRANSPORTATION EQUIPMENT | 0 | 0 | 0 | 0 | 0 |
| 117 CLOCKS AND SCIENTIFIC EQUIPMENT | 0 | 0 | 1 | 122 | 0 |
| 118 JEWELRY, SPORTING GOODS, ETC. | 0 | 0 | 0 | 147 | 0 |
| 119 RAILROADS | 0 | 0 | 0 | 0 | 0 |
| 120 LOCAL TRANSIT AND INTERCITY BUSES | 0 | 0 | 0 | 0 | 0 |
| 121 TRUCK TRANSPORTATION | 0 | 0 | 0 | 3 | 0 |
| 122 WATER TRANSPORATATION | 0 | 0 | 0 | 0 | 0 |

Table 11 - Cont.

| | PART. | SOX | NOX | HC | CO |
|---|---|---|---|---|---|
| 123 AIR TRANSPORTATION | 0 | 0 | 0 | 46 | 0 |
| 124 PIPELINE TRANSPORTATION | 0 | 0 | 0 | 0 | 0 |
| 125 TRANSPORTATION SERVICES | 0 | 0 | 0 | 0 | 0 |
| 126 COMMUNICATION EXCEPT RADIO AND TV | 0 | 0 | 0 | 0 | 0 |
| 127 RADIO AND TELEVISION BROADCASTING | 0 | 0 | 0 | 0 | 0 |
| 128 ELECTRIC COMPANIES AND SYSTEMS | 1826 | 11735 | 9335 | 258 | 1316 |
| 129 GAS COMPANIES AND SYSTEMS | 0 | 0 | 0 | 0 | 0 |
| 130 WATER AND SANITARY SERVICES | 143 | 475 | 390 | 15 | 33 |
| 131 WHOLESALE TRADE | 41 | 0 | 1 | 627 | 14 |
| 132 RETAIL TRADE | 0 | 0 | 0 | 207 | 0 |
| 133 BANKING AND FINANCIAL INTERMEDIARIES | 0 | 0 | 0 | 0 | 0 |
| 134 INSURANCE | 0 | 0 | 0 | 0 | 0 |
| 135 OWNER OCCUPIED REAL ESTATE | 0 | 0 | 0 | 0 | 0 |
| 136 REAL ESTATE | 0 | 0 | 0 | 0 | 0 |
| 137 HOTELS AND LODGING PLACES | 0 | 0 | 0 | 0 | 0 |
| 138 PERSONAL AND REPAIR SERVICES | 8 | 5 | 6 | 480 | 3 |
| 139 MISCELLANEOUS BUSINESS SERVICES | 0 | 0 | 0 | 0 | 0 |
| 140 ADVERTISING | 0 | 0 | 0 | 0 | 0 |
| 141 MISC PROFESSIONAL SERVICES | 0 | 0 | 0 | 0 | 0 |
| 142 AUTOMOBILE REPAIR | 0 | 0 | 0 | 0 | 0 |
| 143 MOTION PICTURES | 0 | 0 | 0 | 0 | 0 |
| 144 AMUSEMENT AND RECREATION SERVICES | 0 | 0 | 0 | 0 | 0 |
| 145 DOCTORS AND DENTISTS | 0 | 0 | 0 | 0 | 0 |
| 146 HOSPITALS | 0 | 0 | 0 | 0 | 0 |
| 147 OTHER MEDICAL SERVICES | 0 | 0 | 0 | 0 | 0 |
| 148 EDUCATIONAL SERVICES | 0 | 1 | 31 | 0 | 0 |
| 149 NONPROFIT ORGANIZATIONS | 0 | 0 | 0 | 0 | 0 |
| 150 POST OFFICE | 0 | 0 | 0 | 0 | 0 |
| 151 OTHER FEDERAL GOVT ENTERPRISES | 0 | 0 | 0 | 24 | 0 |
| 152 STATE AND LOCAL GOVT ENTERPRISES | 0 | 0 | 0 | 0 | 0 |
| 153 NONCOMPETITIVE IMPORTS | 0 | 0 | 0 | 0 | 0 |
| 154 DUMMY INDUSTRIES | 0 | 0 | 0 | 0 | 0 |
| 155 GOVERNMENT INDUSTRY | 0 | 0 | 0 | 0 | 0 |
| 156 SPECIAL INDUSTRIES | 0 | 0 | 0 | 0 | 0 |
| 157 TOTAL INTERMEDIATE INPUTS | 0 | 0 | 0 | 0 | 0 |
| TOTAL, 157 170 SECTORS | 6279 | 12441 | 10183 | 9815 | 1546 |

Table 12

SUMMARY EMISSIONS DATA IN TONS/YEAR - SAN DIEGO AIR BASIN

| | PART. | SOX | NOX | HC | CO |
|---|---|---|---|---|---|
| 1 PETROLEUM PRODUCTION | 0. | 0. | 0. | 0. | 0. |
| 2 PETROLEUM REFINING | 0. | 0. | 0. | 0. | 0. |
| 3 PETROLEUM MARKETING | 0. | 0. | 0. | 7409.500000 | 0. |
| 4 ORGANIC SOLVENT USE - SURFACE COATING | 0. | 0. | 0. | 17775.500000 | 0. |
| 5 ORGANIC SOLVENT USE- DRY CLEANING | 0. | 0. | 0. | 1898.000000 | 0. |
| 6 ORGANIC SOLVENT USE -DEGREASING | 0. | 0. | 0. | 9891.500000 | 0. |
| 7 CHEMICAL PRODUCTION | 0. | 0. | 0. | 0. | 0. |
| 8 METALLURGICAL PROCESSES | 73.000000 | 0. | 0. | 0. | 0. |
| 9 MINERALS PRODUCTION | 7081.000000 | 0. | 36.500000 | 0. | 0. |
| 10 FOOD AND AGRICULTURE PROCESSING | 584.000000 | 0. | 0. | 0. | 0. |
| 11 PESTICIDES PRODUCTION | 0. | 0. | 0. | 693.500000 | 0. |
| 12 WOOD PROCESSSING | 0. | 0. | 0. | 0. | 0. |
| 13 COMBUSTION OF FUELS IN ORCHARD HEATER | 0. | 0. | 0. | 109.500000 | 0. |
| 14 FARMING OPERATIONS | 1496.500000 | 0. | 0. | 0. | 0. |
| 15 CONSTRUCTION AND DEMOLITION | 24147.000000 | 0. | 0. | 0. | 0. |
| 16 OTHER ORGANIC SOLVENT USE | 0. | 0. | 0. | 5329.000000 | 0. |
| 17 COMBUSTION OF FUELS IN MISC. INDUSTRI | 219.000000 | 693.500000 | 1204.500000 | 109.500000 | 146.000000 |
| 18 COMBUSTION OF FUELS IN POWER PLANTS | 3102.500000 | 12665.500000 | 10220.000000 | 219.000000 | 1131.500000 |
| 19 TRANSPORTATION FUEL USE IN TRUCKS AND | 2080.500000 | 1314.000000 | 21389.000000 | 17191.500000 | 122092.500000 |
| 20 AIRCRAFT | 1606.000000 | 0. | 2737.500000 | 3248.500000 | 7300.000000 |
| 21 RAILROADS | 36.500000 | 109.500000 | 766.500000 | 182.500000 | 255.500000 |
| 22 SHIPS | 328.500000 | 3650.000000 | 1423.500000 | 109.500000 | 328.500000 |
| TOTALS | 41354.500000 | 18432.500000 | 37777.500000 | 64167.000000 | 131254.000000 |

(iii) Merging and Adjusting the Data

To overcome the disparities between the basic emissions inventory data and the summary data which the comparisons reveal, the statewide coefficients were applied to each input-output sector of the air basin where the emissions inventory showed zero pollutants. The statewide coefficients were first multiplied by the production level for each sector in the air basin to obtain estimates of pollution levels in absolute terms. Where the basic emissions data were non-zero these were used directly and entered into an "unadjusted" data array by input-output sectors.

This procedure attempts to use as much of the primary emissions data available for detailed sectors at the air basin level as possible. Where no such data exist but production units are obviously present resort is made to applying the statewide average emission coefficients to the estimated levels of production for the relevant sectors of the air basin economy. The resulting array, composed of some primary data and some statewide average data is subsequently adjusted to agree with the summary emissions data given for the 22 economic categories of the individual air basins.

As in the statewide case described above, the input-output sector pollutant data were subsequently adjusted to agree with the basin summary data first by each of the 22 categories and then in a final adjustment to bring the totals of the 152 sectors into agreement with the totals of the basin summary data. Following the pattern for the statewide case, if the basin summary data showed zero for a given category but the estimating technique used for the input-output sector indicated that pollutants were present, the zero of the basin summary data was ignored and the input-output sector estimate was used.

(iv) The Air Basin Coefficients

The total pollutant levels derived as described above were divided by the production levels for the basin industries and the coefficients formed in tons of pollutants per million dollars of production.

The procedure is the best that could be devised without resorting to an extensive analysis of the primary data along with the abatement practices prevailing in each air basin and then establishing the coefficients for detailed sectors on an ad hoc basis. The procedure has merit, in that it attempts to capture the differences in emission levels among the various air basins. Because of the highly aggregated nature (22 categories) of the summary emission data certain disparities in the primary data cannot be overcome by the overall adjustment processes that have been applied. A comparative analysis of the statewide and air basin coefficients per unit of product delivered revealed certain anomalies in the rankings of various industries among basins. A specific example of the primary data problem can be given.

As might be expected Truck Transportation and Local Transit and Intercity buses rank among the top five sectors statewide in terms of carbon monoxide emission levels. This is also true in each of the air basins except the San Francisco Air Basin. An analysis of the San Francisco Air Basin data reveals that a very small amount of CO is reported in the primary emissions data for the truck transportation sector. The procedure for estimating the emission coefficients for the basins, as outlined above, requires that statewide averages be applied unless primary data are available. In this instance primary data on CO emissions are available for the truck transportation sector, but as given are several orders of magnitude below the statewide averages. Nonetheless one might expect that the final "adjustment" process to which the

primary data are subjected to bring them into agreement with the summary emissions totals for the basin would correct such a deficiency. This would be true if there were a one-to-one correspondence between the input-output sectors and the categories of the air basin summary data. Since this is not so, a proportional adjusting of the primary data will leave those original data entries which diverged substantially (order of magnitude) from the statewide averages in a relatively unchanged position in terms of ranking. Undoubtedly, complex procedures could have been devised for flagging those entries outside of certain tolerance limits and adjusting them statistically to conform more closely to the statewide averages. As noted above, however, this would have required an in-depth comparative analysis of the emission coefficients for all air basins. Certain anomalies due to the primary data deficiencies remain in the analyses presented below. These do not detract from the general usefulness of the method and should only serve to highlight the need to improve the data gathering and verification processes.

12. Direct plus Indirect plus Induced Emissions per Unit of Product Delivered

(i) Method

In Section 2 details of the typical input-output multiplier and impact analysis were given. An analysis of this type was accomplished routinely for the statewide model and for each air basin in several steps.

1. The Leontief Inverse $(I-A)^{-1}$ was formed for each input-output model.

2. The pollution coefficients which were derived as described in preceding sections were set up as a diagonal matrix and multiplied into the Leontief inverse.

3. The columns of the resulting matrix were summed to give the "direct plus indirect" emissions per million dollars of demand.

4. The $(I-A)^{-1}$ inverse matrix was augmented with the household column and household row and reinverted.

5. The augmented matrix was again pre-multiplied by the diagonal matrix of pollution coefficients.

6. The columns elements of the augmented inverse were again summed to give the "direct plus indirect plus induced" emissions per million dollars of demand.

7. This procedure was repeated for each of the five air pollutants P, NOx, SOx, HC, CO.

8. The results were ranked so that each of the industries of the various models could be viewed in terms of its pollutant output per one million dollars of product delivered.

(ii) Results

The results indicate that there is a substantial difference in most instances in the direct, or "on site" emissions for a given industry and the "total" pollutants load from all industries to deliver its product to

final consumers. Virtually all industries are interrelated in the modern economy, so that a study of the "on site" emissions of a particular industry while critical, should also be related to the broader aspects of how that industry is interrelated with the other industries in the economy.

The results of the interindustry analysis and the rankings for all industries are shown in the Appendices. The top ranking industries for each pollutant and each air basin are shown on succeeding pages.

(a) Particulates

For the State of California and for each of the four air basins the ten principal sectors ranked according to the total emission coefficients for particulates are shown in Table 13. The sectors which appear most frequently among the principal sectors across the five economies are the Forestry and Fishery Products sectors and the Corn sector. Each of these two sectors appears as one of the prime sources of total particulate emissions per unit of final demand in the State model and in the South Coast, San Joaquin and San Francisco basins. (In the San Diego basin the Forestry & Fishery Products sector is ranked 19th and there is no Corn sector.)

Although Metals Mining and Confectionary Products do not rank among the principal sectors statewide, each appears among the prime sectors in three of the four basins. The ratio of total (direct plus indirect plus induced) emissions varies for the Metals Mining sector from a low of 1.05 in the San Francisco basin to 1.23 in the South Coast Basin. For Confectionary Products the ratio varies from 1.05 in the San Diego to 1.31 in the San Joaquin.

Table 13

Particulate Emissions Coefficients Ranking - 1976

| Region | I-O No. | Sector Name | Direct Emission Coeff. (Tons/$10$^6$) | Total Emission Coeff. (Tons/$10$^6$) | Rank |
|---|---|---|---|---|---|
| Calif. | 43 | Stone & Clay Mining | 89.8 | 103.2 | 1 |
| | 44 | Chem. & Fert. Mineral Mining | 86.5 | 99.0 | 2 |
| | 18 | Food, Feed Grains, nec. | 55.0 | 78.6 | 3 |
| | 82 | Cement & Concrete Products | 50.8 | 78.2 | 4 |
| | 37 | Forestry & Fishery Products | 44.9 | 55.9 | 5 |
| | 13 | Corn | 40.2 | 51.3 | 6 |
| | 7 | Misc. Livestock | 15.5 | 40.0 | 7 |
| | 38 | Agric., Forest, Fish. Serv. | 25.5 | 38.9 | 8 |
| | 55 | Grain Mill Products | 12.5 | 35.2 | 9 |
| | 83 | Structural Clay Products | 21.3 | 35.0 | 10 |
| San Diego | 18 | Stone & Clay Mining | 212.9 | 221.5 | 1 |
| | 21 | New Constr. Public Utility | 95.5 | 97.7 | 2 |
| | 55 | Structural Clay Products | 56.2 | 70.1 | 3 |
| | 31 | Confectionary Products | 21.8 | 22.9 | 4 |
| | 54 | Cement & Concrete Products | 1.7 | 21.6 | 5 |
| | 91 | Truck Transportation | 19.1 | 20.8 | 6 |
| | 53 | Glass | 15.9 | 19.4 | 7 |
| | 45 | Gum & Wood Chemicals | 17.6 | 19.3 | 8 |
| | 19 | New Construct, Residential | 16.6 | 18.4 | 9 |
| | 57 | Misc. Stone & Clay Products | 2.3 | 17.7 | 10 |

Table 13 (Cont.)

| Region | I-O No. | Sector Name | Direct Emission Coeff. (Tons/$10^6$) | Total Emission Coeff. (Tons/$10^6$) | Rank |
|---|---|---|---|---|---|
| South Coast | 108 | Local Transit & Intercity Bus. | 51.5 | 52.4 | 1 |
| | 33 | Chem. & Fert. Mineral Mining | 29.3 | 30.9 | 2 |
| | 116 | Electric Companies & Systems | 9.7 | 10.1 | 3 |
| | 27 | Forestry & Fishery Products | 9.1 | 9.9 | 4 |
| | 12 | Corn | 8.2 | 8.8 | 5 |
| | 14 | Oats | 4.2 | 4.8 | 6 |
| | 29 | Metals Mining | 3.2 | 4.0 | 7 |
| | 7 | Misc. Livestock | 3.2 | 3.9 | 8 |
| | 11 | Barley | 3.1 | 3.9 | 9 |
| | 74 | Blast Furnaces & Basic Steel | 2.8 | 3.8 | 10 |
| San Joaquin | 66 | Gum & Wood Chemicals | 155.5 | 163.5 | 1 |
| | 76 | Structural Clay Products | 149.4 | 155.1 | 2 |
| | 34 | Metals Mining | 115.7 | 122.5 | 3 |
| | 18 | Food, Feed Grains, nec. | 80.0 | 86.7 | 4 |
| | 110 | Jewelry, Sporting Goods, etc. | 77.8 | 84.2 | 5 |
| | 32 | Forestry & Fishery Products | 65.2 | 70.0 | 6 |
| | 13 | Corn | 58.4 | 64.4 | 7 |
| | 52 | Confectionary Products | 34.8 | 45.5 | 8 |
| | 72 | Rubber & Plastics Products | 37.7 | 43.5 | 9 |
| | 16 | Sorghum Grain | 36.2 | 42.0 | 10 |

Table 13 (Cont.)

| Region | I-O No. | Sector Name | Direct Emission Coeff. (Tons/$10^6$) | Total Emission Coeff. (Tons/$10^6$) | Rank |
|---|---|---|---|---|---|
| San Franc. | 26 | Metals Mining | 91.7 | 96.1 | 1 |
| | 65 | Glass | 22.4 | 24.5 | 2 |
| | 24 | Forestry & Fishery Products | 15.2 | 16.2 | 3 |
| | 57 | Gum & Wood Chemicals | 14.7 | 16.0 | 4 |
| | 11 | Corn | 13.6 | 14.4 | 5 |
| | 68 | Pottery & Related Products | 10.4 | 11.2 | 6 |
| | 43 | Confectionary Products | 9.5 | 11.1 | 7 |
| | 14 | Sorghum Grain | 8.5 | 9.3 | 8 |
| | 25 | Agric. Forestry, Fishery Serv. | 8.6 | 9.1 | 9 |
| | 47 | Logging Camps & Sawmills | 7.5 | 8.7 | 10 |

The ratio for each sector varies across the basins because of differing economic linkages and differing coefficients between the economies.

The sector with the highest total particulate emissions coefficient is the Stone & Clay Mining sector in the San Diego basin. Its coefficient of 221.5 tons of particulate matter per million dollars of production for final demand is substantially higher than the 163.5 figure of the next most significant sector, Gum and Wood Products of the San Joaquin basin. It is also significantly higher than the 103.2 value for the Stone & Clay Mining sector in the California state-wide economy.

While the single most significant emitter of particulates on a per unit production basis is located in the San Diego basin, the most significant emissions overall are to be found in the San Joaquin basin. Each of the principal sectors ranked two through ten in this basin have higher emission coefficients than their correspondingly ranked sectors in the other three basins and the statewide economy.

The fifty principal sectors, ranked by total particulate emission coefficients in each of the five economies are shown as follows:

1976 CALIFORNIA EMISSION COEFFICIENTS

TSP EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 43 | STONE + CLAY MIN + QUARRY | 89.7705 | 99.0049 | 103.2438 | 1 |
| 44 | CHEM + FERT MINERAL MIN | 86.4805 | 94.7495 | 98.9772 | 2 |
| 18 | FOOD, FEED GRAINS, NEC | 55.0000 | 74.9900 | 78.6081 | 3 |
| 82 | CEMENT AND CONCRETE PRODUCTS | 50.8361 | 73.6447 | 78.1755 | 4 |
| 37 | FORESTRY AND FISHERY PRODUCTS | 44.8554 | 51.3262 | 55.9311 | 5 |
| 13 | CORN | 40.2067 | 47.7658 | 51.2822 | 6 |
| 7 | MISC. LIVESTOCK | 15.4651 | 35.9729 | 39.9917 | 7 |
| 38 | AGRIC., FORESTRY, FISHERY SERV | 25.4411 | 34.6863 | 38.9068 | 8 |
| 55 | GRAIN MILL PRODUCTS | 12.5190 | 31.3032 | 35.1553 | 9 |
| 83 | STRUCTURAL CLAY PRODUCTS | 21.3187 | 30.4127 | 35.0038 | 10 |
| 16 | SORGHUM GRAIN | 24.9083 | 31.3099 | 34.8347 | 11 |
| 2 | BROILERS, CHICKENS AND EGGS | 1.7205 | 28.4619 | 32.1902 | 12 |
| 15 | OATS | 20.5714 | 28.4977 | 32.0503 | 13 |
| 85 | MISC STONE AND CLAY PRODUCTS | 13.7412 | 26.1410 | 30.7461 | 14 |
| 11 | RICE | 19.8658 | 26.7739 | 30.5984 | 15 |
| 4 | CATTLE AND CALVES | 4.3227 | 26.5230 | 30.0171 | 16 |
| 3 | TURKEYS AND OTHER POULTRY | .3594 | 25.9558 | 29.6475 | 17 |
| 6 | SHEEP, LAMBS, AND WOOL | 2.7570 | 25.9495 | 29.4886 | 18 |
| 63 | LOGGING CAMPS + SAWMILLS | 5.5463 | 24.6773 | 29.3870 | 19 |
| 24 | FRUIT AND TREE NUTS, NEC | 20.0000 | 24.7276 | 28.5063 | 20 |
| 73 | GUM AND WOOD CHEMICALS | 17.8385 | 23.7863 | 28.0297 | 21 |
| 8 | APIARY PRODUCTS | 1.1399 | 23.5284 | 27.4976 | 22 |
| 1 | DAIRIES | 8.6206 | 22.6144 | 26.5293 | 23 |
| 12 | BARLEY | 15.4010 | 22.2763 | 25.8230 | 24 |
| 9 | COTTON | 12.5907 | 21.7690 | 25.1260 | 25 |
| 52 | MEAT PRODUCTS | .0975 | 18.3455 | 22.0973 | 26 |
| 29 | SUGAR BEETS | 13.6873 | 17.6112 | 21.5577 | 27 |
| 10 | WHEAT | 10.6229 | 17.6222 | 21.4540 | 28 |
| 20 | WALNUTS | 12.1263 | 16.8396 | 20.6040 | 29 |
| 5 | HOGS | 1.5952 | 16.8958 | 20.2766 | 30 |
| 31 | POTATOES | 7.6237 | 15.4612 | 19.9316 | 31 |
| 53 | DAIRY PRODUCTS | .1212 | 14.2761 | 18.3820 | 32 |
| 81 | GLASS | 9.3883 | 13.3808 | 18.0108 | 33 |
| 25 | VEGETABLES | 6.7927 | 13.4313 | 17.9318 | 34 |
| 47 | NEW CONSTRUCT, PUBLIC UTILITY | 6.5308 | 12.9403 | 17.7498 | 35 |
| 39 | METALS MINING | 9.5378 | 13.4887 | 17.4582 | 36 |
| 48 | NEW CONSTRUCT, HIGHWAYS | .0842 | 12.2229 | 16.9896 | 37 |
| 72 | AGRICULTURAL CHEMICALS | .5249 | 12.5631 | 16.8762 | 38 |
| 21 | ALMONDS | 8.0763 | 12.6448 | 16.4041 | 39 |
| 22 | NONCITRUS FRUITS | 4.6488 | 12.1540 | 16.3474 | 40 |
| 14 | HAY AND PASTURE | 6.6795 | 12.7317 | 16.2496 | 41 |
| 64 | MILLWORK, PLYWOOD + OTHER WOOD PROD | 1.3325 | 11.1905 | 15.8947 | 42 |
| 58 | CONFECTIONARY PRODUCTS | 6.6117 | 11.9708 | 15.7285 | 43 |
| 28 | MELONS | 4.3282 | 11.0808 | 15.5826 | 44 |
| 65 | WOODEN CONTAINERS | .0482 | 10.0821 | 14.8022 | 45 |
| 121 | TRUCK TRANSPORTATION | 8.2959 | 10.1432 | 14.5575 | 46 |
| 23 | CITRUS FRUITS | 2.[illegible]97 | 10.1841 | 14.3720 | 47 |
| 57 | SUGAR | 3.[illegible]049 | 1[illegible].8300 | 14.3369 | 48 |
| 71 | INDUSTRIAL CHEMICALS | 3.6688 | 9.6870 | 13.8583 | 49 |
| 45 | NEW CONSTRUCT, RESIDENT | 1.1369 | 8.7275 | 13.5768 | 50 |

Table 15

1976 SAN DIEGO EMISSION COEFFICIENTS

TSP EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 18 | STONE + CLAY MIN + QUARRY | 212.9127 | 221.0154 | 221.5412 | 1 |
| 21 | NEW CONSTRUCT, PUBLIC UTILITY | 95.5393 | 97.2510 | 97.7091 | 2 |
| 55 | STRUCTURAL CLAY PRODUCTS | 56.2188 | 69.4936 | 70.0764 | 3 |
| 31 | CONFECTIONARY PRODUCTS | 21.8163 | 22.5436 | 22.8583 | 4 |
| 54 | CEMENT AND CONCRETE PRODUCTS | 1.7290 | 21.0427 | 21.5694 | 5 |
| 91 | TRUCK TRANSPORTATION | 19.1078 | 20.2659 | 20.8478 | 6 |
| 53 | GLASS | 15.9173 | 18.8095 | 19.3614 | 7 |
| 45 | GUM AND WOOD CHEMICALS | 17.6273 | 18.9553 | 19.3194 | 8 |
| 19 | NEW CONSTRUCT, RESIDENT | 16.6323 | 17.8695 | 18.3697 | 9 |
| 57 | MISC STONE AND CLAY PRODUCTS | 2.2546 | 17.2331 | 17.7255 | 10 |
| 47 | DRUGS | 14.8888 | 15.4822 | 15.9887 | 11 |
| 90 | LOCAL TRANSIT AND INTERCITY BUSES | 13.4080 | 14.0351 | 14.6659 | 12 |
| 97 | ELECTRIC COMPANIES AND SYSTEMS | 13.2509 | 13.5775 | 13.8626 | 13 |
| 29 | GRAIN MILL PRODUCTS | 10.7822 | 11.6983 | 11.8948 | 14 |
| 22 | NEW CONSTRUCT, HIGHWAYS | 1.2315 | 11.0661 | 11.6213 | 15 |
| 93 | AIR TRANSPORTATION | 9.6310 | 10.4272 | 10.9270 | 16 |
| 92 | WATER TRANSPORATATION | 8.6584 | 9.8711 | 10.2794 | 17 |
| 23 | NEW CONSTRUCT, ALL OTHER | 6.7539 | 9.3503 | 9.9223 | 18 |
| 16 | FORESTRY AND FISHERY PRODUCTS | 7.4339 | 8.1971 | 8.7535 | 19 |
| 35 | LOGGING CAMPS + SAWMILLS | 5.4807 | 7.7259 | 8.1805 | 20 |
| 56 | POTTERY AND RELATED PRODUCTS | 1.8415 | 5.8001 | 6.4069 | 21 |
| 8 | BARLEY | 2.5524 | 4.8811 | 5.2441 | 22 |
| 17 | AGRIC., FORESTRY, FISHERY SERV | 4.2164 | 4.5655 | 5.0335 | 23 |
| 59 | IRON AND STEEL FOUNDRIES AND FORGIN | 1.9972 | 3.7628 | 4.1950 | 24 |
| 9 | HAY AND PASTURE | 1.1070 | 3.8135 | 4.1799 | 25 |
| 122 | DUMMY INDUSTRIES | 0. | 3.5662 | 3.9317 | 26 |
| 7 | WHEAT | 1.7605 | 3.4002 | 3.8054 | 27 |
| 24 | MAIN. AND REPAIR CONSTRUCTION | .6995 | 3.0417 | 3.6670 | 28 |
| 44 | AGRICULTURAL CHEMICALS | .5187 | 3.2838 | 3.6095 | 29 |
| 14 | POTATOES | 1.2635 | 2.8178 | 3.3357 | 30 |
| 33 | MISC FOOD PRODUCTS | 2.2195 | 3.0989 | 3.3313 | 31 |
| 12 | VEGETABLES | 1.1258 | 2.6158 | 3.2095 | 32 |
| 58 | BLAST FURNACES AND BASIC STEEL PROD | 1.5245 | 2.8100 | 3.2018 | 33 |
| 99 | WATER AND SANITARY SERVICES | .8499 | 2.4545 | 3.0873 | 34 |
| 10 | NONCITRUS FRUITS | .7704 | 2.4503 | 2.9816 | 35 |
| 46 | PLASTICS MATERIALS AND SYNTHETIC FI | 1.4259 | 2.5255 | 2.8893 | 36 |
| 49 | PAINTS AND ALLIED PRODUCTS | .1140 | 2.4103 | 2.7626 | 37 |
| 11 | CITRUS FRUITS | .4193 | 2.2147 | 2.7428 | 38 |
| 43 | INDUSTRIAL CHEMICALS | .7684 | 2.1244 | 2.4990 | 39 |
| 121 | STATE AND LOCAL GOVT ENTERPRISES | .5622 | 1.7599 | 2.4837 | 40 |
| 13 | DRIED BEANS | .2129 | 1.9005 | 2.4736 | 41 |
| 51 | RUBBER AND PLASTICS PRODUCTS | 1.3064 | 2.0449 | 2.4556 | 42 |
| 28 | CANNED AND FROZEN FOODS | .5202 | 2.0618 | 2.4505 | 43 |
| 1 | DAIRIES | 1.4287 | 2.0367 | 2.3541 | 44 |
| 36 | MILLWORK, PLYWOOD + OTHER WOOD PROD | 1.3167 | 1.9945 | 2.3471 | 45 |
| 48 | CLEANING AND TOILET PREPARATIONS | 1.0417 | 1.9093 | 2.2726 | 46 |
| 40 | PAPER + PAPERBOARD PRODUCTS | .6541 | 1.8683 | 2.2529 | 47 |
| 89 | RAILROADS | .8497 | 1.6626 | 2.2364 | 48 |
| 20 | NEW CONSTRUCT, NONRESIDENT | .0928 | 1.5818 | 2.0722 | 49 |
| 15 | GREENHOUSE AND NURSERY PRODUCTS | .5210 | 1.3590 | 1.9886 | 50 |

Table 16

1976 SOUTH COAST EMISSION COEFFICIENTS

TSP EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 108 | LOCAL TRANSIT AND INTERCITY BUSES | 51.5026 | 52.0178 | 52.4328 | 1 |
| 33 | CHEM + FERT MINERAL MIN | 29.2537 | 30.5796 | 30.9425 | 2 |
| 116 | ELECTRIC COMPANIES AND SYSTEMS | 9.6732 | 9.9000 | 10.1378 | 3 |
| 27 | FORESTRY AND FISHERY PRODUCTS | 9.1456 | 9.5649 | 9.9455 | 4 |
| 12 | CORN | 8.1977 | 8.5861 | 8.8410 | 5 |
| 14 | OATS | 4.1943 | 4.5968 | 4.8429 | 6 |
| 29 | METALS MINING | 3.2263 | 3.6665 | 3.9673 | 7 |
| 7 | MISC. LIVESTOCK | 3.1532 | 3.6665 | 3.8658 | 8 |
| 11 | BARLEY | 3.1401 | 3.6083 | 3.8638 | 9 |
| 74 | BLAST FURNACES AND BASIC STEEL PROD | 2.8014 | 3.4795 | 3.7770 | 10 |
| 23 | SUGAR BEETS | 2.7907 | 3.1683 | 3.5148 | 11 |
| 9 | COTTON | 2.5671 | 3.2055 | 3.4585 | 12 |
| 141 | DUMMY INDUSTRIES | 0. | 3.0482 | 3.3493 | 13 |
| 16 | WALNUTS | 2.4724 | 2.8321 | 3.1605 | 14 |
| 111 | AIR TRANSPORTATION | 2.2467 | 2.5554 | 2.9017 | 15 |
| 10 | WHEAT | 2.1659 | 2.4827 | 2.7605 | 16 |
| 118 | WATER AND SANITARY SERVICES | 1.2033 | 2.2406 | 2.6444 | 17 |
| 107 | RAILROADS | 1.6829 | 2.2047 | 2.5842 | 18 |
| 75 | IRON AND STEEL FOUNDRIES AND FORGIN | 1.3326 | 2.0534 | 2.3921 | 19 |
| 13 | HAY AND PASTURE | 1.3619 | 2.1260 | 2.3879 | 20 |
| 17 | ALMONDS | 1.6467 | 1.9744 | 2.3043 | 21 |
| 24 | POTATOES | 1.5544 | 1.9384 | 2.2835 | 22 |
| 110 | WATER TRANSPORATATION | 1.5166 | 1.9528 | 2.2782 | 23 |
| 1 | DAIRIES | 1.7577 | 2.0468 | 2.2764 | 24 |
| 36 | NEW CONSTRUCT, PUBLIC UTILITY | 1.4827 | 1.8149 | 2.2005 | 25 |
| 20 | VEGETABLES | 1.3850 | 1.6532 | 2.0517 | 26 |
| 15 | GRASS SEED | .9780 | 1.5162 | 1.7949 | 27 |
| 140 | STATE AND LOCAL GOVT ENTERPRISES | .9883 | 1.3119 | 1.7850 | 28 |
| 51 | LOGGING CAMPS + SAWMILLS | .2586 | 1.5148 | 1.7796 | 29 |
| 60 | AGRICULTURAL CHEMICALS | .1692 | 1.5134 | 1.7739 | 30 |
| 18 | NONCITRUS FRUITS | .9478 | 1.3006 | 1.6640 | 31 |
| 77 | METAL CONTAINERS | .4521 | 1.2742 | 1.5877 | 32 |
| 22 | MELONS | .8825 | 1.1322 | 1.5307 | 33 |
| 59 | INDUSTRIAL CHEMICALS | .3004 | 1.1449 | 1.4307 | 34 |
| 91 | COMPUTERS AND OFFICE EQUIPMENT | .6546 | 1.0165 | 1.4200 | 35 |
| 71 | STRUCTURAL CLAY PRODUCTS | .6143 | .9737 | 1.3610 | 36 |
| 62 | PLASTICS MATERIALS AND SYNTHETIC FI | .6127 | 1.0875 | 1.3473 | 37 |
| 47 | CONFECTIONARY PRODUCTS | .7943 | 1.0603 | 1.3182 | 38 |
| 19 | CITRUS FRUITS | .5158 | .9266 | 1.2880 | 39 |
| 70 | CEMENT AND CONCRETE PRODUCTS | .5637 | .9328 | 1.2868 | 40 |
| 26 | GREEHOUSE AND NURSERY PRODUCTS | .6409 | .8236 | 1.2362 | 41 |
| 4 | CATTLE AND CALVES | .8813 | 1.0899 | 1.1931 | 42 |
| 79 | FABRICATED STRUCTURAL STEEL | .0917 | .7700 | 1.1068 | 43 |
| 43 | CANNED AND FROZEN FOODS | .0509 | .7960 | 1.0987 | 44 |
| 73 | MISC STONE AND CLAY PRODUCTS | .2768 | .7322 | 1.0945 | 45 |
| 46 | SUGAR | .7191 | .9251 | 1.0873 | 46 |
| 32 | STONE + CLAY MIN + QUARRY | .2593 | .7326 | 1.0868 | 47 |
| 25 | SWEET POTATOES | .5126 | .6851 | 1.0834 | 48 |
| 21 | DRIED BEANS | .2619 | .6760 | 1.0562 | 49 |
| 81 | METAL STAMPINGS | .0690 | .7027 | 1.0442 | 50 |

Table 17

1976 SAN JOAQUIN EMISSION COEFFICIENTS

TSP EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 66 | GUM AND WOOD CHEMICALS | 155.5499 | 161.9566 | 163.4706 | 1 |
| 76 | STRUCTURAL CLAY PRODUCTS | 149.4310 | 152.9293 | 155.1194 | 2 |
| 34 | METALS MINING | 115.7083 | 120.7495 | 122.4506 | 3 |
| 18 | FOOD, FEED GRAINS, NEC | 79.9595 | 85.4926 | 86.7115 | 4 |
| 110 | JEWELRY, SPORTING GOODS, ETC. | 77.8086 | 82.3803 | 84.2236 | 5 |
| 32 | FORESTRY AND FISHERY PRODUCTS | 65.2112 | 67.8590 | 69.9706 | 6 |
| 13 | CORN | 58.4529 | 62.8937 | 64.3883 | 7 |
| 52 | CONFECTIONARY PRODUCTS | 34.7754 | 43.8171 | 45.5066 | 8 |
| 72 | RUBBER AND PLASTICS PRODUCTS | 37.7012 | 41.8613 | 43.4943 | 9 |
| 16 | SORGHUM GRAIN | 36.2119 | 40.4708 | 41.9972 | 10 |
| 75 | CEMENT AND CONCRETE PRODUCTS | 29.5159 | 38.9041 | 41.0964 | 11 |
| 7 | MISC. LIVESTOCK | 22.4833 | 35.9682 | 37.5419 | 12 |
| 49 | GRAIN MILL PRODUCTS | 20.3782 | 35.4319 | 36.9159 | 13 |
| 11 | RICE | 28.8811 | 33.2925 | 35.0191 | 14 |
| 15 | OATS | 29.9069 | 33.5105 | 34.9196 | 15 |
| 23 | FRUIT AND TREE NUTS, NEC | 29.0762 | 30.7702 | 32.6185 | 16 |
| 12 | BARLEY | 22.3901 | 27.3985 | 28.9325 | 17 |
| 78 | MISC STONE AND CLAY PRODUCTS | 19.6344 | 25.5149 | 27.4900 | 18 |
| 115 | AIR TRANSPORTATION | 22.1778 | 23.8306 | 25.6637 | 19 |
| 37 | STONE + CLAY MIN + QUARRY | 17.6244 | 22.7581 | 24.7648 | 20 |
| 1 | DAIRIES | 12.5328 | 22.6362 | 24.3962 | 21 |
| 27 | SUGAR BEETS | 19.8987 | 21.7816 | 23.7680 | 22 |
| 2 | BROILERS, CHICKENS AND EGGS | 2.5013 | 21.9503 | 23.2096 | 23 |
| 9 | COTTON | 18.3045 | 21.4566 | 22.7087 | 24 |
| 4 | CATTLE AND CALVES | 6.2843 | 21.4015 | 22.6917 | 25 |
| 10 | WHEAT | 15.4437 | 20.4697 | 22.2307 | 26 |
| 122 | WATER AND SANITARY SERVICES | 9.7440 | 18.9539 | 21.2444 | 27 |
| 19 | WALNUTS | 17.6293 | 19.2772 | 21.1224 | 28 |
| 64 | INDUSTRIAL CHEMICALS | 14.4069 | 19.0594 | 20.7424 | 29 |
| 6 | SHEEP, LAMBS, AND WOOL | 4.0082 | 18.7753 | 20.0100 | 30 |
| 3 | TURKEYS AND OTHER POULTRY | .5225 | 18.6150 | 19.9027 | 31 |
| 74 | GLASS | 14.0615 | 17.4200 | 19.6994 | 32 |
| 8 | APIARY PRODUCTS | 1.6572 | 17.9391 | 19.4942 | 33 |
| 113 | TRUCK TRANSPORTATION | 12.5710 | 14.8623 | 17.2145 | 34 |
| 28 | POTATOES | 11.0833 | 14.5943 | 16.7651 | 35 |
| 47 | DAIRY PRODUCTS | .4821 | 14.6574 | 16.5394 | 36 |
| 144 | STATE AND LOCAL GOVT ENTERPRISES | 12.1946 | 13.5209 | 16.2256 | 37 |
| 51 | SUGAR | 5.5959 | 14.3078 | 16.0606 | 38 |
| 20 | ALMONDS | 11.7414 | 13.3303 | 15.1880 | 39 |
| 112 | LOCAL TRANSIT AND INTERCITY BUSES | 8.8212 | 12.6695 | 15.0623 | 40 |
| 14 | HAY AND PASTURE | 9.7107 | 13.3805 | 14.8958 | 41 |
| 46 | MEAT PRODUCTS | .4922 | 13.0843 | 14.3388 | 42 |
| 24 | VEGETABLES | 9.8753 | 11.7327 | 13.9323 | 43 |
| 87 | CUTLERY, HAND TOOLS AND GENERAL HAR | 8.9332 | 11.0869 | 13.0654 | 44 |
| 5 | HOGS | 2.3192 | 11.3711 | 12.7472 | 45 |
| 41 | NEW CONSTRUCT, PUBLIC UTILITY | 6.9666 | 10.3791 | 12.2884 | 46 |
| 50 | BAKERY PRODUCTS | .0788 | 9.7531 | 11.7548 | 47 |
| 30 | SAFFLOWER | 6.8075 | 9.9369 | 11.7178 | 48 |
| 96 | COMPUTERS AND OFFICE EQUIPMENT | 8.0764 | 9.4383 | 11.1992 | 49 |
| 17 | GRASS SEED | 6.9736 | 9.4623 | 11.0527 | 50 |

Table 18

1976 SAN FRANCISCO EMISSION COEFFICIENTS

TSP EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 26 | METALS MINING | 91.6541 | 95.7355 | 96.0608 | 1 |
| 65 | GLASS | 22.4288 | 24.0546 | 24.4530 | 2 |
| 24 | FORESTRY AND FISHERY PRODUCTS | 15.2277 | 15.8014 | 16.1832 | 3 |
| 57 | GUM AND WOOD CHEMICALS | 14.6751 | 15.7400 | 16.0486 | 4 |
| 11 | CORN | 13.6496 | 14.1370 | 14.4092 | 5 |
| 68 | POTTERY AND RELATED PRODUCTS | 10.4373 | 10.8020 | 11.2232 | 6 |
| 43 | CONFECTIONARY PRODUCTS | 9.4684 | 10.7918 | 11.0888 | 7 |
| 14 | SORGHUM GRAIN | 8.4560 | 8.9795 | 9.2594 | 8 |
| 25 | AGRIC., FORESTRY, FISHERY SERV | 8.6369 | 8.8060 | 9.1127 | 9 |
| 47 | LOGGING CAMPS + SAWMILLS | 7.4762 | 8.4479 | 8.6906 | 10 |
| 13 | OATS | 6.9837 | 7.4779 | 7.7419 | 11 |
| 60 | CLEANING AND TOILET PREPARATIONS | 5.1573 | 6.6020 | 6.9239 | 12 |
| 32 | NEW CONSTRUCT, PUBLIC UTILITY | 5.4216 | 6.0850 | 6.4731 | 13 |
| 10 | BARLEY | 5.2284 | 5.7513 | 6.0255 | 14 |
| 7 | MISC. LIVESTOCK | 5.2502 | 5.5736 | 5.7646 | 15 |
| 71 | IRON AND STEEL FOUNDRIES AND FORGIN | 4.5536 | 5.2872 | 5.6375 | 16 |
| 20 | SUGAR BEETS | 4.6466 | 5.1994 | 5.5678 | 17 |
| 15 | WALNUTS | 4.1167 | 5.0409 | 5.3883 | 18 |
| 105 | TRUCK TRANSPORTATION | 3.9573 | 4.5969 | 5.0255 | 19 |
| 63 | RUBBER AND PLASTICS PRODUCTS | 3.9576 | 4.6209 | 4.9289 | 20 |
| 9 | WHEAT | 3.6063 | 4.1274 | 4.4232 | 21 |
| 21 | POTATOES | 2.5881 | 3.8021 | 4.1626 | 22 |
| 18 | VEGETABLES | 2.3060 | 3.6772 | 4.0965 | 23 |
| 16 | ALMONDS | 2.7418 | 3.6369 | 3.9860 | 24 |
| 27 | CRUDE PETROLEUM | 3.1801 | 3.3759 | 3.7301 | 25 |
| 104 | LOCAL TRANSIT AND INTERCITY BUSES | 2.7769 | 3.2321 | 3.6495 | 26 |
| 17 | NONCITRUS FRUITS | 1.5782 | 3.1633 | 3.5479 | 27 |
| 1 | DAIRIES | 2.9266 | 3.2441 | 3.4710 | 28 |
| 59 | DRUGS | 1.8043 | 2.8141 | 3.1991 | 29 |
| 12 | HAY AND PASTURE | 2.2676 | 2.8575 | 3.1392 | 30 |
| 72 | PRIMARY NONFERROUS METAL PRODUCTS | .0087 | 2.7020 | 2.9650 | 31 |
| 70 | BLAST FURNACES AND BASIC STEEL PROD | .0433 | 2.5497 | 2.8684 | 32 |
| 66 | CEMENT AND CONCRETE PRODUCTS | 1.5269 | 2.3805 | 2.7639 | 33 |
| 67 | STRUCTURAL CLAY PRODUCTS | 1.6712 | 2.3702 | 2.7528 | 34 |
| 112 | ELECTRIC COMPANIES AND SYSTEMS | 2.1356 | 2.4096 | 2.6306 | 35 |
| 51 | OFFICE FURNITURE AND FIXTURES | 1.2454 | 2.1452 | 2.5112 | 36 |
| 22 | SAFFLOWER | 1.5897 | 2.1575 | 2.4798 | 37 |
| 49 | WOODEN CONTAINERS | 1.1610 | 2.1499 | 2.4324 | 38 |
| 77 | METAL STAMPINGS | 1.1920 | 1.9680 | 2.3208 | 39 |
| 50 | HOUSEHOLD FURNITURE | 1.0975 | 1.9342 | 2.2766 | 40 |
| 29 | STONE + CLAY MIN + QUARRY | 1.0868 | 1.8620 | 2.2347 | 41 |
| 19 | DRIED BEANS | .4361 | 1.7620 | 2.1608 | 42 |
| 44 | BEVERAGES AND FLAVORINGS | .0582 | 1.5781 | 1.9542 | 43 |
| 107 | AIR TRANSPORTATION | 1.3061 | 1.5872 | 1.9393 | 44 |
| 30 | NEW CONSTRUCT, RESIDENT | .9438 | 1.5182 | 1.9070 | 45 |
| 58 | PLASTICS MATERIALS AND SYNTHETIC FI | .6354 | 1.5421 | 1.8533 | 46 |
| 23 | GREEHOUSE AND NURSERY PRODUCTS | 1.0672 | 1.4156 | 1.8395 | 47 |
| 48 | MILLWORK, PLYWOOD + OTHER WOOD PROD | .4116 | 1.5473 | 1.8280 | 48 |
| 4 | CATTLE AND CALVES | 1.4675 | 1.7055 | 1.8060 | 49 |
| 87 | COMPUTERS AND OFFICE EQUIPMENT | .7860 | 1.3628 | 1.7951 | 50 |

(b) Sulfur Oxides

For the State of California and for each of the four air basins the ten principal sectors ranked according to total emissions coefficients of sulfur oxides are shown in Table 19. The most significant emissions of this pollutant resulting from production for final demands are associated with the following sectors: Water Transportation, Gum & Wood Chemicals, Electric Companies & Systems, and Industrial Chemicals. Water Transportation, which ranks first in the San Diego basin, appears among the top ten sectors in all five economies. Each of the remaining sectors ranks in the top ten statewide and also in three of the four basins. On the other hand, Drugs, Metals Mining, and Plastics Materials & Synthetics rank second in the San Diego, South Coast and San Francisco basins, respectively, but are not found in the top ten sectors statewide.

The sector with the highest total emissions coefficient in each of the five cases is different from its counterparts in the other four: Water & Sanitary Services (statewide); Water Transportation (San Diego); Electric Companies & Systems (South Coast); State & Local Government Enterprises (San Joaquin) and Industrial Chemicals (San Francisco).

The sector with the largest coefficient overall is State and Local Government Enterprises, which includes municipal public utilities, in the San Joaquin basin. The SOx emission rate of 233.4 tons resulting in the basin from a million dollars of production by this sector for final demands significantly exceeds the rates associated with all other sectors. Overall, the San Joanquin sectors display the highest SOx emissions rates.

It is of interest to note that in Table 19 there are several sectors which show substantial differences between the emissions that are <u>directly</u> attributable to the sector and the <u>total</u> emissions which result from the sector's linkages to the rest of the economy. For example, the ratio of the total emissions coefficient to the direct coefficient for the Water &

Table 19

Sulfur Oxide Emission Coefficients Ranking - 1976

| Region | I-O No. | Sector Name | Direct Emission Coeff. (Tons/$10^6$) | Total Emission Coeff. (Tons/$10^6$) | Rank |
|---|---|---|---|---|---|
| Calif. | 130 | Water & Sanitary Services | 12.7 | 42.4 | 1 |
| | 152 | State & Local Gov. Enterprises | 34.1 | 40.9 | 2 |
| | 73 | Gum & Wood Chemicals | 25.8 | 36.7 | 3 |
| | 128 | Electric Companies & Systems | 21.4 | 27.1 | 4 |
| | 88 | Blast Furnaces & Basic Steel | 11.4 | 21.5 | 5 |
| | 71 | Industrial Chemicals | 10.7 | 21.0 | 6 |
| | 122 | Water Transportation | 12.0 | 20.7 | 7 |
| | 18 | Food, Feed Grains, nec. | 10.0 | 19.8 | 8 |
| | 120 | Local Transit & Intercity Bus. | 5.1 | 18.3 | 9 |
| | 82 | Cement & Concrete Products | 9.4 | 18.3 | 10 |
| San Diego | 92 | Water Transportation | 78.1 | 85.9 | 1 |
| | 47 | Drugs | 55.4 | 57.5 | 2 |
| | 97 | Electric Cos. & Systems | 43.9 | 44.9 | 3 |
| | 45 | Gum & Wood Chemicals | 20.7 | 23.7 | 4 |
| | 43 | Industrial Chemicals | 8.6 | 12.2 | 5 |
| | 58 | Truck Transportation | 9.8 | 11.6 | 6 |
| | 54 | Blast Furnaces & Basic Steel | 9.1 | 11.6 | 7 |
| | 91 | Cement & Concrete Products | 7.5 | 10.8 | 8 |
| | 15 | Local Transit & Intercity Bus. | 6.8 | 9.3 | 9 |
| | 90 | Greenhouse & Nursery Products | 7.0 | 8.9 | 10 |

Table 19 (Cont.)

| Region | I-O No. | Sector Name | Direct Emission Coeff. (Tons/$10^6$) | Total Emission Coeff. (Tons/$10^6$) | Rank |
|---|---|---|---|---|---|
| South Coast | 116 | Electric Companies & Systems | 38.5 | 40.5 | 1 |
| | 29 | Metals Mining | 31.2 | 33.4 | 2 |
| | 110 | Water Transportation | 12.1 | 15.5 | 3 |
| | 74 | Blast Furnaces & Basic Steel | 7.5 | 10.2 | 4 |
| | 73 | Misc. Stone & Clay Products | 7.4 | 10.1 | 5 |
| | 26 | Greenhouse & Nursery Products | 8.0 | 9.9 | 6 |
| | 27 | Forestry & Fishery Products | 6.6 | 8.7 | 7 |
| | 12 | Corn | 6.3 | 8.3 | 8 |
| | 70 | Cement & Concrete Products | 4.9 | 7.9 | 9 |
| | 109 | Truck Transportation | 5.8 | 7.9 | 10 |
| San Joaquin | 144 | State & Local Gov. Enterprises | 227.4 | 233.4 | 1 |
| | 122 | Water & Sanitary Services | 2.1 | 157.4 | 2 |
| | 66 | Gum & Wood Chemicals | 66.5 | 72.7 | 3 |
| | 112 | Local Transit & Intercity Bus. | 4.3 | 59.7 | 4 |
| | 35 | Crude Petroleum | 34.4 | 38.1 | 5 |
| | 115 | Air Transportation | 14.8 | 24.5 | 6 |
| | 114 | Water Transportation | 4.6 | 20.8 | 7 |
| | 139 | Other Medical Services | 15.5 | 20.2 | 8 |
| | 71 | Petroleum Refining | 2.3 | 18.1 | 9 |
| | 64 | Industrial Chemicals | 7.9 | 15.7 | 10 |

Table 19 (Cont.)

| Region | I-O No. | Sector Name | Direct Emission Coeff. (Tons/$10^6$) | Total Emission Coeff. (Tons/$10^6$) | Rank |
|---|---|---|---|---|---|
| San Franc. | 55 | Industrial Chemicals | 39.2 | 49.5 | 1 |
| | 58 | Plastics Materials & Synths. | 0.0 | 17.8 | 2 |
| | 56 | Agricultural Chemicals | 0.0 | 17.6 | 3 |
| | 112 | Electric Companies & Systems | 9.5 | 12.6 | 4 |
| | 57 | Gum & Wood Chemicals | 0.2 | 11.8 | 5 |
| | 61 | Paints & Allied Products | 0.0 | 11.4 | 6 |
| | 11 | Corn | 6.4 | 11.0 | 7 |
| | 23 | Greenhouse & Nursery Products | 8.0 | 10.4 | 8 |
| | 136 | State & Local Gov. Enterprises | 6.7 | 9.3 | 9 |
| | 106 | Water Transportation | 5.6 | 9.2 | 10 |

Sanitary Services sector in the San Joaquin basin is 157.4/2.1 = 75.0. This high ratio is attributable largely to the primary linkage between the Water & Sanitary Services sector and the State and Local Government Enterprises sector. The relatively non-polluting Water sector purchases approximately 86% of its intermediate local inputs from public utilities in the State and Local sector which has the highest emissions rate in the basin.

The Plastics & Synthetics and the Agricultural Chemicals sectors in the San Francisco basin offer other examples of high total to direct emission rates, examples which are closely analagous to the hypothetical Service sector discussed in the Introduction to this report. As was the case with the theoretical Service sector, the San Francisco Plastics & Synthetics and Agricultural Chemicals sectors have direct emissions coefficients of zero. In spite of their direct coefficients, however, the sectors rank second and third in the basin on the basis of total emission coefficients. This phenomenon arises primarily due to the fact that each of the two sectors purchases over half of its total supporting local production from the Industrial Chemicals sector which has the basin's highest total emissions coefficient.

The fifty principal sectors, ranked by total SOx emission coefficients, in each of the five economies are shown as follows:

1976 CALIFORNIA EMISSION COEFFICIENTS

SOX EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 130 | WATER AND SANITARY SERVICES | 12.6820 | 38.3775 | 42.3763 | 1 |
| 152 | STATE AND LOCAL GOVT ENTERPRISES | 34.1286 | 36.3442 | 40.8549 | 2 |
| 73 | GUM AND WOOD CHEMICALS | 25.7655 | 32.9615 | 36.6697 | 3 |
| 128 | ELECTRIC COMPANIES AND SYSTEMS | 21.4304 | 24.2745 | 27.0594 | 4 |
| 86 | BLAST FURNACES AND BASIC STEEL PROD | 11.3996 | 17.7087 | 21.5344 | 5 |
| 71 | INDUSTRIAL CHEMICALS | 10.6774 | 17.3563 | 21.0014 | 6 |
| 122 | WATER TRANSPORATATION | 12.0258 | 17.2788 | 20.6960 | 7 |
| 18 | FOOD, FEED GRAINS, NEC | 10.0000 | 16.5942 | 19.7560 | 8 |
| 120 | LOCAL TRANSIT AND INTERCITY BUSES | 5.1132 | 14.3993 | 18.3332 | 9 |
| 82 | CEMENT AND CONCRETE PRODUCTS | 9.3583 | 14.3224 | 18.2818 | 10 |
| 72 | AGRICULTURAL CHEMICALS | 3.8729 | 12.7588 | 16.5279 | 11 |
| 36 | GREEHOUSE AND NURSERY PRODUCTS | 8.6776 | 10.6660 | 14.6346 | 12 |
| 13 | CORN | 6.8548 | 11.3205 | 14.3934 | 13 |
| 37 | FORESTRY AND FISHERY PRODUCTS | 7.1452 | 10.0729 | 14.0971 | 14 |
| 7 | MISC. LIVESTOCK | 4.0698 | 10.3598 | 13.8717 | 15 |
| 121 | TRUCK TRANSPORTATION | 7.3825 | 9.4313 | 13.2888 | 16 |
| 74 | PLASTICS MATERIALS AND SYNTHETIC FI | .0080 | 9.1298 | 12.8881 | 17 |
| 89 | METAL CONTAINERS | .0172 | 7.9855 | 12.0848 | 18 |
| 16 | SORGHUM GRAIN | 4.2661 | 8.7650 | 11.8453 | 19 |
| 15 | OATS | 3.6429 | 8.2944 | 11.3990 | 20 |
| 6 | SHEEP, LAMBS, AND WOOL | 1.1215 | 7.8594 | 10.9521 | 21 |
| 11 | RICE | 3.5571 | 7.5825 | 10.9246 | 22 |
| 4 | CATTLE AND CALVES | 1.1699 | 7.7318 | 10.7852 | 23 |
| 77 | PAINTS AND ALLIED PRODUCTS | 0. | 7.0441 | 10.6897 | 24 |
| 93 | METAL STAMPINGS | 0. | 6.4648 | 10.6457 | 25 |
| 2 | BROILERS, CHICKENS AND EGGS | 1.5754 | 7.2900 | 10.5481 | 26 |
| 39 | METALS MINING | 3.4035 | 7.0659 | 10.5348 | 27 |
| 91 | FABRICATED STRUCTURAL STEEL | .0025 | 6.3939 | 10.5236 | 28 |
| 12 | BARLEY | 2.7318 | 7.3152 | 10.4146 | 29 |
| 1 | DAIRIES | 2.2291 | 6.8208 | 10.2419 | 30 |
| 9 | COTTON | 2.3040 | 7.1474 | 10.0811 | 31 |
| 87 | IRON AND STEEL FOUNDRIES AND FORGIN | .3871 | 5.9112 | 9.8636 | 32 |
| 95 | OTHER FABRICATED METAL PRODUCTS | .0232 | 5.6176 | 9.7737 | 33 |
| 47 | NEW CONSTRUCT, PUBLIC UTILITY | 2.0835 | 5.5097 | 9.7126 | 34 |
| 14 | HAY AND PASTURE | 1.3862 | 6.6124 | 9.6866 | 35 |
| 119 | RAILROADS | 3.6843 | 5.7165 | 9.5031 | 36 |
| 8 | APIARY PRODUCTS | 0. | 5.9555 | 9.4241 | 37 |
| 78 | PETROLEUM REFINING AND RELATED PROD | 3.0613 | 6.3249 | 9.3228 | 38 |
| 63 | LOGGING CAMPS + SAWMILLS | .5186 | 5.1830 | 9.2986 | 39 |
| 76 | CLEANING AND TOILET PREPARATIONS | .0029 | 5.4329 | 9.2875 | 40 |
| 92 | SCREW MACHINE PRODUCTS | 0. | 4.9591 | 9.1932 | 41 |
| 3 | TURKEYS AND OTHER POULTRY | .6230 | 5.9307 | 9.1568 | 42 |
| 52 | MEAT PRODUCTS | .0054 | 5.8669 | 9.1455 | 43 |
| 10 | WHEAT | 1.8687 | 5.6869 | 9.0354 | 44 |
| 29 | SUGAR BEETS | 2.4194 | 5.4516 | 8.9004 | 45 |
| 64 | MILLWORK, PLYWOOD + OTHER WOOD PROD | 1.1489 | 4.7794 | 8.8903 | 46 |
| 79 | RUBBER AND PLASTICS PRODUCTS | .4493 | 4.8546 | 8.7785 | 47 |
| 68 | PAPER + PAPERBOARD PRODUCTS | .7937 | 4.6974 | 8.7638 | 48 |
| 31 | POTATOES | 1.3871 | 4.8464 | 8.7530 | 49 |
| 55 | GRAIN MILL PRODUCTS | .0235 | 5.2432 | 8.6093 | 50 |

# Table 21

1976 SAN DIEGO EMISSION COEFFICIENTS

SOX EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 92 | WATER TRANSPORATATION | 78.0556 | 85.1600 | 85.8694 | 1 |
| 47 | DRUGS | 55.4107 | 56.6340 | 57.5142 | 2 |
| 97 | ELECTRIC COMPANIES AND SYSTEMS | 43.8899 | 44.3930 | 44.8884 | 3 |
| 45 | GUM AND WOOD CHEMICALS | 20.6574 | 23.1048 | 23.7375 | 4 |
| 43 | INDUSTRIAL CHEMICALS | 8.5606 | 11.5813 | 12.2323 | 5 |
| 91 | TRUCK TRANSPORTATION | 9.8189 | 10.5824 | 11.5936 | 6 |
| 58 | BLAST FURNACES AND BASIC STEEL PROD | 9.1396 | 10.8857 | 11.5666 | 7 |
| 54 | CEMENT AND CONCRETE PRODUCTS | 7.5030 | 9.9077 | 10.8228 | 8 |
| 90 | LOCAL TRANSIT AND INTERCITY BUSES | 6.8007 | 8.2428 | 9.3390 | 9 |
| 15 | GREENHOUSE AND NURSERY PRODUCTS | 6.9572 | 7.8358 | 8.9299 | 10 |
| 16 | FORESTRY AND FISHERY PRODUCTS | 5.7287 | 6.6668 | 7.6337 | 11 |
| 44 | AGRICULTURAL CHEMICALS | 3.1051 | 6.2302 | 6.7962 | 12 |
| 99 | WATER AND SANITARY SERVICES | 1.4393 | 5.4588 | 6.5585 | 13 |
| 121 | STATE AND LOCAL GOVT ENTERPRISES | 3.2856 | 4.6731 | 5.9310 | 14 |
| 9 | HAY AND PASTURE | 1.1114 | 4.6398 | 5.2766 | 15 |
| 8 | BARLEY | 2.1902 | 4.0768 | 4.7078 | 16 |
| 50 | PETROLEUM REFINING AND RELATED PROD | 2.4544 | 4.3870 | 4.7003 | 17 |
| 46 | PLASTICS MATERIALS AND SYNTHETIC FI | .0064 | 3.7335 | 4.3657 | 18 |
| 89 | RAILROADS | 2.0682 | 3.1649 | 4.1619 | 19 |
| 14 | POTATOES | 1.1121 | 2.6694 | 3.5695 | 20 |
| 18 | STONE + CLAY MIN + QUARRY | .1872 | 2.6292 | 3.5429 | 21 |
| 7 | WHEAT | 1.4982 | 2.7406 | 3.4448 | 22 |
| 35 | LOGGING CAMPS + SAWMILLS | .4158 | 2.4790 | 3.2690 | 23 |
| 115 | HOSPITALS | .0280 | 2.0273 | 3.2575 | 24 |
| 57 | MISC STONE AND CLAY PRODUCTS | .5083 | 2.2536 | 3.1092 | 25 |
| 118 | NONPROFIT ORGANIZATIONS | .0028 | 1.6588 | 3.0827 | 26 |
| 1 | DAIRIES | 1.7872 | 2.4621 | 3.0137 | 27 |
| 21 | NEW CONSTRUCT, PUBLIC UTILITY | 1.6705 | 2.1948 | 2.9908 | 28 |
| 53 | GLASS | .6398 | 1.9369 | 2.8961 | 29 |
| 13 | DRIED BEANS | .1873 | 1.8961 | 2.8920 | 30 |
| 116 | OTHER MEDICAL SERVICES | .2238 | 1.5992 | 2.8614 | 31 |
| 106 | HOTELS AND LODGING PLACES | 0. | 1.9551 | 2.8565 | 32 |
| 12 | VEGETABLES | .9082 | 1.7799 | 2.8117 | 33 |
| 11 | CITRUS FRUITS | .3922 | 1.8823 | 2.8000 | 34 |
| 49 | PAINTS AND ALLIED PRODUCTS | 0. | 2.1604 | 2.7727 | 35 |
| 10 | NONCITRUS FRUITS | .6673 | 1.8381 | 2.7612 | 36 |
| 59 | IRON AND STEEL FOUNDRIES AND FORGIN | .3104 | 1.9741 | 2.7251 | 37 |
| 117 | EDUCATIONAL SERVICES | .0012 | 1.3525 | 2.6923 | 38 |
| 102 | BANKING AND FINANCIAL INTERMEDIARIE | .0625 | 1.0151 | 2.6413 | 39 |
| 55 | STRUCTURAL CLAY PRODUCTS | .5178 | 1.6282 | 2.6410 | 40 |
| 40 | PAPER + PAPERBOARD PRODUCTS | .6364 | 1.6818 | 2.3501 | 41 |
| 51 | RUBBER AND PLASTICS PRODUCTS | .3602 | 1.5643 | 2.2780 | 42 |
| 36 | MILLWORK, PLYWOOD + OTHER WOOD PROD | .9211 | 1.6160 | 2.2287 | 43 |
| 48 | CLEANING AND TOILET PREPARATIONS | .0023 | 1.5964 | 2.2278 | 44 |
| 96 | RADIO AND TELEVISION BROADCASTING | .0499 | 1.0932 | 2.1841 | 45 |
| 2 | BROILERS, CHICKENS AND EGGS | 1.2631 | 1.8654 | 2.1429 | 46 |
| 56 | POTTERY AND RELATED PRODUCTS | .0338 | 1.0315 | 2.0860 | 47 |
| 95 | COMMUNICATION EXCEPT RADIO AND TV | .0217 | 1.0193 | 1.9671 | 48 |
| 22 | NEW CONSTRUCT, HIGHWAYS | 0. | .9998 | 1.9646 | 49 |
| 28 | CANNED AND FROZEN FOODS | .0519 | 1.2848 | 1.9603 | 50 |

# Table 22

1976 SOUTH COAST EMISSION COEFFICIENTS

SOX EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 116 | ELECTRIC COMPANIES AND SYSTEMS | 38.4815 | 39.9595 | 40.5238 | 1 |
| 29 | METALS MINING | 31.1662 | 32.7242 | 33.4378 | 2 |
| 110 | WATER TRANSPORATATION | 12.0530 | 14.6782 | 15.4501 | 3 |
| 74 | BLAST FURNACES AND BASIC STEEL PROD | 7.4975 | 9.5051 | 10.2110 | 4 |
| 73 | MISC STONE AND CLAY PRODUCTS | 7.3895 | 9.2344 | 10.0937 | 5 |
| 26 | GREENHOUSE AND NURSERY PRODUCTS | 7.9759 | 8.9296 | 9.9085 | 6 |
| 27 | FORESTRY AND FISHERY PRODUCTS | 6.5675 | 7.7687 | 8.6714 | 7 |
| 12 | CORN | 6.3005 | 7.7346 | 8.3392 | 8 |
| 70 | CEMENT AND CONCRETE PRODUCTS | 4.9179 | 7.1036 | 7.9435 | 9 |
| 109 | TRUCK TRANSPORTATION | 5.7627 | 6.9262 | 7.9018 | 10 |
| 118 | WATER AND SANITARY SERVICES | 3.0765 | 6.3475 | 7.3052 | 11 |
| 108 | LOCAL TRANSIT AND INTERCITY BUSES | 3.9913 | 5.3699 | 6.3544 | 12 |
| 32 | STONE + CLAY MIN + QUARRY | 3.0907 | 5.0123 | 5.8526 | 13 |
| 7 | MISC. LIVESTOCK | 3.7407 | 5.1790 | 5.6518 | 14 |
| 60 | AGRICULTURAL CHEMICALS | 3.5598 | 4.9605 | 5.5784 | 15 |
| 69 | GLASS | 3.3008 | 4.6326 | 5.5756 | 16 |
| 14 | OATS | 3.3483 | 4.7449 | 5.3285 | 17 |
| 107 | RAILROADS | 3.2829 | 4.3854 | 5.2857 | 18 |
| 140 | STATE AND LOCAL GOVT ENTERPRISES | 2.8432 | 4.0065 | 5.1290 | 19 |
| 9 | COTTON | 2.1177 | 4.4071 | 5.0072 | 20 |
| 13 | HAY AND PASTURE | 1.2741 | 4.1419 | 4.7633 | 21 |
| 11 | BARLEY | 2.5109 | 4.1393 | 4.7454 | 22 |
| 23 | SUGAR BEETS | 2.2238 | 3.5723 | 4.3942 | 23 |
| 66 | PETROLEUM REFINING AND RELATED PROD | 2.4229 | 3.7073 | 4.1341 | 24 |
| 16 | WALNUTS | 1.9031 | 3.3084 | 4.0874 | 25 |
| 36 | NEW CONSTRUCT, PUBLIC UTILITY | 1.9151 | 3.0452 | 3.9598 | 26 |
| 71 | STRUCTURAL CLAY PRODUCTS | 1.6816 | 2.8676 | 3.7864 | 27 |
| 15 | GRASS SEED | .9216 | 2.9955 | 3.6565 | 28 |
| 17 | ALMONDS | 1.5141 | 2.7854 | 3.5680 | 29 |
| 24 | POTATOES | 1.2749 | 2.7420 | 3.5606 | 30 |
| 10 | WHEAT | 1.7176 | 2.8255 | 3.4845 | 31 |
| 112 | PIPELINE TRANSPORTATION | .0259 | 2.6809 | 3.4546 | 32 |
| 1 | DAIRIES | 2.0488 | 2.8367 | 3.3812 | 33 |
| 59 | INDUSTRIAL CHEMICALS | .2422 | 2.3809 | 3.0586 | 34 |
| 20 | VEGETABLES | 1.0412 | 2.0720 | 3.0172 | 35 |
| 75 | IRON AND STEEL FOUNDRIES AND FORGIN | .1062 | 2.1337 | 2.9373 | 36 |
| 18 | NONCITRUS FRUITS | .7650 | 2.0726 | 2.9346 | 37 |
| 30 | CRUDE PETROLEUM | 1.5237 | 2.1365 | 2.9270 | 38 |
| 77 | METAL CONTAINERS | .0065 | 2.1607 | 2.9044 | 39 |
| 19 | CITRUS FRUITS | .4496 | 1.9866 | 2.8439 | 40 |
| 134 | HOSPITALS | .0486 | 1.6064 | 2.7177 | 41 |
| 21 | DRIED BEANS | .2147 | 1.8107 | 2.7126 | 42 |
| 81 | METAL STAMPINGS | 0. | 1.8358 | 2.6458 | 43 |
| 79 | FABRICATED STRUCTURAL STEEL | .0013 | 1.8250 | 2.6240 | 44 |
| 2 | BROILERS, CHICKENS AND EGGS | 1.4480 | 2.1341 | 2.5370 | 45 |
| 47 | CONFECTIONARY PRODUCTS | 1.1180 | 1.9190 | 2.5307 | 46 |
| 22 | MELONS | .6331 | 1.5818 | 2.5271 | 47 |
| 51 | LOGGING CAMPS + SAWMILLS | .4766 | 1.8910 | 2.5193 | 48 |
| 137 | NONPROFIT ORGANIZATIONS | .0050 | 1.2840 | 2.5027 | 49 |
| 125 | HOTELS AND LODGING PLACES | 0. | 1.6427 | 2.4779 | 50 |

Table 23

1976 SAN JOAQUIN EMISSION COEFFICIENTS

SOX EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 144 | STATE AND LOCAL GOVT ENTERPRISES | 227.4393 | 230.0093 | 233.3719 | 1 |
| 122 | WATER AND SANITARY SERVICES | 2.1332 | 154.5342 | 157.3817 | 2 |
| 66 | GUM AND WOOD CHEMICALS | 66.5313 | 70.8618 | 72.7440 | 3 |
| 112 | LOCAL TRANSIT AND INTERCITY BUSES | 4.3214 | 56.7285 | 59.7033 | 4 |
| 35 | CRUDE PETROLEUM | 34.4472 | 35.8263 | 38.1220 | 5 |
| 115 | AIR TRANSPORTATION | 14.7540 | 22.1993 | 24.4783 | 6 |
| 114 | WATER TRANSPORATATION | 4.6203 | 18.6980 | 20.7632 | 7 |
| 139 | OTHER MEDICAL SERVICES | 15.4904 | 16.8584 | 20.1807 | 8 |
| 71 | PETROLEUM REFINING AND RELATED PROD | 2.3443 | 16.4101 | 18.0576 | 9 |
| 64 | INDUSTRIAL CHEMICALS | 7.8894 | 13.6150 | 15.7073 | 10 |
| 121 | GAS COMPANIES AND SYSTEMS | .0038 | 11.3133 | 12.9449 | 11 |
| 113 | TRUCK TRANSPORTATION | 6.2392 | 9.5962 | 12.5205 | 12 |
| 65 | AGRICULTURAL CHEMICALS | 5.6674 | 10.4560 | 12.4438 | 13 |
| 34 | METALS MINING | 8.0161 | 9.7821 | 11.8970 | 14 |
| 36 | NATURAL GAS + N.G. LIQUIDS | 0. | 9.6796 | 11.7127 | 15 |
| 76 | STRUCTURAL CLAY PRODUCTS | 6.6295 | 8.3682 | 11.0911 | 16 |
| 18 | FOOD, FEED GRAINS, NEC | 4.7527 | 9.4093 | 10.9247 | 17 |
| 125 | BANKING AND FINANCIAL INTERMEDIARIE | 4.3242 | 6.2136 | 10.2118 | 18 |
| 79 | BLAST FURNACES AND BASIC STEEL PROD | 5.4179 | 7.4152 | 9.3849 | 19 |
| 13 | CLAN | 3.2579 | 7.3818 | 9.2399 | 20 |
| 120 | ELECTRIC COMPANIES AND SYSTEMS | .0167 | 6.8001 | 8.6472 | 21 |
| 31 | GREENHOUSE AND NURSERY PRODUCTS | 4.1242 | 5.4583 | 8.3440 | 22 |
| 32 | FORESTRY AND FISHERY PRODUCTS | 3.3959 | 5.4300 | 8.0552 | 23 |
| 16 | SORGHUM GRAIN | 2.0275 | 6.0727 | 7.9703 | 24 |
| 11 | RICE | 1.6906 | 5.1869 | 7.3335 | 25 |
| 119 | RADIO AND TELEVISION BROADCASTING | 3.4541 | 4.6092 | 7.2204 | 26 |
| 12 | BARLEY | 1.2984 | 5.3111 | 7.2181 | 27 |
| 15 | OATS | 1.7314 | 5.4576 | 7.2094 | 28 |
| 128 | REAL ESTATE | 1.7502 | 5.5922 | 6.9910 | 29 |
| 27 | SUGAR BEETS | 1.1499 | 4.4644 | 6.9340 | 30 |
| 143 | OTHER FEDERAL GOVT ENTERPRISES | 2.6913 | 3.5388 | 6.8963 | 31 |
| 9 | COTTON | 1.0950 | 5.1602 | 6.7168 | 32 |
| 111 | RAILROADS | 1.6473 | 3.9290 | 6.7166 | 33 |
| 28 | POTATOES | .6593 | 3.9999 | 6.6987 | 34 |
| 67 | PLASTICS MATERIALS AND SYNTHETIC FI | .0038 | 4.7323 | 6.6188 | 35 |
| 10 | WHEAT | .8881 | 4.4150 | 6.6043 | 36 |
| 7 | MISC. LIVESTOCK | 1.9343 | 4.6383 | 6.5947 | 37 |
| 138 | HOSPITALS | .0329 | 3.2544 | 6.5512 | 38 |
| 24 | VEGETABLES | .5384 | 3.7510 | 6.4856 | 39 |
| 134 | AUTOMOBILE REPAIR | .0001 | 4.1547 | 6.4325 | 40 |
| 140 | EDUCATIONAL SERVICES | .0808 | 2.8711 | 6.4165 | 41 |
| 26 | MELONS | .3274 | 3.5875 | 6.3135 | 42 |
| 14 | HAY AND PASTURE | .6588 | 4.4279 | 6.3118 | 43 |
| 142 | POST OFFICE | 1.4033 | 2.1780 | 6.1654 | 44 |
| 25 | DRIED BEANS | .1110 | 3.2647 | 5.9753 | 45 |
| 19 | WALNUTS | .9841 | 3.6733 | 5.9673 | 46 |
| 137 | DOCTORS AND DENTISTS | .2890 | 2.1688 | 5.9224 | 47 |
| 23 | FRUIT AND TREE NUTS, NEC | .8641 | 3.5582 | 5.8561 | 48 |
| 141 | NONPROFIT ORGANIZATIONS | .1950 | 2.0342 | 5.7894 | 49 |
| 29 | SWEET POTATOES | .1593 | 2.8226 | 5.7587 | 50 |

Table 24

1976 SAN FRANCISCO EMISSION COEFFICIENTS

SOX EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 55 | INDUSTRIAL CHEMICALS | 39.2262 | 48.8309 | 49.4538 | 1 |
| 58 | PLASTICS MATERIALS AND SYNTHETIC FI | .0074 | 17.1483 | 17.7896 | 2 |
| 56 | AGRICULTURAL CHEMICALS | .0101 | 16.9544 | 17.5906 | 3 |
| 112 | ELECTRIC COMPANIES AND SYSTEMS | 9.5376 | 12.1013 | 12.5566 | 4 |
| 57 | GUM AND WOOD CHEMICALS | .2032 | 11.1972 | 11.8331 | 5 |
| 61 | PAINTS AND ALLIED PRODUCTS | 0. | 10.7121 | 11.3520 | 6 |
| 11 | CORN | 6.3536 | 10.3971 | 10.9580 | 7 |
| 23 | GREENHOUSE AND NURSERY PRODUCTS | 8.0432 | 9.5745 | 10.4481 | 8 |
| 136 | STATE AND LOCAL GOVT ENTERPRISES | 6.6965 | 8.2813 | 9.3040 | 9 |
| 106 | WATER TRANSPORATATION | 5.6488 | 8.4805 | 9.1541 | 10 |
| 24 | FORESTRY AND FISHERY PRODUCTS | 6.6229 | 8.0254 | 8.8122 | 11 |
| 14 | SORGHUM GRAIN | 3.9542 | 8.1886 | 8.7654 | 12 |
| 114 | WATER AND SANITARY SERVICES | 2.4884 | 7.6394 | 8.4106 | 13 |
| 13 | OATS | 3.3765 | 7.4178 | 7.9617 | 14 |
| 60 | CLEANING AND TOILET PREPARATIONS | .0026 | 7.1357 | 7.7990 | 15 |
| 10 | BARLEY | 2.5321 | 6.7423 | 7.3073 | 16 |
| 66 | CEMENT AND CONCRETE PRODUCTS | 4.2053 | 6.4054 | 7.1953 | 17 |
| 62 | PETROLEUM REFINING AND RELATED PROD | 4.2185 | 6.7726 | 7.0702 | 18 |
| 12 | HAY AND PASTURE | 1.2849 | 5.7664 | 6.3467 | 19 |
| 105 | TRUCK TRANSPORTATION | 4.0335 | 5.1811 | 6.0643 | 20 |
| 20 | SUGAR BEETS | 2.2426 | 5.1528 | 5.9118 | 21 |
| 104 | LOCAL TRANSIT AND INTERCITY BUSES | 2.7937 | 4.9224 | 5.7825 | 22 |
| 9 | WHEAT | 1.7321 | 4.6276 | 5.2372 | 23 |
| 63 | RUBBER AND PLASTICS PRODUCTS | 1.6506 | 4.4960 | 5.1308 | 24 |
| 26 | METALS MINING | 2.6494 | 4.4087 | 5.0791 | 25 |
| 15 | WALNUTS | 1.9192 | 4.2224 | 4.9381 | 26 |
| 7 | MISC. LIVESTOCK | 3.7722 | 4.5174 | 4.9108 | 27 |
| 59 | DRUGS | .0329 | 3.7780 | 4.5715 | 28 |
| 16 | ALMONDS | 1.5269 | 3.7242 | 4.4436 | 29 |
| 65 | GLASS | 1.7750 | 3.5769 | 4.3979 | 30 |
| 18 | VEGETABLES | 1.0500 | 3.2880 | 4.1520 | 31 |
| 21 | POTATOES | 1.2857 | 3.3968 | 4.1396 | 32 |
| 17 | NONCITRUS FRUITS | .7714 | 3.3226 | 4.1152 | 33 |
| 32 | NEW CONSTRUCT, PUBLIC UTILITY | 1.9312 | 2.8240 | 3.6237 | 34 |
| 68 | POTTERY AND RELATED PRODUCTS | .0328 | 2.5900 | 3.4581 | 35 |
| 103 | RAILROADS | 1.4921 | 2.5241 | 3.3482 | 36 |
| 19 | DRIED BEANS | .2165 | 2.4767 | 3.2985 | 37 |
| 22 | SAFFLOWER | .7602 | 2.4147 | 3.0790 | 38 |
| 52 | PAPER + PAPERBOARD PRODUCTS | .3504 | 2.3525 | 3.0436 | 39 |
| 1 | DAIRIES | 2.0661 | 2.5627 | 3.0303 | 40 |
| 69 | MISC STONE AND CLAY PRODUCTS | .4935 | 2.2316 | 2.9686 | 41 |
| 36 | ORDNANCE + GUIDED MISSILES | .1401 | 2.0735 | 2.8735 | 42 |
| 29 | STONE + CLAY MIN + QUARRY | .1817 | 1.9439 | 2.7119 | 43 |
| 48 | MILLWORK, PLYWOOD + OTHER WOOD PROD | 1.0649 | 2.1266 | 2.7051 | 44 |
| 96 | MISC ELECTRICAL PRODUCTS | .0013 | 1.7667 | 2.5535 | 45 |
| 101 | CLOCKS AND SCIENTIFIC EQUIPMENT | .0023 | 1.6743 | 2.5393 | 46 |
| 67 | STRUCTURAL CLAY PRODUCTS | .5027 | 1.7294 | 2.5177 | 47 |
| 33 | NEW CONSTRUCT, HIGHWAYS | 0. | 1.5675 | 2.4358 | 48 |
| 70 | BLAST FURNACES AND BASIC STEEL PROD | .0564 | 1.7013 | 2.3581 | 49 |
| 27 | CRUDE PETROLEUM | .5105 | 1.6011 | 2.3310 | 50 |

(c) Nitrogen Oxides

The principal sectors ranked according to total emission coefficients of nitrogen oxides are shown in Table 25. As can be seen from the Table the transportation sectors are prominent. The Truck Transportation and Local Transit & Intercity Buses sectors place in the top ten sectors statewide and in each of the four basins with the notable exception of the Truck Transportation sector in the San Francisco basin. Railroads also place in the ten principal sectors in four of the five cases, ranking eleventh in the San Joaquin basin. Air Transportation ranks first in the San Joaquin basin and eighth in the San Diego basin.

Several non-transportation sectors are also prominent among the principal sectors. Forestry and Fishery Products appears in the top ten in each of the five cases. The State & Local Government Enterprises and the Water & Sanitary Services sectors appear among the principal sectors in each listing, save for that of San Diego where they rank twelfth and fourteenth respectively. The Corn sector, ranked seventh statewide, places sixth in the South Coast and San Francisco basins and tenth in the San Joaquin.

The Air Transportation sector in the San Joaquin basin has the highest NOx emission rate of all sectors. Its coefficient of 281.9 tons per million dollars of production for final demand significantly exceeds the second ranked coefficient of 225.0 associated with the Local Transit & Intercity Buses sector in the San Francisco basin. Overall, the sectors of the San Joaquin basin again display the highest coefficients.

The fifty principal sectors, ranked by total NOx emission coefficients, in each of the five economies are shown as follows:

Table 25

Nitrogen Oxide Emission Coefficients Ranking - 1976

| Region | I-O No. | Sector Name | Direct Emission Coeff. (Tons/$10^6$) | Total Emission Coeff. (Tons/$10^6$) | Rank |
|---|---|---|---|---|---|
| Calif. | 121 | Truck Transportation | 70.3 | 87.6 | 1 |
| | 120 | Local Transit & Intercity Bus. | 49.6 | 68.0 | 2 |
| | 18 | Food, Feed Grains, nec. | 32.5 | 51.8 | 3 |
| | 152 | State & Local Gov. Enterprises | 40.7 | 51.4 | 4 |
| | 130 | Water & Sanitary Services | 9.6 | 47.3 | 5 |
| | 37 | Forestry & Fishery Products | 25.8 | 37.4 | 6 |
| | 13 | Corn | 22.9 | 34.4 | 7 |
| | 119 | Railroads | 23.6 | 34.3 | 8 |
| | 82 | Cement & Concrete Products | 15.6 | 33.6 | 9 |
| | 7 | Misc. Livestock | 8.7 | 28.0 | 10 |
| San Diego | 91 | Truck Transportation | 169.2 | 180.7 | 1 |
| | 90 | Local Transit & Intercity Bus. | 119.4 | 124.2 | 2 |
| | 47 | Drugs | 74.5 | 77.9 | 3 |
| | 97 | Electric Companies & Systems | 37.6 | 39.6 | 4 |
| | 92 | Water Transportation | 32.4 | 39.0 | 5 |
| | 16 | Forestry & Fishery Products | 22.0 | 25.8 | 6 |
| | 89 | Railroads | 15.4 | 19.9 | 7 |
| | 93 | Air Transportation | 14.2 | 17.9 | 8 |
| | 55 | Structural Clay Products | 9.2 | 13.4 | 9 |
| | 122 | Dummy Industries | 0.0 | 11.5 | 10 |

Table 25 (Contd.)

| Region | I-O No. | Sector Name | Direct Emission Coeff. (Tons/$10^6$) | Total Emission Coeff. (Tons/$10^6$) | Rank |
|---|---|---|---|---|---|
| South Coast | 109 | Truck Transportation | 55.5 | 65.3 | 1 |
| | 108 | Local Transit & Intercity Bus. | 39.1 | 46.0 | 2 |
| | 116 | Electric Companies & Systems | 28.7 | 31.7 | 3 |
| | 27 | Forestry & Fishery Products | 24.5 | 28.0 | 4 |
| | 107 | Railroads | 21.9 | 25.8 | 5 |
| | 12 | Corn | 21.7 | 24.8 | 6 |
| | 118 | Water & Sanitary Services | 7.0 | 21.2 | 7 |
| | 140 | State & Local Gov. Enterprises | 15.9 | 20.0 | 8 |
| | 110 | Water Transportation | 11.0 | 17.0 | 9 |
| | 70 | Cement & Concrete Products | 8.7 | 16.2 | 10 |
| San Joaquin | 115 | Air Transportation | 272.7 | 281.9 | 1 |
| | 144 | State & Local Gov. Enterprises | 139.9 | 146.6 | 2 |
| | 76 | Structural Clay Products | 122.7 | 129.4 | 3 |
| | 34 | Metals Mining | 105.3 | 112.1 | 4 |
| | 122 | Water & Sanitary Services | 2.8 | 101.0 | 5 |
| | 113 | Truck Transportation | 78.6 | 92.5 | 6 |
| | 112 | Local Transit & Intercity Bus. | 55.4 | 92.2 | 7 |
| | 18 | Food, Feed, Grains, nec. | 19.8 | 26.7 | 8 |
| | 32 | Forestry & Fishery Products | 15.7 | 21.1 | 9 |
| | 13 | Corn | 13.9 | 20.4 | 10 |

Table 25 (contd.)

| Region | I-O No. | Sector Name | Direct Emission Coeff. (Tons/$10^6$) | Total Emission Coeff. (Tons/$10^6$) | Rank |
|---|---|---|---|---|---|
| San Franc. | 104 | Local Transit & Intercity Bus. | 213.6 | 225.0 | 1 |
| | 136 | State & Local Gov. Enterprises | 41.5 | 45.2 | 2 |
| | 114 | Water & Sanitary Services | 0.1 | 26.5 | 3 |
| | 24 | Forestry & Fishery Products | 23.2 | 25.9 | 4 |
| | 112 | Electric Companies & Systems | 22.7 | 24.5 | 5 |
| | 11 | Corn | 20.5 | 23.2 | 6 |
| | 137 | Dummy Industries | 0.0 | 18.6 | 7 |
| | 14 | Sorgum Grain | 12.7 | 15.7 | 8 |
| | 103 | Railroads | 10.9 | 15.7 | 9 |
| | 13 | Oats | 10.6 | 13.3 | 10 |

Table 26

1976 CALIFORNIA EMISSION COEFFICIENTS

NOX EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 121 | TRUCK TRANSPORTATION | 70.2863 | 80.9568 | 87.5596 | 1 |
| 120 | LOCAL TRANSIT AND INTERCITY BUSES | 49.5808 | 61.2995 | 68.0330 | 2 |
| 18 | FOOD, FEED GRAINS, NEC | 32.5000 | 46.3681 | 51.7800 | 3 |
| 152 | STATE AND LOCAL GOVT ENTERPRISES | 40.6574 | 43.7109 | 51.4317 | 4 |
| 130 | WATER AND SANITARY SERVICES | 9.5662 | 40.4266 | 47.2712 | 5 |
| 37 | FORESTRY AND FISHERY PRODUCTS | 25.8255 | 30.5188 | 37.4068 | 6 |
| 13 | CORN | 22.9050 | 29.1628 | 34.4225 | 7 |
| 119 | RAILROADS | 23.5513 | 27.8144 | 34.2958 | 8 |
| 82 | CEMENT AND CONCRETE PRODUCTS | 15.5923 | 26.8109 | 33.5880 | 9 |
| 7 | MISC. LIVESTOCK | 8.7209 | 22.0384 | 28.0496 | 10 |
| 128 | ELECTRIC COMPANIES AND SYSTEMS | 19.5296 | 22.8649 | 27.6316 | 11 |
| 16 | SORGHUM GRAIN | 14.1973 | 19.9903 | 25.2627 | 12 |
| 15 | OATS | 11.8571 | 18.4288 | 23.7429 | 13 |
| 11 | RICE | 11.2508 | 17.1769 | 22.8974 | 14 |
| 4 | CATTLE AND CALVES | 2.5065 | 17.4566 | 22.6830 | 15 |
| 6 | SHEEP, LAMBS, AND WOOL | 1.4642 | 17.0554 | 22.3492 | 16 |
| 1 | DAIRIES | 5.0168 | 15.4642 | 21.3200 | 17 |
| 2 | BROILERS, CHICKENS AND EGGS | 1.1902 | 15.2185 | 20.7952 | 18 |
| 12 | BARLEY | 8.7970 | 14.8635 | 20.1686 | 19 |
| 8 | APIARY PRODUCTS | .4145 | 14.1950 | 20.1321 | 20 |
| 52 | MEAT PRODUCTS | 0. | 14.1803 | 19.7922 | 21 |
| 122 | WATER TRANSPORATATION | 6.6927 | 13.4233 | 19.2724 | 22 |
| 3 | TURKEYS AND OTHER POULTRY | .2476 | 13.6265 | 19.1484 | 23 |
| 47 | NEW CONSTRUCT, PUBLIC UTILITY | 6.7995 | 11.7744 | 18.9684 | 24 |
| 55 | GRAIN MILL PRODUCTS | .0014 | 12.9758 | 18.7376 | 25 |
| 83 | STRUCTURAL CLAY PRODUCTS | 7.8849 | 11.7498 | 18.6171 | 26 |
| 63 | LOGGING CAMPS + SAWMILLS | .0597 | 11.1159 | 18.1605 | 27 |
| 9 | COTTON | 7.1976 | 12.9188 | 17.9402 | 28 |
| 10 | WHEAT | 6.0438 | 11.8662 | 17.5976 | 29 |
| 29 | SUGAR BEETS | 7.7972 | 11.2864 | 17.1895 | 30 |
| 154 | DUMMY INDUSTRIES | 0. | 10.6769 | 16.9952 | 31 |
| 53 | DAIRY PRODUCTS | .0005 | 10.3667 | 16.5082 | 32 |
| 5 | HOGS | .8333 | 11.1932 | 16.2501 | 33 |
| 20 | WALNUTS | 6.8988 | 10.3422 | 15.9730 | 34 |
| 72 | AGRICULTURAL CHEMICALS | 2.3886 | 9.4720 | 15.9234 | 35 |
| 31 | POTATOES | 4.2903 | 9.0337 | 15.7204 | 36 |
| 54 | CANNED AND FROZEN FOODS | .0014 | 9.0846 | 15.5290 | 37 |
| 14 | HAY AND PASTURE | 3.8660 | 10.1587 | 15.4207 | 38 |
| 86 | BLAST FURNACES AND BASIC STEEL PROD | 2.2863 | 8.8000 | 15.3484 | 39 |
| 24 | FRUIT AND TREE NUTS, NEC | 6.3636 | 9.6645 | 15.3166 | 40 |
| 48 | NEW CONSTRUCT, HIGHWAYS | 0. | 7.1778 | 14.3078 | 41 |
| 25 | VEGETABLES | 3.8964 | 7.5588 | 14.2905 | 42 |
| 71 | INDUSTRIAL CHEMICALS | 2.5711 | 7.9176 | 14.1568 | 43 |
| 123 | AIR TRANSPORTATION | 4.4868 | 8.0925 | 13.9112 | 44 |
| 85 | MISC STONE AND CLAY PRODUCTS | 1.8149 | 6.8608 | 13.7491 | 45 |
| 74 | PLASTICS MATERIALS AND SYNTHETIC FI | 1.2430 | 7.1805 | 13.6133 | 46 |
| 93 | METAL STAMPINGS | 1.2952 | 6.4322 | 13.5884 | 47 |
| 21 | ALMONDS | 4.6435 | 7.9214 | 13.5446 | 48 |
| 36 | GREENHOUSE AND NURSERY PRODUCTS | 3.7722 | 6.6762 | 13.4691 | 49 |
| 89 | METAL CONTAINERS | .1902 | 6.3886 | 13.4053 | 50 |

1976 SAN DIEGO EMISSION COEFFICIENTS

NOX EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 91 | TRUCK TRANSPORTATION | 169.2341 | 178.7503 | 180.6798 | 1 |
| 90 | LOCAL TRANSIT AND INTERCITY BUSES | 119.3798 | 122.1215 | 124.2131 | 2 |
| 47 | DRUGS | 74.5355 | 76.2449 | 77.9243 | 3 |
| 97 | ELECTRIC COMPANIES AND SYSTEMS | 37.6473 | 38.6454 | 39.5906 | 4 |
| 92 | WATER TRANSPORATATION | 32.3600 | 37.6488 | 39.0024 | 5 |
| 16 | FORESTRY AND FISHERY PRODUCTS | 22.0104 | 23.9082 | 25.7532 | 6 |
| 85 | RAILROADS | 15.3895 | 17.9532 | 19.8557 | 7 |
| 93 | AIR TRANSPORTATION | 14.1589 | 16.2012 | 17.8585 | 8 |
| 55 | STRUCTURAL CLAY PRODUCTS | 9.2157 | 11.4970 | 13.4294 | 9 |
| 122 | DUMMY INDUSTRIES | 0. | 10.2846 | 11.4965 | 10 |
| 8 | BARLEY | 7.4974 | 10.1560 | 11.3598 | 11 |
| 121 | STATE AND LOCAL GOVT ENTERPRISES | 4.8729 | 6.9979 | 9.3980 | 12 |
| 99 | WATER AND SANITARY SERVICES | 1.4712 | 7.1263 | 9.2245 | 13 |
| 21 | NEW CONSTRUCT, PUBLIC UTILITY | 5.7950 | 7.3082 | 8.8271 | 14 |
| 7 | WHEAT | 5.1509 | 7.0802 | 8.4239 | 15 |
| 9 | HAY AND PASTURE | 3.2949 | 7.1686 | 8.3835 | 16 |
| 35 | LOGGING CAMPS + SAWMILLS | .0508 | 6.1699 | 7.6773 | 17 |
| 1 | DAIRIES | 4.2757 | 6.5303 | 7.5828 | 18 |
| 54 | CEMENT AND CONCRETE PRODUCTS | .0550 | 5.6827 | 7.4288 | 19 |
| 14 | POTATOES | 3.6565 | 5.6231 | 7.3405 | 20 |
| 15 | GREENHOUSE AND NURSERY PRODUCTS | 3.2149 | 4.7793 | 6.8668 | 21 |
| 28 | CANNED AND FROZEN FOODS | .0012 | 5.4420 | 6.7308 | 22 |
| 12 | VEGETABLES | 3.3208 | 4.7391 | 6.7077 | 23 |
| 53 | GLASS | 2.5622 | 4.6267 | 6.4569 | 24 |
| 58 | BLAST FURNACES AND BASIC STEEL PROD | 1.9485 | 5.0234 | 6.3226 | 25 |
| 57 | MISC STONE AND CLAY PRODUCTS | 2.1212 | 4.6543 | 6.2870 | 26 |
| 44 | AGRICULTURAL CHEMICALS | 2.0357 | 5.1061 | 6.1860 | 27 |
| 43 | INDUSTRIAL CHEMICALS | 2.1913 | 4.8720 | 6.1141 | 28 |
| 119 | POST OFFICE | .1091 | 3.1718 | 6.0186 | 29 |
| 10 | NONCITRUS FRUITS | 2.2734 | 3.9552 | 5.7166 | 30 |
| 22 | NEW CONSTRUCT, HIGHWAYS | 0. | 3.5622 | 5.4031 | 31 |
| 46 | PLASTICS MATERIALS AND SYNTHETIC FI | 1.0594 | 3.8300 | 5.0363 | 32 |
| 115 | HOSPITALS | .0503 | 2.6448 | 4.9920 | 33 |
| 11 | CITRUS FRUITS | 1.2487 | 3.2171 | 4.9681 | 34 |
| 118 | NONPROFIT ORGANIZATIONS | .0110 | 1.9878 | 4.7047 | 35 |
| 13 | DRIED BEANS | .6470 | 2.8044 | 4.7046 | 36 |
| 102 | BANKING AND FINANCIAL INTERMEDIARIE | .1050 | 1.5298 | 4.6326 | 37 |
| 18 | STONE + CLAY MIN + QUARRY | .4728 | 2.8298 | 4.5731 | 38 |
| 45 | GUM AND WOOD CHEMICALS | .7851 | 3.3446 | 4.5517 | 39 |
| 116 | OTHER MEDICAL SERVICES | .2470 | 2.0261 | 4.4344 | 40 |
| 117 | EDUCATIONAL SERVICES | .0463 | 1.8402 | 4.3967 | 41 |
| 106 | HOTELS AND LODGING PLACES | .0136 | 2.5730 | 4.2928 | 42 |
| 59 | IRON AND STEEL FOUNDRIES AND FORGIN | .2297 | 2.6182 | 4.2511 | 43 |
| 63 | METAL STAMPINGS | 1.1038 | 2.7232 | 4.1260 | 44 |
| 19 | NEW CONSTRUCT, RESIDENT | 1.0310 | 2.3550 | 4.0135 | 45 |
| 4 | CATTLE AND CALVES | 2.1362 | 3.5019 | 3.9599 | 46 |
| 56 | POTTERY AND RELATED PRODUCTS | .1673 | 1.8593 | 3.8713 | 47 |
| 50 | PETROLEUM REFINING AND RELATED PROD | 1.1205 | 3.2518 | 3.8495 | 48 |
| 49 | PAINTS AND ALLIED PRODUCTS | .0092 | 2.5678 | 3.7359 | 49 |
| 96 | RADIO AND TELEVISION BROADCASTING | .0423 | 1.6366 | 3.7181 | 50 |

Table 28

1976 SOUTH COAST EMISSION COEFFICIENTS

NOX EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 109 | TRUCK TRANSPORTATION | 55.4617 | 63.3918 | 65.2785 | 1 |
| 108 | LOCAL TRANSIT AND INTERCITY BUSES | 39.1234 | 44.1261 | 46.0298 | 2 |
| 116 | ELECTRIC COMPANIES AND SYSTEMS | 28.6667 | 30.6022 | 31.6934 | 3 |
| 27 | FORESTRY AND FISHERY PRODUCTS | 24.4637 | 26.2541 | 27.9997 | 4 |
| 107 | RAILROADS | 21.9293 | 24.0271 | 25.7681 | 5 |
| 12 | CORN | 21.6972 | 23.6501 | 24.8191 | 6 |
| 118 | WATER AND SANITARY SERVICES | 6.9760 | 19.3692 | 21.2213 | 7 |
| 140 | STATE AND LOCAL GOVT ENTERPRISES | 15.9307 | 17.7822 | 19.9529 | 8 |
| 110 | WATER TRANSPORATATION | 10.9538 | 15.5264 | 17.0191 | 9 |
| 70 | CEMENT AND CONCRETE PRODUCTS | 8.7002 | 14.5446 | 16.1688 | 10 |
| 14 | OATS | 11.2319 | 13.1921 | 14.3207 | 11 |
| 11 | BARLEY | 8.3331 | 10.5025 | 11.6746 | 12 |
| 7 | MISC. LIVESTOCK | 8.2611 | 10.4212 | 11.3355 | 13 |
| 23 | SUGAR BEETS | 7.3860 | 9.0729 | 10.6623 | 14 |
| 36 | NEW CONSTRUCT, PUBLIC UTILITY | 6.4410 | 8.7625 | 10.5313 | 15 |
| 9 | COTTON | 6.8180 | 9.3092 | 10.4697 | 16 |
| 16 | WALNUTS | 6.5350 | 8.2642 | 9.7707 | 17 |
| 29 | METALS MINING | 6.3112 | 7.8861 | 9.2662 | 18 |
| 69 | GLASS | 5.1223 | 7.3418 | 9.1653 | 19 |
| 74 | BLAST FURNACES AND BASIC STEEL PROD | 4.3087 | 7.4066 | 8.7717 | 20 |
| 10 | WHEAT | 5.7251 | 7.4725 | 8.7467 | 21 |
| 33 | CHEM + FERT MINERAL MIN | 5.2794 | 6.7795 | 8.4445 | 22 |
| 1 | DAIRIES | 4.7523 | 6.9875 | 8.0405 | 23 |
| 13 | HAY AND PASTURE | 3.6621 | 6.7263 | 7.9280 | 24 |
| 17 | ALMONDS | 4.3986 | 6.0094 | 7.5228 | 25 |
| 71 | STRUCTURAL CLAY PRODUCTS | 3.6302 | 5.7253 | 7.5022 | 26 |
| 24 | POTATOES | 4.0641 | 5.8441 | 7.4271 | 27 |
| 73 | MISC STONE AND CLAY PRODUCTS | 2.9644 | 5.6057 | 7.2675 | 28 |
| 20 | VEGETABLES | 3.6910 | 5.2153 | 7.0431 | 29 |
| 26 | GREENHOUSE AND NURSERY PRODUCTS | 3.5733 | 5.0047 | 6.8976 | 30 |
| 15 | GRASS SEED | 2.7468 | 5.3879 | 6.6660 | 31 |
| 141 | DUMMY INDUSTRIES | 0. | 4.8842 | 6.2654 | 32 |
| 43 | CANNED AND FROZEN FOODS | .0009 | 4.6736 | 6.0622 | 33 |
| 111 | AIR TRANSPORTATION | 2.4571 | 4.3587 | 5.9475 | 34 |
| 18 | NONCITRUS FRUITS | 2.5268 | 4.1587 | 5.8257 | 35 |
| 37 | NEW CONSTRUCT, HIGHWAYS | 0. | 3.9475 | 5.7968 | 36 |
| 22 | MELONS | 2.3601 | 3.8414 | 5.6694 | 37 |
| 51 | LOGGING CAMPS + SAWMILLS | .1478 | 3.9780 | 5.1929 | 38 |
| 62 | PLASTICS MATERIALS AND SYNTHETIC FI | 1.6566 | 3.7371 | 4.9289 | 39 |
| 138 | POST OFFICE | .3565 | 2.4428 | 4.9097 | 40 |
| 19 | CITRUS FRUITS | 1.3879 | 3.2010 | 4.8589 | 41 |
| 77 | METAL CONTAINERS | .4992 | 3.3919 | 4.8303 | 42 |
| 34 | NEW CONSTRUCT, RESIDENT | 1.1459 | 3.0259 | 4.7911 | 43 |
| 32 | STONE + CLAY MIN + QUARRY | .6501 | 3.0337 | 4.6587 | 44 |
| 31 | NATURAL GAS + N.G. LIQUIDS | 2.3443 | 3.4588 | 4.6224 | 45 |
| 136 | EDUCATIONAL SERVICES | .7791 | 2.2122 | 4.4464 | 46 |
| 112 | PIPELINE TRANSPORTATION | .1469 | 2.9278 | 4.4241 | 47 |
| 134 | HOSPITALS | .2207 | 2.2669 | 4.4160 | 48 |
| 21 | DRIED BEANS | .7191 | 2.6540 | 4.3981 | 49 |
| 135 | OTHER MEDICAL SERVICES | .8074 | 2.1457 | 4.3044 | 50 |

Table 29

1976 SAN JOAQUIN EMISSION COEFFICIENTS

NOX EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 115 | AIR TRANSPORTATION | 272.6840 | 279.2609 | 281.9075 | 1 |
| 144 | STATE AND LOCAL GOVT ENTERPRISES | 139.9289 | 142.7276 | 146.6327 | 2 |
| 76 | STRUCTURAL CLAY PRODUCTS | 122.6998 | 126.2433 | 129.4054 | 3 |
| 34 | METALS MINING | 105.2676 | 109.6552 | 112.1113 | 4 |
| 122 | WATER AND SANITARY SERVICES | 2.8293 | 97.6873 | 100.9942 | 5 |
| 113 | TRUCK TRANSPORTATION | 78.6018 | 89.0813 | 92.4774 | 6 |
| 112 | LOCAL TRANSIT AND INTERCITY BUSES | 55.4467 | 88.7581 | 92.2128 | 7 |
| 10 | FCLD, FEED GRAINS, NEC | 19.7640 | 24.9194 | 26.6792 | 8 |
| 32 | FORESTRY AND FISHERY PRODUCTS | 15.7051 | 18.0286 | 21.0773 | 9 |
| 13 | CORN | 13.9291 | 18.2164 | 20.3742 | 10 |
| 111 | RAILROADS | 13.5765 | 17.0186 | 20.2559 | 11 |
| 35 | CRUDE PETROLEUM | 15.4412 | 16.8744 | 19.5404 | 12 |
| 51 | SUGAR | 4.5797 | 14.6348 | 17.1654 | 13 |
| 114 | WATER TRANSPORATATION | 2.3647 | 13.3281 | 15.7265 | 14 |
| 16 | SORGHUM GRAIN | 8.6337 | 12.9067 | 15.1105 | 15 |
| 75 | CEMENT AND CONCRETE PRODUCTS | 4.4517 | 11.5303 | 14.6956 | 16 |
| 71 | PETROLEUM REFINING AND RELATED PROD | 4.1352 | 12.2939 | 14.2071 | 17 |
| 120 | ELECTRIC COMPANIES AND SYSTEMS | 5.8075 | 11.4920 | 13.6372 | 18 |
| 11 | RICE | 6.8418 | 10.8475 | 13.3404 | 19 |
| 15 | OATS | 7.2106 | 11.0732 | 13.1075 | 20 |
| 139 | OTHER MEDICAL SERVICES | 7.0916 | 8.8314 | 12.6897 | 21 |
| 7 | MISC. LIVESTOCK | 5.3034 | 10.3674 | 12.6394 | 22 |
| 12 | BARLEY | 5.3497 | 9.7673 | 11.9819 | 23 |
| 142 | POST OFFICE | 3.1314 | 6.5436 | 11.1742 | 24 |
| 1 | DAIRIES | 3.0509 | 8.1882 | 10.7292 | 25 |
| 27 | SUGAR BEETS | 4.7416 | 7.7363 | 10.6042 | 26 |
| 145 | DUMMY INDUSTRIES | 0. | 8.8658 | 10.3824 | 27 |
| 10 | WHEAT | 3.6754 | 7.8312 | 10.3737 | 28 |
| 128 | REAL ESTATE | 5.5507 | 8.6226 | 10.2470 | 29 |
| 9 | COTTON | 4.3770 | 8.3329 | 10.1407 | 30 |
| 65 | AGRICULTURAL CHEMICALS | 3.2387 | 7.5478 | 9.8563 | 31 |
| 140 | EDUCATIONAL SERVICES | 2.9223 | 5.5479 | 9.6652 | 32 |
| 41 | NEW CONSTRUCT, PUBLIC UTILITY | 4.1349 | 6.8895 | 9.6461 | 33 |
| 125 | BANKING AND FINANCIAL INTERMEDIARIE | 3.0145 | 4.9448 | 9.5879 | 34 |
| 19 | WALNUTS | 4.1953 | 6.8713 | 9.5354 | 35 |
| 4 | CATTLE AND CALVES | 1.5242 | 7.4552 | 9.3180 | 36 |
| 28 | POTATOES | 2.6090 | 6.0899 | 9.2241 | 37 |
| 121 | GAS COMPANIES AND SYSTEMS | .0468 | 7.2886 | 9.1834 | 38 |
| 23 | FRUIT AND TREE NUTS, NEC | 3.8699 | 6.4832 | 9.1518 | 39 |
| 47 | DAIRY PRODUCTS | .2302 | 6.1204 | 8.8375 | 40 |
| 49 | GRAIN MILL PRODUCTS | .3989 | 6.6839 | 8.8265 | 41 |
| 64 | INDUSTRIAL CHEMICALS | 1.6694 | 6.2889 | 8.7187 | 42 |
| 14 | HAY AND PASTURE | 2.3510 | 6.4941 | 8.6819 | 43 |
| 6 | SHEEP, LAMBS, AND WOOL | .8904 | 6.8871 | 8.6697 | 44 |
| 79 | BLAST FURNACES AND BASIC STEEL PROD | 1.3903 | 6.2905 | 8.5778 | 45 |
| 24 | VEGETABLES | 2.3695 | 5.3558 | 8.5316 | 46 |
| 36 | NATURAL GAS + N.G. LIQUIDS | .4468 | 6.1216 | 8.4827 | 47 |
| 42 | NEW CONSTRUCT, HIGHWAYS | 0. | 5.1925 | 8.4731 | 48 |
| 48 | CANNED AND FROZEN FOODS | .7557 | 5.9080 | 8.2826 | 49 |
| 46 | MEAT PRODUCTS | .0017 | 6.3744 | 8.1856 | 50 |

Table 30

1976 SAN FRANCISCO EMISSION COEFFICIENTS

NOX EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 104 | LOCAL TRANSIT AND INTERCITY BUSES | 213.5780 | 222.8917 | 224.9815 | 1 |
| 136 | STATE AND LOCAL GOVT ENTERPRISES | 41.4944 | 42.7174 | 45.2026 | 2 |
| 114 | WATER AND SANITARY SERVICES | .0559 | 24.6267 | 26.5006 | 3 |
| 24 | FORESTRY AND FISHERY PRODUCTS | 23.1538 | 23.9625 | 25.8743 | 4 |
| 112 | ELECTRIC COMPANIES AND SYSTEMS | 22.6790 | 23.4127 | 24.5190 | 5 |
| 11 | CORN | 20.5354 | 21.8446 | 23.2073 | 6 |
| 137 | DUMMY INDUSTRIES | 0. | 16.9846 | 18.5944 | 7 |
| 14 | SORGHUM GRAIN | 12.7285 | 14.2864 | 15.6879 | 8 |
| 103 | RAILROADS | 10.9271 | 13.6791 | 15.6815 | 9 |
| 13 | OATS | 10.6305 | 11.9674 | 13.2889 | 10 |
| 10 | BARLEY | 7.8869 | 9.3958 | 10.7685 | 11 |
| 20 | SUGAR BEETS | 6.9905 | 8.2280 | 10.0722 | 12 |
| 7 | MISC. LIVESTOCK | 7.8187 | 8.8164 | 9.7725 | 13 |
| 77 | METAL STAMPINGS | 6.4556 | 7.4352 | 9.2019 | 14 |
| 15 | WALNUTS | 6.1851 | 7.4033 | 9.1425 | 15 |
| 32 | NEW CONSTRUCT, PUBLIC UTILITY | 6.0961 | 6.8513 | 8.7945 | 16 |
| 9 | WHEAT | 5.4185 | 6.5852 | 8.0666 | 17 |
| 12 | HAY AND PASTURE | 3.4661 | 5.7942 | 7.2043 | 18 |
| 16 | ALMONDS | 4.1631 | 5.2899 | 7.0378 | 19 |
| 21 | POTATOES | 3.8465 | 5.1034 | 6.9083 | 20 |
| 18 | VEGETABLES | 3.4933 | 4.5249 | 6.6243 | 21 |
| 23 | GREENHOUSE AND NURSERY PRODUCTS | 3.3819 | 4.0676 | 6.1903 | 22 |
| 1 | DAIRIES | 4.4978 | 5.0267 | 6.1631 | 23 |
| 131 | OTHER MEDICAL SERVICES | 2.1030 | 3.4659 | 5.9318 | 24 |
| 106 | WATER TRANSPORATATION | 1.4570 | 4.0020 | 5.6386 | 25 |
| 107 | AIR TRANSPORTATION | 2.1158 | 3.7091 | 5.4721 | 26 |
| 17 | NONCITRUS FRUITS | 2.3915 | 3.5304 | 5.4563 | 27 |
| 117 | BANKING AND FINANCIAL INTERMEDIARIE | .8939 | 2.3788 | 5.4411 | 28 |
| 57 | GUM AND WOOD CHEMICALS | 2.3807 | 3.6009 | 5.1461 | 29 |
| 22 | SAFFLOWER | 2.2770 | 3.3105 | 4.9246 | 30 |
| 130 | HOSPITALS | .4287 | 2.3063 | 4.7449 | 31 |
| 135 | OTHER FEDERAL GOVT ENTERPRISES | 1.4747 | 2.0582 | 4.5258 | 32 |
| 66 | CEMENT AND CONCRETE PRODUCTS | 1.2977 | 2.5787 | 4.4980 | 33 |
| 71 | IRON AND STEEL FOUNDRIES AND FORGIN | .8907 | 2.7247 | 4.4784 | 34 |
| 133 | NONPROFIT ORGANIZATIONS | .0939 | 1.6532 | 4.3777 | 35 |
| 134 | POST OFFICE | .9286 | 1.4431 | 4.2819 | 36 |
| 132 | EDUCATIONAL SERVICES | .1596 | 1.6745 | 4.2547 | 37 |
| 56 | AGRICULTURAL CHEMICALS | 1.2776 | 2.6466 | 4.1924 | 38 |
| 121 | HOTELS AND LODGING PLACES | .1155 | 2.3383 | 4.1592 | 39 |
| 111 | RADIO AND TELEVISION BROADCASTING | .3603 | 1.9684 | 4.1360 | 40 |
| 129 | DOCTORS AND DENTISTS | .6539 | 1.3875 | 4.1109 | 41 |
| 70 | BLAST FURNACES AND BASIC STEEL PROD | .9657 | 2.5046 | 4.1005 | 42 |
| 19 | DRIED BEANS | .6806 | 2.0938 | 4.0907 | 43 |
| 118 | INSURANCE | .0002 | 1.6660 | 4.0585 | 44 |
| 108 | PIPELINE TRANSPORTATION | .1390 | 2.0934 | 3.7929 | 45 |
| 120 | REAL ESTATE | 1.6460 | 2.6552 | 3.7549 | 46 |
| 30 | NEW CONSTRUCT, RESIDENT | 1.0846 | 1.7035 | 3.6500 | 47 |
| 59 | DRUGS | .5206 | 1.6983 | 3.6262 | 48 |
| 127 | MOTION PICTURES | .0102 | 1.7902 | 3.6253 | 49 |
| 65 | GLASS | .5924 | 1.6178 | 3.6127 | 50 |

(d) Hydrocarbons

The hydrocarbon emission coefficients for the statewide economy and for the economies of the four air basins are shown in Table 31. Although the transportation sectors are not as prominent as they are in the case of nitrogen oxide emissions, they are nevertheless important among the sectors with the highest emission rates of hydrocarbons. Local Transit & Intercity Buses appear in the lists of all five economies, placing first in the San Diego and South Coast basins. Pipeline Transportation and Truck Transportation also appear among the principal sectors statewide and in the San Joaquin and San Francisco basins. Air Transportation, which ranks first in the San Joaquin basin, is also one of the principal sectors in the San Diego basin.

Prominent non-transportation sectors include Plastics Materials & Synthetics, Drugs, Crude Petroleum, and Agricultural Chemicals. Each of these sectors ranks among the top ten sectors statewide and among the ten principal sectors in three of the four basins. The Ship and Boat Building and Repair sector is another conspicuous sector. It is among the principal ten sectors statewide and in the South Coast and San Francisco basins and places eleventh and ninteenth, respectively, in the San Diego and San Joaquin basins.

The Local Transit and Intercity Buses sector in the San Diego basin is the sector with the highest emissions coefficient. The rate of 688.7 tons of hydrocarbons per million dollars of production for final demand exceeds slightly the next highest coefficient of 657.6 tons associated with the Air Transportation sector in the San Joaquin basin. With the exception of the top ranked sector, the sectors of the San Joaquin basin have higher coefficients than correspondingly ranked sectors in the other three basins.

Table 31

Hydrocarbon Emission Coefficients Ranking - 1976

| Region | I-O No. | Sector Name | Direct Emission Coeff. (Tons/$10^6$) | Total Emission Coeff. (Tons/$10^6$) | Rank |
|---|---|---|---|---|---|
| Calif. | 124 | Pipeline Transportation | 224.3 | 239.5 | 1 |
| | 120 | Local Transit & Intercity Bus. | 82.7 | 100.1 | 2 |
| | 121 | Truck Transportation | 70.3 | 95.1 | 3 |
| | 74 | Plastics Materials & Synthetics | 64.5 | 91.1 | 4 |
| | 75 | Drugs | 69.6 | 91.0 | 5 |
| | 41 | Crude Petroleum | 56.9 | 72.3 | 6 |
| | 72 | Agricultural Chemicals | 36.6 | 62.6 | 7 |
| | 42 | Nat. Gas & N.G. Liquids | 20.6 | 51.6 | 8 |
| | 78 | Petroleum Refining | 4.8 | 47.5 | 9 |
| | 115 | Ship & Boat Building & Repair | 28.7 | 46.7 | 10 |
| San Diego | 90 | Local Transit & Intercity Bus. | 681.9 | 688.7 | 1 |
| | 47 | Drugs | 120.2 | 125.2 | 2 |
| | 53 | Glass | 106.3 | 110.6 | 3 |
| | 46 | Plastics Materials & Synth. | 101.3 | 105.7 | 4 |
| | 111 | Auto Repair | 42.6 | 47.1 | 5 |
| | 44 | Agricultural Chemicals | 38.9 | 42.4 | 6 |
| | 122 | Dummy Industries | 0.0 | 34.3 | 7 |
| | 93 | Air Transportation | 25.9 | 31.3 | 8 |
| | 100 | Wholesale Trade | 15.7 | 21.2 | 9 |
| | 107 | Personal & Repair Services | 15.1 | 21.0 | 10 |

Table 31 (contd.)

| Region | I-O No. | Sector Name | Direct Emission Coeff. (Tons/$10^6$) | Total Emission Coeff. (Tons/$10^6$) | Rank |
|---|---|---|---|---|---|
| South Coast | 108 | Local Transit & Intercity Bus. | 553.3 | 558.9 | 1 |
| | 31 | Natural Gas & N.G. Liquids | 196.3 | 200.6 | 2 |
| | 62 | Plastic Materials & Synth. | 66.0 | 70.8 | 3 |
| | 141 | Dummy Industries | 0.0 | 28.4 | 4 |
| | 103 | Ship & Boat Building & Repair | 17.6 | 22.1 | 5 |
| | 107 | Railroads | 9.7 | 16.1 | 6 |
| | 60 | Agricultural Chemicals | 11.5 | 16.1 | 7 |
| | 126 | Personal & Repair Services | 9.4 | 14.0 | 8 |
| | 30 | Crude Petroleum | 9.6 | 13.2 | 9 |
| | 119 | Wholesale Trade | 7.6 | 11.7 | 10 |
| San Joaquin | 115 | Air Transportation | 646.6 | 657.6 | 1 |
| | 68 | Drugs | 361.5 | 368.9 | 2 |
| | 66 | Gum & Wood Chemicals | 184.3 | 195.2 | 3 |
| | 116 | Pipeline Transportation | 149.9 | 156.4 | 4 |
| | 112 | Local Transit & Intercity Bus. | 118.2 | 129.1 | 5 |
| | 113 | Truck Transportation | 100.5 | 118.6 | 6 |
| | 67 | Plastics Materials & Synth. | 90.8 | 100.5 | 7 |
| | 35 | Crude Petroleum | 48.3 | 53.7 | 8 |
| | 65 | Agricultural Chemicals | 22.3 | 33.5 | 9 |
| | 71 | Petroleum Refining | 8.6 | 33.1 | 10 |

Table 31 (contd.)

| Region | I-O No. | Sector Name | Direct Emission Coeff. (Tons/$10^6$) | Total Emission Coeff. (Tons/$10^6$) | Rank |
|---|---|---|---|---|---|
| San Franc. | 59 | Drugs | 243.4 | 257.0 | 1 |
| | 99 | Ship & Boat Building & Repair | 80.8 | 87.8 | 2 |
| | 27 | Crude Petroleum | 73.6 | 77.3 | 3 |
| | 104 | Local Transit & Intercity Bus. | 44.5 | 49.6 | 4 |
| | 105 | Truck Transportation | 37.9 | 47.5 | 5 |
| | 28 | Natural Gas & N.G. Liquids | 26.7 | 29.6 | 6 |
| | 70 | Blast Furnaces & Basic Steel | 13.4 | 19.8 | 7 |
| | 108 | Pipeline Transportation | 14.9 | 19.0 | 8 |
| | 115 | Wholesale Trade | 11.1 | 15.8 | 9 |
| | 122 | Personal & Repair Services | 10.3 | 15.2 | 10 |

The fifty principal sectors, ranked by the total emission coefficients, in each of the five economies are shown as follows:

Table 32

1976 CALIFORNIA EMISSION COEFFICIENTS

HC EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 124 | PIPELINE TRANSPORTATION | 224.3198 | 230.1191 | 239.5493 | 1 |
| 120 | LOCAL TRANSIT AND INTERCITY BUSES | 82.6929 | 88.6732 | 100.0860 | 2 |
| 121 | TRUCK TRANSPORTATION | 70.3271 | 83.9483 | 95.1394 | 3 |
| 74 | PLASTICS MATERIALS AND SYNTHETIC FI | 64.4982 | 80.2409 | 91.1440 | 4 |
| 75 | DRUGS | 69.6324 | 79.7324 | 91.0352 | 5 |
| 41 | CRUDE PETROLEUM | 56.8639 | 62.3835 | 72.2813 | 6 |
| 72 | AGRICULTURAL CHEMICALS | 36.5711 | 51.6778 | 62.6123 | 7 |
| 42 | NATURAL GAS + N.G. LIQUIDS | 20.6037 | 42.0988 | 51.6461 | 8 |
| 78 | PETROLEUM REFINING AND RELATED PROD | 4.8499 | 38.8438 | 47.5410 | 9 |
| 115 | SHIP AND BOAT BUILDING AND REPAIRIN | 28.6793 | 34.4289 | 46.6705 | 10 |
| 73 | GUM AND WOOD CHEMICALS | 19.4607 | 34.0609 | 44.8190 | 11 |
| 79 | RUBBER AND PLASTICS PRODUCTS | 2.9730 | 25.7996 | 37.1834 | 12 |
| 18 | FOOD, FEED GRAINS, NEC | 7.5000 | 20.9656 | 30.1383 | 13 |
| 123 | AIR TRANSPORTATION | 12.0934 | 19.9413 | 29.8035 | 14 |
| 77 | PAINTS AND ALLIED PRODUCTS | 1.2750 | 18.3206 | 28.8968 | 15 |
| 119 | RAILROADS | 9.6807 | 15.9400 | 26.9253 | 16 |
| 154 | DUMMY INDUSTRIES | 0. | 16.1981 | 26.9069 | 17 |
| 62 | TEXTILE PRODUCTS | .2162 | 14.4025 | 26.6691 | 18 |
| 71 | INDUSTRIAL CHEMICALS | .1266 | 15.6210 | 26.1960 | 19 |
| 138 | PERSONAL AND REPAIR SERVICES | 9.6464 | 13.7122 | 25.8414 | 20 |
| 131 | WHOLESALE TRADE | 11.3261 | 14.5633 | 25.5672 | 21 |
| 122 | WATER TRANSPORATATION | 1.2046 | 15.5344 | 25.4480 | 22 |
| 128 | ELECTRIC COMPANIES AND SYSTEMS | 1.0197 | 17.1026 | 25.1817 | 23 |
| 76 | CLEANING AND TOILET PREPARATIONS | .9503 | 13.2385 | 24.4212 | 24 |
| 129 | GAS COMPANIES AND SYSTEMS | .0102 | 14.5856 | 22.8811 | 25 |
| 142 | AUTOMOBILE REPAIR | 7.1618 | 12.1567 | 22.6652 | 26 |
| 7 | MISC. LIVESTOCK | 2.5581 | 11.6582 | 21.8467 | 27 |
| 15 | OATS | 2.3571 | 12.8139 | 21.8207 | 28 |
| 113 | MOTOR VEHICLES | 1.8059 | 9.6472 | 21.3709 | 29 |
| 152 | STATE AND LOCAL GOVT ENTERPRISES | 3.7001 | 8.2484 | 21.3345 | 30 |
| 48 | NEW CONSTRUCT, HIGHWAYS | .0510 | 9.0839 | 21.1686 | 31 |
| 80 | LEATHER TANNING AND PRODUCTS | .1605 | 8.6704 | 20.9450 | 32 |
| 82 | CEMENT AND CONCRETE PRODUCTS | .1440 | 9.2179 | 20.7045 | 33 |
| 118 | JEWELRY, SPORTING GOODS, ETC. | .2234 | 8.7906 | 20.6195 | 34 |
| 30 | HOPS | 0. | 9.6363 | 20.5668 | 35 |
| 9 | COTTON | .0095 | 11.8553 | 20.3662 | 36 |
| 8 | APIARY PRODUCTS | .9845 | 10.0342 | 20.0970 | 37 |
| 68 | PAPER + PAPERBOARD PRODUCTS | .0900 | 8.2599 | 20.0571 | 38 |
| 85 | MISC STONE AND CLAY PRODUCTS | .0348 | 8.2942 | 19.9692 | 39 |
| 58 | CONFECTIONARY PRODUCTS | 2.6399 | 10.4151 | 19.9417 | 40 |
| 54 | CANNED AND FROZEN FOODS | .0280 | 8.8707 | 19.7933 | 41 |
| 107 | HOUSEHOLD APPLIANCES | .6509 | 7.6464 | 19.7154 | 42 |
| 66 | HOUSEHOLD FURNITURE | .2472 | 7.1316 | 19.6099 | 43 |
| 6 | SHEEP, LAMBS, AND WOOL | 1.0125 | 10.6123 | 19.5848 | 44 |
| 55 | GRAIN MILL PRODUCTS | .0277 | 9.7981 | 19.5638 | 45 |
| 13 | CORN | .0335 | 10.5295 | 19.4443 | 46 |
| 52 | MEAT PRODUCTS | .0105 | 9.8813 | 19.3928 | 47 |
| 88 | PRIMARY NONFERROUS METAL PRODUCTS | .0115 | 8.0778 | 19.3408 | 48 |
| 116 | OTHER TRANSPORTATION EQUIPMENT | .1479 | 7.2636 | 19.2248 | 49 |
| 16 | SORGHUM GRAIN | .0229 | 10.2050 | 19.1412 | 50 |

Table 33

1976 SAN DIEGO EMISSION COEFFICIENTS

HC EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 90 | LOCAL TRANSIT AND INTERCITY BUSES | 681.9061 | 684.8419 | 688.6586 | 1 |
| 47 | DRUGS | 120.1897 | 122.0960 | 125.1605 | 2 |
| 53 | GLASS | 106.2622 | 107.2686 | 110.6085 | 3 |
| 46 | PLASTICS MATERIALS AND SYNTHETIC FI | 101.2840 | 103.5091 | 105.7103 | 4 |
| 111 | AUTOMOBILE REPAIR | 42.5809 | 44.2156 | 47.0767 | 5 |
| 44 | AGRICULTURAL CHEMICALS | 38.9339 | 40.4234 | 42.3939 | 6 |
| 122 | DUMMY INDUSTRIES | 0. | 32.0914 | 34.3029 | 7 |
| 93 | AIR TRANSPORTATION | 25.8718 | 28.2564 | 31.2806 | 8 |
| 100 | WHLLESALE TRADE | 15.7154 | 17.3999 | 21.2065 | 9 |
| 107 | PERSONAL AND REPAIR SERVICES | 15.0636 | 17.0974 | 21.0017 | 10 |
| 85 | SHIP AND BOAT BUILDING AND REPAIRIN | 16.0062 | 17.7647 | 20.7193 | 11 |
| 38 | HOUSEHOLD FURNITURE | 12.1046 | 13.8941 | 16.5907 | 12 |
| 89 | RAILROADS | 5.6421 | 9.2456 | 12.7172 | 13 |
| 60 | PRIMARY NONFERROUS METAL PRODUCTS | 8.6371 | 11.0484 | 12.5986 | 14 |
| 51 | RUBBER AND PLASTICS PRODUCTS | 3.9015 | 8.3056 | 10.7905 | 15 |
| 65 | OTHER FABRICATED METAL PRODUCTS | 6.0340 | 7.1925 | 9.6911 | 16 |
| 92 | WATER TRANSPORATATION | 3.8330 | 5.8268 | 8.2969 | 17 |
| 50 | PETROLEUM REFINING AND RELATED PROD | 6.3647 | 7.0744 | 8.1652 | 18 |
| 49 | PAINTS AND ALLIED PRODUCTS | 2.0021 | 5.4389 | 7.5707 | 19 |
| 102 | BANKING AND FINANCIAL INTERMEDIARIE | .0050 | 1.5116 | 7.1735 | 20 |
| 119 | POST OFFICE | .0101 | 1.8284 | 7.0233 | 21 |
| 110 | MISC PROFESSIONAL SERVICES | .0001 | 2.0175 | 6.6158 | 22 |
| 72 | MACHINE SHOP PRODUCTS | 1.8805 | 3.2883 | 6.5985 | 23 |
| 118 | NONPROFIT ORGANIZATIONS | .0002 | 1.5297 | 6.4874 | 24 |
| 31 | CONFECTIONARY PRODUCTS | 3.4644 | 4.5609 | 6.4645 | 25 |
| 114 | DOCTORS AND DENTISTS | .0083 | 1.1763 | 6.1068 | 26 |
| 116 | OTHER MEDICAL SERVICES | .0047 | 1.6864 | 6.0812 | 27 |
| 106 | HOTELS AND LODGING PLACES | .0000 | 2.8936 | 6.0320 | 28 |
| 91 | TRUCK TRANSPORTATION | .2931 | 2.5089 | 6.0298 | 29 |
| 101 | RETAIL TRADE | 1.4209 | 2.0082 | 6.0237 | 30 |
| 103 | INSURANCE | .0000 | 2.1812 | 6.0163 | 31 |
| 117 | EDUCATIONAL SERVICES | .0012 | 1.3221 | 5.9871 | 32 |
| 115 | HOSPITALS | .0002 | 1.6883 | 5.9716 | 33 |
| 108 | MISCELLANEOUS BUSINESS SERVICES | .0002 | 1.8501 | 5.9032 | 34 |
| 73 | COMPUTERS AND OFFICE EQUIPMENT | .0037 | 2.2409 | 5.7910 | 35 |
| 39 | OFFICE FURNITURE AND FIXTURES | 1.6890 | 3.0067 | 5.7429 | 36 |
| 13 | DRIED BEANS | 1.2070 | 2.2750 | 5.7425 | 37 |
| 96 | RADIO AND TELEVISION BROADCASTING | .0006 | 1.8404 | 5.6388 | 38 |
| 121 | STATE AND LOCAL GOVT ENTERPRISES | .1695 | 1.1944 | 5.5741 | 39 |
| 84 | AIRCRAFT | .1207 | 2.0744 | 5.5540 | 40 |
| 79 | RADIO AND TV RECEIVING SETS | .0032 | 2.0330 | 5.5013 | 41 |
| 94 | TRANSPORTATION SERVICES | .6179 | 1.4633 | 5.4702 | 42 |
| 80 | COMMUNICATION EQUIPMENT | .0007 | 1.2807 | 5.3761 | 43 |
| 21 | NEW CONSTRUCT, PUBLIC UTILITY | 1.5005 | 2.5990 | 5.3707 | 44 |
| 48 | CLEANING AND TOILET PREPARATIONS | 1.4923 | 3.1492 | 5.3474 | 45 |
| 25 | ORDNANCE + GUIDED MISSILES | .3700 | 1.8941 | 5.2700 | 46 |
| 81 | ELECTRONIC COMPONENTS | .1170 | 1.6487 | 5.2583 | 47 |
| 66 | ENGINES, TURBINES AND GENERATORS | .6940 | 2.5103 | 5.1898 | 48 |
| 14 | POTATOES | 1.1289 | 2.0433 | 5.1772 | 49 |
| 99 | WATER AND SANITARY SERVICES | .0216 | 1.3474 | 5.1763 | 50 |

Table 34

1976 SOUTH COAST EMISSION COEFFICIENTS

HC EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 108 | LOCAL TRANSIT AND INTERCITY BUSES | 553.3239 | 555.8807 | 558.9408 | 1 |
| 31 | NATURAL GAS + N.G. LIQUIDS | 196.3430 | 198.6844 | 200.5549 | 2 |
| 62 | PLASTICS MATERIALS AND SYNTHETIC FI | 65.9638 | 68.8561 | 70.7718 | 3 |
| 141 | DUMMY INDUSTRIES | 0. | 26.1431 | 28.3634 | 4 |
| 103 | SHIP AND BOAT BUILDING AND REPAIRIN | 17.5822 | 19.3029 | 22.0784 | 5 |
| 107 | RAILROADS | 9.6583 | 13.3459 | 16.1443 | 6 |
| 60 | AGRICULTURAL CHEMICALS | 11.5101 | 14.1923 | 16.1132 | 7 |
| 126 | PERSONAL AND REPAIR SERVICES | 9.4155 | 10.8034 | 14.0255 | 8 |
| 30 | CRUDE PETROLEUM | 9.5525 | 10.7144 | 13.1719 | 9 |
| 119 | WHOLESALE TRADE | 7.6403 | 8.6986 | 11.7002 | 10 |
| 111 | AIR TRANSPORTATION | 5.6939 | 7.5937 | 10.1477 | 11 |
| 112 | PIPELINE TRANSPORTATION | 6.2055 | 7.3150 | 9.7202 | 12 |
| 130 | AUTOMOBILE REPAIR | 4.9661 | 6.4916 | 9.0999 | 13 |
| 67 | RUBBER AND PLASTICS PRODUCTS | .5353 | 6.2318 | 8.5765 | 14 |
| 14 | OATS | 4.4279 | 6.5486 | 8.3629 | 15 |
| 66 | PETROLEUM REFINING AND RELATED PROD | 4.1418 | 6.9589 | 8.2857 | 16 |
| 65 | PAINTS AND ALLIED PRODUCTS | 1.9954 | 5.9552 | 7.9467 | 17 |
| 63 | DRUGS | 2.9115 | 4.7249 | 7.4600 | 18 |
| 110 | WATER TRANSPORATATION | 1.6537 | 4.9344 | 7.3338 | 19 |
| 7 | MISC. LIVESTOCK | 4.8055 | 5.5608 | 7.0305 | 20 |
| 21 | DRIED BEANS | 1.7277 | 3.2065 | 6.0101 | 21 |
| 64 | CLEANING AND TOILET PREPARATIONS | 1.3027 | 3.6052 | 5.9595 | 22 |
| 36 | NEW CONSTRUCT, PUBLIC UTILITY | 1.6696 | 2.9671 | 5.8104 | 23 |
| 50 | TEXTILE PRODUCTS | .0226 | 3.1529 | 5.7892 | 24 |
| 109 | TRUCK TRANSPORTATION | 1.2046 | 2.6925 | 5.7254 | 25 |
| 116 | ELECTRIC COMPANIES AND SYSTEMS | .8971 | 3.8478 | 5.6019 | 26 |
| 24 | POTATOES | 1.6159 | 2.9664 | 5.5110 | 27 |
| 61 | GUM AND WOOD CHEMICALS | .6564 | 3.3214 | 5.3511 | 28 |
| 121 | BANKING AND FINANCIAL INTERMEDIARIE | .0171 | 1.0464 | 5.3242 | 29 |
| 15 | GRASS SEED | 1.6291 | 3.0878 | 5.1424 | 30 |
| 140 | STATE AND LOCAL GOVT ENTERPRISES | .5814 | 1.6529 | 5.1423 | 31 |
| 106 | JEWELRY, SPORTING GOODS, ETC. | .1618 | 2.3806 | 5.1291 | 32 |
| 38 | NEW CONSTRUCT, ALL OTHER | .8742 | 2.0320 | 5.0888 | 33 |
| 59 | INDUSTRIAL CHEMICALS | .0558 | 2.9034 | 5.0104 | 34 |
| 95 | HOUSEHOLD APPLIANCES | .4405 | 2.2041 | 4.9546 | 35 |
| 34 | NEW CONSTRUCT, RESIDENT | .9224 | 2.0774 | 4.9149 | 36 |
| 122 | INSURANCE | .0002 | 1.5973 | 4.8939 | 37 |
| 105 | CLOCKS AND SCIENTIFIC EQUIPMENT | .1471 | 1.7970 | 4.8351 | 38 |
| 134 | HOSPITALS | .0051 | 1.3577 | 4.8124 | 39 |
| 91 | COMPUTERS AND OFFICE EQUIPMENT | .0009 | 1.8311 | 4.8063 | 40 |
| 9 | COTTON | .0179 | 2.9185 | 4.7839 | 41 |
| 102 | AIRCRAFT | .0887 | 1.6973 | 4.7557 | 42 |
| 137 | NONPROFIT ORGANIZATIONS | .0066 | .9656 | 4.7540 | 43 |
| 135 | OTHER MEDICAL SERVICES | .0161 | 1.2824 | 4.7523 | 44 |
| 138 | POST OFFICE | .0347 | .7763 | 4.7419 | 45 |
| 99 | ELECTRONIC COMPONENTS | .2389 | 1.7086 | 4.7128 | 46 |
| 118 | WATER AND SANITARY SERVICES | .2470 | 1.7187 | 4.6959 | 47 |
| 129 | MISC PROFESSIONAL SERVICES | .0025 | 1.1877 | 4.6766 | 48 |
| 125 | HOTELS AND LODGING PLACES | .0009 | 2.0780 | 4.6745 | 49 |
| 120 | RETAIL TRADE | 1.1770 | 1.6001 | 4.6611 | 50 |

Table 35

1976 SAN JOAQUIN EMISSION COEFFICIENTS

HC EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 115 | AIR TRANSPORTATION | 646.6084 | 654.1911 | 657.5797 | 1 |
| 68 | DRUGS | 361.5176 | 365.4243 | 368.8650 | 2 |
| 66 | GUM AND WOOD CHEMICALS | 184.2897 | 192.4050 | 195.2036 | 3 |
| 116 | PIPELINE TRANSPORTATION | 149.8522 | 153.0438 | 156.4325 | 4 |
| 112 | LOCAL TRANSIT AND INTERCITY BUSES | 118.1963 | 124.6649 | 129.0881 | 5 |
| 113 | TRUCK TRANSPORTATION | 100.5214 | 114.2153 | 118.5634 | 6 |
| 67 | PLASTICS MATERIALS AND SYNTHETIC FI | 90.8199 | 97.7255 | 100.5304 | 7 |
| 35 | CRUDE PETROLEUM | 48.3242 | 50.2478 | 53.6613 | 8 |
| 65 | AGRICULTURAL CHEMICALS | 22.3019 | 30.5707 | 33.5264 | 9 |
| 71 | PETROLEUM REFINING AND RELATED PROD | 8.5674 | 30.6582 | 33.1078 | 10 |
| 76 | STRUCTURAL CLAY PRODUCTS | 22.3083 | 25.6904 | 29.7389 | 11 |
| 36 | NATURAL GAS + N.G. LIQUIDS | 9.7468 | 24.1245 | 27.1474 | 12 |
| 107 | SHIP AND BOAT BUILDING AND REPAIRIN | 19.1586 | 21.6518 | 25.0060 | 13 |
| 122 | WATER AND SANITARY SERVICES | 5.5557 | 16.6745 | 20.9085 | 14 |
| 144 | STATE AND LOCAL GOVT ENTERPRISES | 12.7857 | 15.7525 | 20.7523 | 15 |
| 145 | DUMMY INDUSTRIES | 0. | 16.3695 | 18.3113 | 16 |
| 114 | WATER TRANSPORATATION | 4.1655 | 15.0374 | 18.1082 | 17 |
| 18 | FEED, FEED GRAINS, NEC | 8.0341 | 14.9461 | 17.1992 | 18 |
| 123 | WHOLESALE TRADE | 9.6797 | 12.2547 | 16.5584 | 19 |
| 111 | RAILROADS | 6.9889 | 11.5193 | 15.6640 | 20 |
| 130 | PERSONAL AND REPAIR SERVICES | 8.7395 | 11.0065 | 15.3631 | 21 |
| 120 | ELECTRIC COMPANIES AND SYSTEMS | .1735 | 12.1961 | 14.9426 | 22 |
| 69 | CLEANING AND TOILET PREPARATIONS | 4.9339 | 10.7891 | 13.3356 | 23 |
| 64 | INDUSTRIAL CHEMICALS | .1000 | 9.1000 | 12.2109 | 24 |
| 75 | CEMENT AND CONCRETE PRODUCTS | .0719 | 7.8444 | 11.8970 | 25 |
| 70 | PAINTS AND ALLIED PRODUCTS | 1.1722 | 9.1949 | 11.8375 | 26 |
| 42 | NEW CONSTRUCT, HIGHWAYS | .0546 | 7.5955 | 11.7957 | 27 |
| 72 | RUBBER AND PLASTICS PRODUCTS | 1.8829 | 8.7051 | 11.7238 | 28 |
| 142 | POST OFFICE | .7635 | 5.7397 | 11.6685 | 29 |
| 105 | MOTOR VEHICLES | 6.2403 | 9.3672 | 11.6448 | 30 |
| 134 | AUTOMOBILE REPAIR | 4.7843 | 7.8162 | 11.2031 | 31 |
| 15 | OATS | 2.5250 | 8.4686 | 11.0733 | 32 |
| 23 | FRUIT AND TREE NUTS, NEC | 2.9215 | 6.9101 | 10.3268 | 33 |
| 7 | MISC. LIVESTOCK | 2.7403 | 7.3463 | 10.2552 | 34 |
| 51 | SUGAR | .0052 | 6.9752 | 10.2152 | 35 |
| 52 | CONFECTIONARY PRODUCTS | 1.3088 | 6.8279 | 9.9511 | 36 |
| 74 | GLASS | 2.3518 | 5.6041 | 9.8176 | 37 |
| 13 | CORN | .0359 | 6.6308 | 9.3936 | 38 |
| 9 | COTTON | .0102 | 7.0701 | 9.3847 | 39 |
| 61 | PAPER + PAPERBOARD PRODUCTS | .3268 | 5.9235 | 9.3639 | 40 |
| 48 | CANNED AND FROZEN FOODS | .0014 | 6.3021 | 9.3423 | 41 |
| 87 | CUTLERY, HAND TOOLS AND GENERAL HAR | 3.2072 | 5.6518 | 9.3092 | 42 |
| 16 | SORGHUM GRAIN | .0246 | 6.4373 | 9.2589 | 43 |
| 12 | BARLEY | .0067 | 6.2496 | 9.0850 | 44 |
| 28 | POTATOES | .9215 | 5.0652 | 9.0781 | 45 |
| 78 | MISC STONE AND CLAY PRODUCTS | .0373 | 5.3247 | 8.9758 | 46 |
| 25 | DRIED BEANS | .9852 | 4.9128 | 8.9431 | 47 |
| 30 | SAFFLOWER | .5101 | 5.5316 | 8.8237 | 48 |
| 37 | STONE + CLAY MIN + QUARRY | .0275 | 5.0475 | 8.7570 | 49 |
| 14 | HAY AND PASTURE | .0069 | 5.9524 | 8.7535 | 50 |

Table 36

1976 SAN FRANCISCO EMISSION COEFFICIENTS

HC EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 59 | DRUGS | 243.4499 | 253.9283 | 257.0028 | 1 |
| 99 | SHIP AND BOAT BUILDING AND REPAIRIN | 80.8240 | 84.6148 | 87.8196 | 2 |
| 27 | CRUDE PETROLEUM | 73.6231 | 74.4574 | 77.2859 | 3 |
| 104 | LOCAL TRANSIT AND INTERCITY BUSES | 44.5436 | 46.2189 | 49.5516 | 4 |
| 105 | TRUCK TRANSPORTATION | 37.8826 | 44.0361 | 47.4583 | 5 |
| 28 | NATURAL GAS + N.G. LIQUIDS | 26.6761 | 27.7176 | 29.6017 | 6 |
| 70 | BLAST FURNACES AND BASIC STEEL PROD | 13.4298 | 17.3032 | 19.8482 | 7 |
| 108 | PIPELINE TRANSPORTATION | 14.8849 | 16.2698 | 18.9801 | 8 |
| 115 | WHOLESALE TRADE | 11.1225 | 12.3624 | 15.7796 | 9 |
| 122 | PERSONAL AND REPAIR SERVICES | 10.2869 | 11.6077 | 15.1727 | 10 |
| 73 | METAL CONTAINERS | 5.0940 | 9.8904 | 12.5662 | 11 |
| 60 | CLEANING AND TOILET PREPARATIONS | 3.3226 | 9.9307 | 12.5010 | 12 |
| 42 | SUGAR | 3.4811 | 9.4786 | 11.6384 | 13 |
| 62 | PETROLEUM REFINING AND RELATED PROD | 7.5727 | 9.5012 | 10.6543 | 14 |
| 106 | WATER TRANSPORATATION | .6137 | 7.9113 | 10.5214 | 15 |
| 130 | HOSPITALS | .0004 | 6.4404 | 10.3294 | 16 |
| 103 | RAILROADS | 5.0615 | 6.9992 | 10.1925 | 17 |
| 107 | AIR TRANSPORTATION | 4.4362 | 6.7446 | 9.5562 | 18 |
| 71 | IRON AND STEEL FOUNDRIES AND FORGIN | 3.3356 | 6.7098 | 9.5066 | 19 |
| 129 | DOCTORS AND DENTISTS | .0173 | 5.0505 | 9.3937 | 20 |
| 137 | DUMMY INDUSTRIES | 0. | 6.6490 | 9.2161 | 21 |
| 43 | CONFECTIONARY PRODUCTS | 3.3228 | 6.7686 | 9.1403 | 22 |
| 77 | METAL STAMPINGS | 1.7733 | 5.5825 | 8.3999 | 23 |
| 81 | FARM MACHINERY | 2.2227 | 5.2088 | 8.1599 | 24 |
| 131 | OTHER MEDICAL SERVICES | .0098 | 4.1168 | 8.0493 | 25 |
| 75 | FABRICATED STRUCTURAL STEEL | .4529 | 4.8352 | 7.5537 | 26 |
| 97 | MOTOR VEHICLES | 1.6964 | 4.5221 | 7.0001 | 27 |
| 32 | NEW CONSTRUCT, PUBLIC UTILITY | 1.4804 | 3.8534 | 6.9523 | 28 |
| 13 | OATS | 3.0519 | 4.8089 | 6.9163 | 29 |
| 33 | NEW CONSTRUCT, HIGHWAYS | .0660 | 3.4997 | 6.8645 | 30 |
| 58 | PLASTICS MATERIALS AND SYNTHETIC FI | 1.7662 | 4.2076 | 6.6927 | 31 |
| 66 | CEMENT AND CONCRETE PRODUCTS | .0082 | 3.5003 | 6.5611 | 32 |
| 7 | MISC. LIVESTOCK | 3.3121 | 4.9033 | 6.4280 | 33 |
| 39 | CANNED AND FROZEN FOODS | .0013 | 3.9156 | 6.2439 | 34 |
| 100 | OTHER TRANSPORTATION EQUIPMENT | .0142 | 3.7794 | 6.2354 | 35 |
| 101 | CLOCKS AND SCIENTIFIC EQUIPMENT | .3777 | 2.8244 | 6.1761 | 36 |
| 134 | POST OFFICE | .0212 | 1.6083 | 6.1354 | 37 |
| 78 | CUTLERY, HAND TOOLS AND GENERAL HAR | .7788 | 2.9686 | 6.1019 | 38 |
| 57 | GUM AND WOOD CHEMICALS | .0201 | 3.6118 | 6.0761 | 39 |
| 34 | NEW CONSTRUCT, ALL OTHER | .4253 | 2.6423 | 6.0742 | 40 |
| 76 | SCREW MACHINE PRODUCTS | .0169 | 2.9788 | 6.0692 | 41 |
| 79 | OTHER FABRICATED METAL PRODUCTS | .0750 | 3.2288 | 6.0457 | 42 |
| 55 | INDUSTRIAL CHEMICALS | .0008 | 3.6021 | 6.0161 | 43 |
| 56 | AGRICULTURAL CHEMICALS | .0188 | 3.5405 | 6.0057 | 44 |
| 24 | FORESTRY AND FISHERY PRODUCTS | .0862 | 2.9241 | 5.9730 | 45 |
| 82 | CONSTRUCTION + MATERIAL HANDLING EQ | .0067 | 2.8708 | 5.9162 | 46 |
| 112 | ELECTRIC COMPANIES AND SYSTEMS | .2523 | 4.0800 | 5.8444 | 47 |
| 80 | ENGINES, TURBINES AND GENERATORS | .0206 | 2.8722 | 5.7946 | 48 |
| 136 | STATE AND LOCAL GOVT ENTERPRISES | .3550 | 1.7429 | 5.7062 | 49 |
| 61 | PAINTS AND ALLIED PRODUCTS | .0539 | 3.2261 | 5.7057 | 50 |

(e) Carbon Monoxide

The carbon monoxide emission coefficients for the principal sectors in the California statewide economy and for each of the four air basins are shown in Table 37. As would be expected the Truck Transportation and the Local Transit & Intercity Buses sectors are found among the first five principal sectors in the statewide economy and in the economies of each of the four basins (with, again, the notable exception of the Truck Transportation sector in San Francisco Basin). The Forestry & Fishery Products sector is also among the first five sectors in each case.

The Corn sector is among the principal emitters of CO statewide and for each basin where corn is produced. (Corn production is absent in the San Diego Basin.) Gum & Wood Chemicals, which ranks first as an emitter of CO statewide, ranks among the top ten sectors in the San Diego, San Joaquin and San Francisco basins. The Blast Furnaces & Basic Steel sector, sixth statewide, is found among the principal sectors in both the San Diego and South Coast basins.

The most significant sector in the rankings is the Local Transit & Intercity Buses sector in the South Coast basin. Its total CO emission coefficient of 962.6 is almost four and a half times the statewide average of 215.7. The coefficient for this sector is slightly higher than that of the next largest figure, 928.0, of the San Joaquin Gum & Wood Chemicals sector. For each of the principal sectors #2-10, the San Joaquin sectors exhibit higher direct and total emission coefficients than the correspondingly ranked sectors statewide and in the other air basins.

The fifty principal sectors, ranked by total CO emission coefficients, in each of the five economies are shown as follows:

Table 37

Carbon Monoxide Emission Coefficients Ranking - 1976

| Region | I-O No. | Sector Name | Direct Emission Coeff. (Tons/$10^6$) | Total Emission Coeff. (Tons/$10^6$) | Rank |
|---|---|---|---|---|---|
| Calif. | 71 | Gum & Wood Chemicals | 323.8 | 367.3 | 1 |
| | 121 | Truck Transportation | 269.6 | 326.1 | 2 |
| | 120 | Local Transit & Intercity Bus. | 186.4 | 215.7 | 3 |
| | 37 | Forestry & Fishery Products | 143.1 | 178.3 | 4 |
| | 18 | Food, Feed Grains, nec. | 70.0 | 116.5 | 5 |
| | 86 | Blast Furnaces & Basic Steel | 41.4 | 86.4 | 6 |
| | 13 | Corn | 53.1 | 81.7 | 7 |
| | 63 | Logging Camps & Sawmills | 2.7 | 79.6 | 8 |
| | 7 | Misc. Livestock | 28.4 | 76.6 | 9 |
| | 6 | Sheep, Lambs & Wool | 15.7 | 69.5 | 10 |
| San Diego | 90 | Local Transit & Intercity Bus. | 822.6 | 831.6 | 1 |
| | 91 | Truck Transportation | 414.2 | 441.7 | 2 |
| | 45 | Gum & Wood Chemicals | 252.4 | 263.4 | 3 |
| | 16 | Forestry & Fishery Products | 111.6 | 122.6 | 4 |
| | 122 | Dummy Industries | 0.0 | 46.5 | 5 |
| | 93 | Air Transportation | 34.5 | 42.9 | 6 |
| | 58 | Blast Furnaces & Basic Steel | 32.3 | 42.2 | 7 |
| | 35 | Logging Camps & Sawmills | 2.1 | 34.1 | 8 |
| | 57 | Misc. Stone & Clay Products | 13.1 | 23.1 | 9 |
| | 28 | Canned & Frozen Foods | 0.0 | 20.8 | 10 |

Table 37 (Contd.)

| Region | I-O No. | Sector Name | Direct Emission Coeff. (Tons/$10^6$) | Total Emission Coeff. (Tons/$10^6$) | Rank |
|---|---|---|---|---|---|
| South Coast | 108 | Local Transit & Intercity Bus. | 950.1 | 962.6 | 1 |
| | 109 | Truck Transportation | 215.9 | 252.2 | 2 |
| | 27 | Forestry & Fishery Products | 130.6 | 143.3 | 3 |
| | 74 | Blast Furnaces & Basic Steel | 69.7 | 90.3 | 4 |
| | 141 | Dummy Industries | 0.0 | 60.1 | 5 |
| | 12 | Corn | 48.4 | 56.8 | 6 |
| | 73 | Misc. Stone & Clay Products | 29.9 | 43.9 | 7 |
| | 111 | Air Transportation | 27.5 | 38.6 | 8 |
| | 7 | Misc. Livestock | 25.9 | 33.7 | 9 |
| | 16 | Walnuts | 23.6 | 32.3 | 10 |
| San Joaquin | 66 | Gum and Wood Chemicals | 895.6 | 928.0 | 1 |
| | 113 | Truck Transportation | 555.2 | 628.5 | 2 |
| | 112 | Local Transit & Intercity Bus. | 443.2 | 465.5 | 3 |
| | 32 | Forestry & Fishery Products | 121.5 | 140.0 | 4 |
| | 87 | Cutlery, Hand Tools | 111.7 | 124.1 | 5 |
| | 115 | Air Transportation | 98.3 | 118.2 | 6 |
| | 18 | Food, Feed Grains, nec. | 59.4 | 81.2 | 7 |
| | 13 | Corn | 45.1 | 65.0 | 8 |
| | 76 | Structural Clay Products | 41.4 | 62.5 | 9 |
| | 71 | Petroleum Refining | 38.6 | 57.8 | 10 |

Table 37 (contd.)

| Region | I-O No. | Sector Name | Direct Emission Coeff. (Tons/$10^6$) | Total Emission Coeff. (Tons/$10^6$) | Rank |
|---|---|---|---|---|---|
| San Franc. | 104 | Local Transit & Intercity Bus. | 200.9 | 204.3 | 1 |
| | 24 | Forestry & Fishery Products | 131.1 | 133.2 | 2 |
| | 47 | Logging Camps & Sawmills | 54.0 | 60.8 | 3 |
| | 11 | Corn | 48.6 | 50.2 | 4 |
| | 14 | Sorghum Grain | 37.9 | 39.5 | 5 |
| | 57 | Gum & Wood Chemicals | 31.1 | 34.4 | 6 |
| | 71 | Iron & Steel Foundries | 27.8 | 30.5 | 7 |
| | 7 | Misc. Livestock | 26.0 | 27.1 | 8 |
| | 15 | Walnuts | 23.7 | 25.4 | 9 |
| | 16 | Almonds | 23.4 | 25.1 | 10 |

Table 38

1976 CALIFORNIA EMISSION COEFFICIENTS

CO EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 73 | GUM AND WOOD CHEMICALS | 323.7572 | 350.0590 | 367.3021 | 1 |
| 121 | TRUCK TRANSPORTATION | 269.6305 | 308.1162 | 326.0526 | 2 |
| 120 | LOCAL TRANSIT AND INTERCITY BUSES | 186.4478 | 197.4432 | 215.7348 | 3 |
| 37 | FORESTRY AND FISHERY PRODUCTS | 143.0934 | 159.6015 | 178.3125 | 4 |
| 18 | FOOD, FEED GRAINS, NEC | 70.0000 | 101.7723 | 116.4737 | 5 |
| 86 | BLAST FURNACES AND BASIC STEEL PROD | 41.3964 | 68.6441 | 86.4328 | 6 |
| 13 | CORN | 53.0894 | 67.3991 | 81.6872 | 7 |
| 64 | LOGGING CAMPS + SAWMILLS | 2.7376 | 60.4239 | 79.5604 | 8 |
| 7 | MISC. LIVESTOCK | 28.3721 | 60.2415 | 76.5708 | 9 |
| 6 | SHEEP, LAMBS, AND WOOL | 15.7165 | 55.0973 | 69.4777 | 10 |
| 16 | SORGHUM GRAIN | 41.3991 | 54.2619 | 68.5843 | 11 |
| 123 | AIR TRANSPORTATION | 42.7775 | 52.5224 | 68.3289 | 12 |
| 8 | APIARY PRODUCTS | 16.6321 | 52.1846 | 68.3126 | 13 |
| 154 | DUMMY INDUSTRIES | 0. | 42.4371 | 59.6004 | 14 |
| 4 | CATTLE AND CALVES | 6.9829 | 43.8649 | 58.0623 | 15 |
| 87 | IRON AND STEEL FOUNDRIES AND FORGIN | 13.9220 | 38.6001 | 56.9777 | 16 |
| 85 | MISC STONE AND CLAY PRODUCTS | 16.7545 | 37.3014 | 56.0132 | 17 |
| 89 | METAL CONTAINERS | .0661 | 35.6993 | 54.7599 | 18 |
| 52 | MEAT PRODUCTS | 0. | 39.1150 | 54.3595 | 19 |
| 2 | BROILERS, CHICKENS AND EGGS | 4.6917 | 39.0410 | 54.1899 | 20 |
| 54 | CANNED AND FROZEN FOODS | .0429 | 35.5787 | 53.0847 | 21 |
| 15 | OATS | 21.7857 | 36.2144 | 50.6499 | 22 |
| 64 | MILLWORK, PLYWOOD + OTHER WOOD PROD | .1172 | 31.4033 | 50.5176 | 23 |
| 1 | DAIRIES | 5.9255 | 32.8632 | 48.7702 | 24 |
| 20 | WALNUTS | 25.8496 | 33.4231 | 48.7190 | 25 |
| 3 | TURKEYS AND OTHER POULTRY | .6629 | 33.7071 | 48.7073 | 26 |
| 93 | METAL STAMPINGS | .4650 | 29.0866 | 48.5262 | 27 |
| 65 | WOODEN CONTAINERS | 0. | 29.2032 | 48.3823 | 28 |
| 55 | GRAIN MILL PRODUCTS | .0277 | 32.4709 | 48.1227 | 29 |
| 21 | ALMONDS | 25.4948 | 32.8155 | 48.0908 | 30 |
| 24 | FRUIT AND TREE NUTS, NEC | 24.5455 | 32.4785 | 47.8323 | 31 |
| 82 | CEMENT AND CONCRETE PRODUCTS | 3.3720 | 29.3730 | 47.7828 | 32 |
| 91 | FABRICATED STRUCTURAL STEEL | 0. | 28.3842 | 47.5864 | 33 |
| 152 | STATE AND LOCAL GOVT ENTERPRISES | 18.3079 | 25.7534 | 46.7269 | 34 |
| 47 | NEW CONSTRUCT, PUBLIC UTILITY | 8.2970 | 25.6827 | 45.2249 | 35 |
| 95 | OTHER FABRICATED METAL PRODUCTS | .0553 | 25.7759 | 45.1003 | 36 |
| 45 | NEW CONSTRUCT, RESIDENT | 9.2519 | 24.9793 | 44.6832 | 37 |
| 68 | PAPER + PAPERBOARD PRODUCTS | .4563 | 25.2454 | 44.1530 | 38 |
| 28 | MELONS | 16.8367 | 25.5082 | 43.8001 | 39 |
| 12 | BARLEY | 16.0338 | 29.1912 | 43.6023 | 40 |
| 25 | VEGETABLES | 16.5181 | 24.9060 | 43.1927 | 41 |
| 116 | OTHER TRANSPORTATION EQUIPMENT | 0. | 23.9895 | 43.1601 | 42 |
| 26 | DRIED BEANS | 15.4599 | 24.3904 | 42.5743 | 43 |
| 5 | HOGS | 2.3571 | 27.7733 | 41.5103 | 44 |
| 92 | SCREW MACHINE PRODUCTS | 0. | 21.2214 | 40.9087 | 45 |
| 53 | DAIRY PRODUCTS | .0069 | 23.6864 | 40.3696 | 46 |
| 77 | PAINTS AND ALLIED PRODUCTS | 0. | 23.3091 | 40.2598 | 47 |
| 48 | NEW CONSTRUCT, HIGHWAYS | 0. | 20.6642 | 40.0327 | 48 |
| 76 | CLEANING AND TOILET PREPARATIONS | .0100 | 22.0449 | 39.9677 | 49 |
| 10 | WHEAT | 11.0227 | 24.1450 | 39.7142 | 50 |

Table 39

1976 SAN DIEGO EMISSION COEFFICIENTS

CO EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 90 | LOCAL TRANSIT AND INTERCITY BUSES | 822.5793 | 826.8321 | 831.6056 | 1 |
| 91 | TRUCK TRANSPORTATION | 414.1969 | 437.2667 | 441.6702 | 2 |
| 45 | GUM AND WOOD CHEMICALS | 252.4292 | 260.6295 | 263.3845 | 3 |
| 16 | FORESTRY AND FISHERY PRODUCTS | 111.5680 | 118.3635 | 122.5742 | 4 |
| 122 | DUMMY INDUSTRIES | 0. | 43.7219 | 46.4878 | 5 |
| 93 | AIR TRANSPORTATION | 34.5415 | 39.1398 | 42.9222 | 6 |
| 58 | BLAST FURNACES AND BASIC STEEL PROD | 32.2762 | 39.2649 | 42.2299 | 7 |
| 35 | LOGGING CAMPS + SAWMILLS | 2.1344 | 30.6396 | 34.0797 | 8 |
| 57 | MISC STONE AND CLAY PRODUCTS | 13.0633 | 19.3336 | 23.0597 | 9 |
| 28 | CANNED AND FROZEN FOODS | .0334 | 17.8100 | 20.7515 | 10 |
| 59 | IRON AND STEEL FOUNDRIES AND FORGIN | 10.8548 | 17.0811 | 20.3513 | 11 |
| 12 | VEGETABLES | 12.8789 | 15.2358 | 19.7287 | 12 |
| 13 | DRIED BEANS | 12.0538 | 14.5464 | 18.8832 | 13 |
| 8 | BARLEY | 12.5014 | 16.0318 | 18.7794 | 14 |
| 54 | CEMENT AND CONCRETE PRODUCTS | 2.6291 | 14.7438 | 18.7289 | 15 |
| 6 | APIARY PRODUCTS | 12.9678 | 16.5600 | 18.2562 | 16 |
| 92 | WATER TRANSPORATATION | 6.8317 | 12.9935 | 16.0828 | 17 |
| 9 | HAY AND PASTURE | 10.0225 | 13.2380 | 16.0107 | 18 |
| 89 | RAILROADS | 4.6929 | 10.6633 | 15.0051 | 19 |
| 10 | NONCITRUS FRUITS | 8.5100 | 10.8896 | 14.9096 | 20 |
| 7 | WHEAT | 8.5943 | 11.4815 | 14.5482 | 21 |
| 19 | NEW CONSTRUCT, RESIDENT | 7.2136 | 10.4700 | 14.2552 | 22 |
| 11 | CITRUS FRUITS | 7.3410 | 9.8036 | 13.7999 | 23 |
| 21 | NEW CONSTRUCT, PUBLIC UTILITY | 6.4691 | 10.3134 | 13.7799 | 24 |
| 119 | POST OFFICE | .0245 | 6.7925 | 13.2896 | 25 |
| 22 | NEW CONSTRUCT, HIGHWAYS | 0. | 8.7489 | 12.9505 | 26 |
| 14 | POTATOES | 5.9441 | 8.1726 | 12.0921 | 27 |
| 1 | DAIRIES | 4.6200 | 9.2635 | 11.6657 | 28 |
| 47 | DRUGS | 2.5538 | 6.9833 | 10.8161 | 29 |
| 55 | STRUCTURAL CLAY PRODUCTS | 1.8524 | 6.3357 | 10.7461 | 30 |
| 49 | PAINTS AND ALLIED PRODUCTS | 0. | 7.5656 | 10.2317 | 31 |
| 102 | BANKING AND FINANCIAL INTERMEDIARIE | .0113 | 2.3143 | 9.3955 | 32 |
| 4 | CATTLE AND CALVES | 5.4445 | 8.1275 | 9.1729 | 33 |
| 40 | PAPER + PAPERBOARD PRODUCTS | .3557 | 6.1139 | 9.0238 | 34 |
| 121 | STATE AND LOCAL GOVT ENTERPRISES | .3632 | 3.5281 | 9.0056 | 35 |
| 18 | STONE + CLAY MIN + QUARRY | .1138 | 4.9545 | 8.9331 | 36 |
| 48 | CLEANING AND TOILET PREPARATIONS | .0078 | 6.0931 | 8.8424 | 37 |
| 23 | NEW CONSTRUCT, ALL OTHER | 0. | 4.4658 | 8.7939 | 38 |
| 100 | WHOLESALE TRADE | .0235 | 3.8233 | 8.5842 | 39 |
| 108 | MISCELLANEOUS BUSINESS SERVICES | 0. | 3.5018 | 8.5709 | 40 |
| 15 | GREENHOUSE AND NURSERY PRODUCTS | .8206 | 3.7748 | 8.5389 | 41 |
| 42 | OTHER PRINTING AND PUBLISHING | .0011 | 4.0164 | 8.5205 | 42 |
| 44 | AGRICULTURAL CHEMICALS | .1118 | 6.0193 | 8.4838 | 43 |
| 118 | NONPROFIT ORGANIZATIONS | .0000 | 2.1700 | 8.3705 | 44 |
| 115 | HOSPITALS | .0000 | 2.9378 | 8.2948 | 45 |
| 33 | MISC FOOD PRODUCTS | .3098 | 6.4752 | 8.2341 | 46 |
| 63 | METAL STAMPINGS | .3626 | 5.0321 | 8.2336 | 47 |
| 110 | MISC PROFESSIONAL SERVICES | 0. | 2.3902 | 8.1411 | 48 |
| 117 | EDUCATIONAL SERVICES | .0000 | 2.2110 | 8.0455 | 49 |
| 53 | GLASS | .5014 | 3.8368 | 8.0138 | 50 |

Table 40

1976 SOUTH COAST EMISSION COEFFICIENTS

CO EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 108 | LOCAL TRANSIT AND INTERCITY BUSES | 950.0700 | 955.9467 | 962.6039 | 1 |
| 109 | TRUCK TRANSPORTATION | 215.9116 | 245.5880 | 252.1859 | 2 |
| 27 | FORESTRY AND FISHERY PRODUCTS | 130.5782 | 137.1840 | 143.2885 | 3 |
| 74 | BLAST FURNACES AND BASIC STEEL PROD | 69.6563 | 85.5461 | 90.3196 | 4 |
| 141 | DUMMY INDUSTRIES | 0. | 55.3060 | 60.1361 | 5 |
| 12 | CORN | 48.4461 | 52.6673 | 56.7553 | 6 |
| 73 | MISC STONE AND CLAY PRODUCTS | 29.8547 | 38.0590 | 43.8699 | 7 |
| 111 | AIR TRANSPORTATION | 27.5226 | 32.9974 | 38.5534 | 8 |
| 7 | MISC. LIVESTOCK | 25.8906 | 30.4865 | 33.6837 | 9 |
| 16 | WALNUTS | 23.5887 | 27.0705 | 32.3385 | 10 |
| 17 | ALMONDS | 23.2649 | 26.6396 | 31.9319 | 11 |
| 14 | OATS | 19.8803 | 24.1998 | 28.1467 | 12 |
| 77 | METAL CONTAINERS | .1586 | 21.1002 | 26.1300 | 13 |
| 22 | MELONS | 15.3642 | 18.9436 | 25.3363 | 14 |
| 70 | CEMENT AND CONCRETE PRODUCTS | 3.4112 | 19.5513 | 25.2310 | 15 |
| 20 | VEGETABLES | 15.0734 | 18.5873 | 24.9792 | 16 |
| 43 | CANNED AND FROZEN FOODS | .0745 | 18.9243 | 23.7802 | 17 |
| 21 | DRIED BEANS | 14.1077 | 17.5637 | 23.6627 | 18 |
| 11 | BARLEY | 14.6315 | 19.0889 | 23.1874 | 19 |
| 36 | NEW CONSTRUCT, PUBLIC UTILITY | 7.5713 | 16.8772 | 23.0627 | 20 |
| 8 | APIARY PRODUCTS | 15.1775 | 20.0255 | 22.8409 | 21 |
| 23 | SUGAR BEETS | 14.0569 | 17.2367 | 22.7950 | 22 |
| 51 | LOGGING CAMPS + SAWMILLS | .0158 | 18.2317 | 22.4800 | 23 |
| 79 | FABRICATED STRUCTURAL STEEL | 0. | 16.5823 | 21.9858 | 24 |
| 81 | METAL STAMPINGS | .7799 | 16.3837 | 21.8613 | 25 |
| 107 | RAILROADS | 7.2430 | 15.4985 | 21.5864 | 26 |
| 9 | COTTON | 12.7996 | 17.1726 | 21.2307 | 27 |
| 6 | SHEEP, LAMBS, AND WOOL | 14.3419 | 19.3280 | 21.1325 | 28 |
| 34 | NEW CONSTRUCT, RESIDENT | 8.4428 | 14.4951 | 20.6679 | 29 |
| 13 | HAY AND PASTURE | 11.7303 | 16.2147 | 20.4171 | 30 |
| 75 | IRON AND STEEL FOUNDRIES AND FORGIN | .2945 | 14.1276 | 19.5622 | 31 |
| 18 | NONCITRUS FRUITS | 9.9600 | 13.5978 | 19.4272 | 32 |
| 37 | NEW CONSTRUCT, HIGHWAYS | 0. | 12.7606 | 19.2278 | 33 |
| 110 | WATER TRANSPORATATION | 4.7866 | 13.8383 | 19.0579 | 34 |
| 10 | WHEAT | 10.0587 | 13.9937 | 18.4497 | 35 |
| 80 | SCREW MACHINE PRODUCTS | 0. | 12.3747 | 18.4224 | 36 |
| 15 | GRASS SEED | 9.3480 | 13.7824 | 18.2518 | 37 |
| 19 | CITRUS FRUITS | 8.5919 | 12.2991 | 18.0967 | 38 |
| 83 | OTHER FABRICATED METAL PRODUCTS | .0810 | 12.3711 | 17.9656 | 39 |
| 138 | POST OFFICE | .0288 | 7.8462 | 16.4731 | 40 |
| 104 | OTHER TRANSPORTATION EQUIPMENT | 0. | 11.0625 | 16.2456 | 41 |
| 1 | DAIRIES | 5.4073 | 12.3567 | 16.0388 | 42 |
| 78 | HEATING APPARATUS AND PLUMBING FIXT | .0087 | 9.9349 | 15.7932 | 43 |
| 85 | FARM MACHINERY | 0. | 10.2020 | 15.7645 | 44 |
| 82 | CUTLERY, HAND TOOLS AND GENERAL HAR | .5122 | 9.3459 | 15.7042 | 45 |
| 24 | POTATOES | 6.9569 | 10.1303 | 15.6660 | 46 |
| 86 | CONSTRUCTION + MATERIAL HANDLING EQ | .1083 | 9.6406 | 15.5950 | 47 |
| 89 | GENERAL INDUSTRIAL MACHINERY | 0. | 9.0994 | 15.2402 | 48 |
| 35 | NEW CONSTRUCT, NONRESIDENT | 0. | 8.4710 | 14.9752 | 49 |
| 88 | SPECIAL INDUSTRIAL MACHINERY | 0. | 8.6425 | 14.7843 | 50 |

# Table 41

1976 SAN JOAQUIN EMISSION COEFFICIENTS

CO EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 66 | GUM AND WOOD CHEMICALS | 895.5801 | 921.7555 | 927.9873 | 1 |
| 113 | TRUCK TRANSPORTATION | 555.2316 | 618.8298 | 628.5121 | 2 |
| 112 | LOCAL TRANSIT AND INTERCITY BUSES | 443.1707 | 455.6441 | 465.4936 | 3 |
| 32 | FORESTRY AND FISHERY PRODUCTS | 121.4863 | 131.3153 | 140.0073 | 4 |
| 87 | CUTLERY, HAND TOOLS AND GENERAL HAR | 111.7127 | 119.9798 | 128.1242 | 5 |
| 115 | AIR TRANSPORTATION | 98.2652 | 110.6912 | 118.2368 | 6 |
| 18 | FOOD, FEED GRAINS, NEC | 59.4300 | 76.1752 | 81.1925 | 7 |
| 13 | CORN | 45.0729 | 58.8892 | 65.0412 | 8 |
| 76 | STRUCTURAL CLAY PRODUCTS | 41.3658 | 53.4427 | 62.4579 | 9 |
| 71 | PETROLEUM REFINING AND RELATED PROD | 38.5872 | 52.3472 | 57.8018 | 10 |
| 16 | SORGHUM GRAIN | 35.1478 | 48.6514 | 54.9344 | 11 |
| 7 | MISC. LIVESTOCK | 24.0879 | 43.5663 | 50.0438 | 12 |
| 75 | CEMENT AND CONCRETE PRODUCTS | .0063 | 35.0597 | 44.0839 | 13 |
| 8 | APIARY PRODUCTS | 14.1207 | 37.3571 | 43.7583 | 14 |
| 6 | SHEEP, LAMBS, AND WOOL | 13.3433 | 38.1877 | 43.2700 | 15 |
| 78 | MISC STONE AND CLAY PRODUCTS | 14.2246 | 33.8213 | 41.9516 | 16 |
| 56 | LOGGING CAMPS + SAWMILLS | 21.9390 | 34.1644 | 40.4398 | 17 |
| 51 | SUGAR | .2470 | 32.2352 | 39.4501 | 18 |
| 122 | WATER AND SANITARY SERVICES | 12.3782 | 28.6557 | 38.0837 | 19 |
| 19 | WALNUTS | 21.9463 | 29.9014 | 37.4967 | 20 |
| 42 | NEW CONSTRUCT, HIGHWAYS | 0. | 27.8284 | 37.1813 | 21 |
| 20 | ALMONDS | 21.6451 | 29.2055 | 36.8523 | 22 |
| 23 | FRUIT AND TREE NUTS, NEC | 20.8391 | 29.1219 | 36.7301 | 23 |
| 46 | MEAT PRODUCTS | 0. | 31.3031 | 36.4668 | 24 |
| 15 | OATS | 18.4961 | 30.5746 | 36.3747 | 25 |
| 1 | DAIRIES | 5.0308 | 27.8415 | 35.0860 | 26 |
| 4 | CATTLE AND CALVES | 5.9285 | 29.5701 | 34.8810 | 27 |
| 114 | WATER TRANSPORATATION | 2.0630 | 27.1386 | 33.9766 | 28 |
| 144 | STATE AND LOCAL GOVT ENTERPRISES | 13.6564 | 22.3402 | 33.4737 | 29 |
| 12 | BARLEY | 13.6127 | 27.0647 | 33.3787 | 30 |
| 48 | CANNED AND FROZEN FOODS | .0747 | 25.8727 | 32.6426 | 31 |
| 49 | GRAIN MILL PRODUCTS | .0579 | 25.5905 | 31.6992 | 32 |
| 26 | MELONS | 14.2944 | 22.3433 | 31.3690 | 33 |
| 24 | VEGETABLES | 14.0238 | 21.8707 | 30.9248 | 34 |
| 34 | METALS MINING | 13.5659 | 23.4304 | 30.4327 | 35 |
| 25 | DRIED BEANS | 13.1254 | 21.2995 | 30.2740 | 36 |
| 2 | BROILERS, CHICKENS AND EGGS | 3.9832 | 24.9072 | 30.0911 | 37 |
| 14 | HAY AND PASTURE | 10.9135 | 23.2145 | 29.4520 | 38 |
| 120 | ELECTRIC COMPANIES AND SYSTEMS | .7863 | 23.2812 | 29.3971 | 39 |
| 10 | WHEAT | 9.3583 | 22.0999 | 29.3488 | 40 |
| 52 | CONFECTIONARY PRODUCTS | .1188 | 22.2982 | 29.2529 | 41 |
| 27 | SUGAR BEETS | 13.0781 | 20.9715 | 29.1481 | 42 |
| 61 | PAPER + PAPERBOARD PRODUCTS | .0734 | 21.1257 | 28.7867 | 43 |
| 39 | NEW CONSTRUCT, RESIDENT | 7.8549 | 19.6743 | 28.4946 | 44 |
| 145 | DUMMY INDUSTRIES | 0. | 23.9839 | 28.3078 | 45 |
| 70 | PAINTS AND ALLIED PRODUCTS | 0. | 22.1893 | 28.0738 | 46 |
| 47 | DAIRY PRODUCTS | .0369 | 20.2997 | 28.0465 | 47 |
| 142 | POST OFFICE | .9204 | 14.6576 | 27.8597 | 48 |
| 65 | AGRICULTURAL CHEMICALS | .2595 | 21.1280 | 27.7096 | 49 |
| 9 | COTTON | 11.9084 | 22.5527 | 27.7068 | 50 |

Table 42

1976 SAN FRANCISCO EMISSION COEFFICIENTS

CO EMISSIONS IN TONS PER MILLION DOLLARS OF DEMAND

RANKING IN ORDER OF DIRECT + INDIRECT + INDUCED EFFECTS

| | SECTOR | DIRECT | +INDIRECT | +INDUCED | RANK |
|---|---|---|---|---|---|
| 104 | LOCAL TRANSIT AND INTERCITY BUSES | 200.9167 | 202.8629 | 204.2750 | 1 |
| 24 | FORESTRY AND FISHERY PRODUCTS | 131.0967 | 131.9070 | 133.1989 | 2 |
| 47 | LOGGING CAMPS + SAWMILLS | 53.9860 | 59.9998 | 60.8210 | 3 |
| 11 | CORN | 48.6385 | 49.2525 | 50.1733 | 4 |
| 14 | SORGHUM GRAIN | 37.9283 | 38.5778 | 39.5248 | 5 |
| 57 | GUM AND WOOD CHEMICALS | 31.1074 | 33.3107 | 34.3548 | 6 |
| 71 | IRON AND STEEL FOUNDRIES AND FORGIN | 27.7604 | 29.3316 | 30.5166 | 7 |
| 7 | MISC. LIVESTOCK | 25.9934 | 26.4697 | 27.1157 | 8 |
| 15 | WALNUTS | 23.6824 | 24.2736 | 25.4488 | 9 |
| 16 | ALMONDS | 23.3573 | 23.9233 | 25.1044 | 10 |
| 13 | OATS | 19.9592 | 20.5899 | 21.4828 | 11 |
| 137 | DUMMY INDUSTRIES | 0. | 17.0560 | 18.1437 | 12 |
| 18 | VEGETABLES | 15.1332 | 15.6469 | 17.0654 | 13 |
| 10 | BARLEY | 14.6896 | 15.3543 | 16.2818 | 14 |
| 8 | APIARY PRODUCTS | 15.2377 | 15.7134 | 16.2706 | 15 |
| 19 | DRIED BEANS | 14.1637 | 14.7201 | 16.0694 | 16 |
| 20 | SUGAR BEETS | 14.1127 | 14.5710 | 15.8172 | 17 |
| 6 | SHEEP, LAMBS, AND WOOL | 14.3989 | 15.4035 | 15.7673 | 18 |
| 12 | HAY AND PASTURE | 11.7769 | 12.5163 | 13.4691 | 19 |
| 17 | NONCITRUS FRUITS | 9.9996 | 10.5728 | 11.8741 | 20 |
| 9 | WHEAT | 10.0986 | 10.6297 | 11.6306 | 21 |
| 30 | NEW CONSTRUCT, RESIDENT | 8.4763 | 9.9463 | 11.2615 | 22 |
| 107 | AIR TRANSPORTATION | 8.6966 | 9.7148 | 10.9061 | 23 |
| 32 | NEW CONSTRUCT, PUBLIC UTILITY | 7.6014 | 8.5762 | 9.8893 | 24 |
| 21 | POTATOES | 6.9845 | 7.4788 | 8.6984 | 25 |
| 103 | RAILROADS | 4.0030 | 6.2141 | 7.5671 | 26 |
| 48 | MILLWORK, PLYWOOD + OTHER WOOD PROD | 1.0460 | 6.4431 | 7.3930 | 27 |
| 4 | CATTLE AND CALVES | 6.3975 | 6.9232 | 7.2631 | 28 |
| 1 | DAIRIES | 5.4287 | 5.8634 | 6.6313 | 29 |
| 49 | WOODEN CONTAINERS | 0. | 5.6633 | 6.6190 | 30 |
| 136 | STATE AND LOCAL GOVT ENTERPRISES | 4.3300 | 4.9085 | 6.5878 | 31 |
| 22 | SAFFLOWER | 3.5386 | 4.2219 | 5.3125 | 32 |
| 2 | BROILERS, CHICKENS AND EGGS | 4.2983 | 4.6813 | 5.1979 | 33 |
| 52 | PAPER + PAPERBOARD PRODUCTS | .8146 | 3.6038 | 4.7385 | 34 |
| 114 | WATER AND SANITARY SERVICES | .0013 | 2.9748 | 4.2410 | 35 |
| 112 | ELECTRIC COMPANIES AND SYSTEMS | 2.8924 | 3.4454 | 4.1930 | 36 |
| 50 | HOUSEHOLD FURNITURE | 0. | 2.4321 | 3.5904 | 37 |
| 65 | GLASS | 1.3421 | 2.1612 | 3.5092 | 38 |
| 80 | ENGINES, TURBINES AND GENERATORS | .1074 | 2.1385 | 3.3767 | 39 |
| 77 | METAL STAMPINGS | 1.3102 | 2.1001 | 3.2939 | 40 |
| 82 | CONSTRUCTION + MATERIAL HANDLING EQ | .0095 | 1.9245 | 3.2149 | 41 |
| 55 | INDUSTRIAL CHEMICALS | .8771 | 2.1324 | 3.1553 | 42 |
| 81 | FARM MACHINERY | 0. | 1.8598 | 3.1102 | 43 |
| 5 | HOGS | 2.1595 | 2.4785 | 3.0626 | 44 |
| 100 | OTHER TRANSPORTATION EQUIPMENT | 0. | 1.9648 | 3.0054 | 45 |
| 61 | PAINTS AND ALLIED PRODUCTS | 0. | 1.9350 | 2.9857 | 46 |
| 117 | BANKING AND FINANCIAL INTERMEDIARIE | .1344 | .9148 | 2.9841 | 47 |
| 84 | SPECIAL INDUSTRIAL MACHINERY | 0. | 1.6153 | 2.9271 | 48 |
| 85 | GENERAL INDUSTRIAL MACHINERY | 0. | 1.5696 | 2.8835 | 49 |
| 54 | OTHER PRINTING AND PUBLISHING | .0251 | 1.3575 | 2.8785 | 50 |

13. Synopsis

Non-survey techniques and secondary source economic data were used to construct input-output models and emissions for the four major air basins of the State of California.

California Air Resources Board emissions inventory data were supplemented with estimates of fuel combustion emissions to derive air pollution coefficients for five critical pollutants for each detailed sector of a statewide input-output model. The estimates were adjusted to agree with broader emission totals for major economic categories provided by the Air Resources Board for all California air basins.

The statewide coefficients for detailed industries were used to supplement the basic emissions inventory data available for each air basin. The totals thus derived were adjusted to the summary estimates of emissions for each individual basin.

The adjusted emission coefficients derived for detailed sectors were multiplied into the Leontief inverses of each air basin input-output model and the direct plus indirect plus induced emissions were calculated and ranked for each of the five pollutants. The rankings indicate in tons per million dollars of deliveries the total pollutant load generated in the air basin economy for each industry.

The values of the emission coefficients derived for the various industries seem to be reasonable in terms of orders of magnitude. The rankings indicate rather clearly those industries with higher pollutant levels per million dollar of product deliveries. With all industries on a comparable basis the disparities in emission levels in many instances

are pronounced.

From the empirical results some observations may be made. First, for each pollutant the sectors with the highest associated total emission rates will vary between basins. Second, in each basin (and in the statewide economy as well) the ranking of the economic sectors by total emissions differs from the ranking by direct emissions. Third, the ratio of total to direct emissions for a particular sector will vary across basins due to variations in direct emission rates and to differences in industrial structure.

Although it has not been done in the study, the emission coefficients could be related to employment and income levels for each basin and additional coefficients derived which ranked each industry in terms of employment or income generated per ton of pollutant emitted. In this manner those industries which generate the lowest income and employment levels per ton of pollutant emitted could be analyzed in greater detail as part of a broader policy analysis concerned with the potential growth pattern of the respective air basins.

## 14. Glossary of Economic Terms*

Final Demand. Products and services that are purchased for ultimate use, or consumption, and not for further resale or processing. Final demand is contrasted with interindustry demand wherein products and services are purchased as part of the production process.

Value Added. Value added is usually defined as the difference between the final value, or sale price, of a product and the cost of the materials and supplies used to produce the product. More specifically, value added consists of payments to wages, salaries, profits, interest, rent, taxes and depreciation.

Multiplier. The concept relates to the secondary and tertiary (indirect) increases or decreases of some measure of economic activity such as employment or income resulting from an initial change in demand for, or output of, some good or service.

Output Multiplier. The column sums of the Leontief Inverse of an input-output model. These sums show in dollar terms the degree of "interrelatedness" of the sectors of the economy under study.

Technical Coefficient. (Technological Coefficient). The term used in interindustry, or input-output, analysis to define the ratio of the units of input to the units of output. Technical coefficients are derived by normalizing (dividing) each of the column elements of the transactions table by the respective column sum.

Leontief Inverse. The term used to describe the table which shows the direct and indirect (total) requirements of each industry from all other industries to deliver a unit of product to final demand. The table is named after Professor Wassily Leontief who pioneered in the field of input-output analysis.

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* The interested reader may consult Douglas Greenwald et al., The McGraw-Hill Dictionary of Modern Economics, McGraw-Hill, New York, New York, 1973.

15. Footnotes

[1]Actually the computer algorithm does not follow the iterative procedure outlined here. As can be seen from Appendix 1 the input-output model is a set of simultaneous linear equations. Thus matrix inversion is employed to generate the table of total requirements.

[2]It is to be noted that this figure is understated because the induced impact (the impact generated by increased consumer expenditures) has been ignored in our simple illustration. However, for all air pollutant emissions pertaining to the California air basins analyzed in the body of this report, the induced impact is included with the direct and indirect impacts. The induced impact is determined by "closing" the I-O model with respect to households, i.e., by shifting households from an exogenous to an endogeous variable in the model.

[3]Non-stationary transportation sources of emissions considered in this report include those transportation sectors explicitly set forth in the Statewide I-O model (e.g. Truck Transport, Local Transit and Inter-city Buses) and those transportation activities which are implicitly included in non-transportation sectors (e.g. auto travel by the in-surance industry, auto and truck travel by the communications companies and other utilities).

[4]The official 1972 U.S. Input-Output Table was released by BEA in June of 1979.

[5]For a complete description of the California input-output model for 1976 prepared by the Department of Water Resources including specific sector definitions, data, and procedures used see: State of California, The Resources Agency, Department of Water Resources, Division of Planning, Techniques for Statewide and Regional Resource - Constrained Industrial Outlooks, Draft Technical Report, Sacramento, California, November 1978.

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