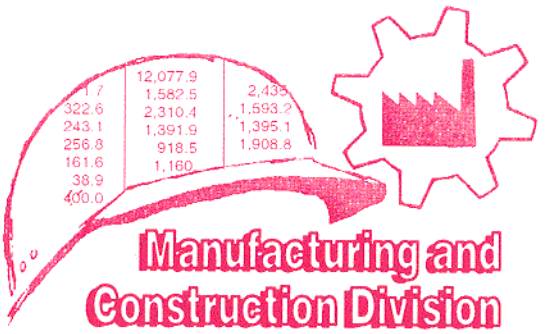
Working Papers

Industrial and Construction Statistics



Manufacturing and Construction Division

Bureau of the Census

LED

CONTENTS AND DATA LIMITATIONS

OF THE LED FILE

BY

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CONTENTS AND THE DATA LIMITATIONS OF THE LED FILE

For many years, staff of the Bureau of the Census, as well as outside researchers, have been aware of a great statistical potential existing within the computer files of the Census Bureau. However, until now, analysis of manufacturing data has been confined to looking at aggregates over time. Detailed microanalysis has been either impossible to do or could be done only at great expense both of time and of money. Serious time series analysis of census micro-data has, therefore, been almost nonexistent.

Several attempts have been made in the past to create a longitudinal file and an environment within the Bureau in which time series data could be maintained and accessed. None of these previous attempts have met with complete success. We have, however, learned a great deal from these past efforts both in file matching and review and editing necessary to create and maintain such a file.

Recently the climate surrounding this work has been such that a fresh attempt has been made at creating a Longitudinal Establishment Data (LED) file. There is a renewed interest in the type of economic problems that can best be solved by microanalysis. The change in the climate of capital investment; the shift in our balance of trade which has an effect on individual establishments; the quickening of the merger movement is bringing renewed interest of the effect of changes in ownership on plant operations both before and after the change.

In response to these and many other concerns, the Census Bureau has now successfully created the LED file. This file now exists and has been created from the census of manufactures and the annual survey of manufactures (ASM). The file

currently contains longitudinal establishment data for manufacturing establishments for the period 1972 to 1981. Subsequent data from the census/ASM series will be added to this file a year at a time as they become available. This file will have a tremendous value for use in economic research in the years to come. The development and maintenance of this file, however, poses significant conceptual and operational problems. Some of these problems are only internal Census Bureau problems but others may result in limitations of the data's usefulness for certain applications. This paper discusses some of the characteristics of the LED file that may need to be taken into consideration before to using it for a specific research project.

Description of Census/ASM Series

The Census Bureau conducts the ASM in each of the 4 years between censuses of manufactures. The ASM is based on a scientifically selected sample drawn from the census of manufactures universe of approximately 350,000 establishments. Since 1972, the ASM has ranged in size from approximately 70,000 to its current size of approximately 55,000 establishments.

Like the census, the ASM collects statistics on employment, payroll, value of shipments, capital expenditures, and so forth. In addition to these items, establishments in the ASM sample panel have, since 1972, been requested to supply detailed information on assets, rental payments, supplemental labor cost, consumption of specific types of fuels and other selected items. Unlike the census, the ASM does not request detail on individual materials consumed and

products shipped. A further description of the census/ASM series, including a list of the various items collected by year, is included in the attachment. A more complete description of the individual items is included in the documentation you were given at the outset of this conference.

The existence of this file should make possible, really for the first time, serious examination of the structure and interaction of establishments within the manufacturing sector. We would invision potential research projects being proposed that would seek to answer questions of a time series as well as a cross-sectional nature. Ideally, a research proposal would be sent to the Bureau for consideration. Members of the Bureau staff would examine the proposal and review with the researcher, how characteristics of the file may impact on the research. Once the ramifications of these characteristics are understood and incorporated into the research plan, the data necessary for the analysis could be stripped from the file and the results delivered to the researcher in a minimum of time. The existence of a special staff within the Bureau to expedite this work should substantially improve the timeliness of the Bureau's response.

The LED file is without a doubt many good things but there are some things that it is not. It is not a vehicle which will allow for the reproduction of ASM or census tabulations. Benchmarking adjustment factors included in ASM estimates are not part of the LED file. Estimates derived from administrative records and included in census and ASM tabs are not part of the file. Other related economic time series from within the Bureau or from other government agencies are not inlcuded.

The LED file as it exists now is really a by-product of our current program of statistical data collection. Since the data was not collected and reviewed with longitudinal analysis in mind, several characteristics about the file may impact potential analysis. Individuals considering using the file should be prepared to answer several questions about their research and how the results would be affected by the characteristics of the file.

For example:

1. Do you want to use imputed as well as reported data?

   The imputation routines may or may not adversely affect your conclusions. The imputation rates are not low, particularly for small establishments. Will the existence of industry average imputation affect your study results?

2. Do you want to compare large vs. small establishments?

   The quality of large establishment data is far superior to that of small establishment data. Small establishments are more likely to be imputed and when imputation takes place, the large establishments primarily determine how that imputation is done.

3. Do you want to use only "matched data" cases for which we have a complete time series?

   Establishments that are completely or nearly completely matched over time are usually large and are likely to be associated with large companies. Will this matter in your analysis?

4. Do you want to use weighted data for sample cases?

   Small establishments in the file in non-census years are weighted to more accurately represent the universe of small establishments.

   Exclusion of the weights for these cases may have an impact on regression studies as well as size class comparisons.

5. Do you want to study geographic area data?

   The samples drawn for the ASM are not large enough to support detailed geographic analysis. Using intercensal sample data for this type of analysis is hazzardous at best.

6. Do you need to study companies rather than establishments?

   Company data is not universally available for all years of the file.

7. Are you aware that the definitions of certain data items have evolved over time?

   Different questions, different instructions to respondents, as well as different editing and imputation strategies over time will, no doubt, affect some kinds of analysis. Will it affect yours?

These questions and concerns should be resolved between the researchers and Bureau staff members before significant work is undertaken on a project. Failure to do this may result in disappointment with the end product.

A more detailed discussion of special characteristics of the file and how they may affect potential work follows.

Characteristics of the LED File Which May Limit Its Usefulness

Perhaps the most serious potential limitation of this file as it now exists is that although it represents data for establishments over several years, the data included are not always appropriate for time series analysis. Neither the census of manufactures nor the ASM sample survey has been conducted with time series implications in mind.

Traditionally, the Census Bureau's objectives for both the census of manufactures and the ASM have been to publish the most useful and accurate aggregates. We have been concerned with individual establishment records only as they affect the completeness of aggregation or the test for confidentiality. Furthermore, in handling mass data whose primary use is in cross-classified aggregations, the quality of detailed establishment records must be balanced against cost and timing considerations. As a result, many uncorrected establishment records may be left in the file, either with improper company affiliation or with omitted or erroneous data that have no significant effect on published aggregates. Although the aggregates are relatively unaffected, these data records could be significant when considered in light of a time series comparison, particularly if those comparisons are related to the size of the firm.

Establishments have been included in or excluded from the ASM sample, edited, reviewed, and imputed for purposes of aggregate estimation. The distribution of

the micro-data has not been a concern when considering imputation strategies. For respondent burden considerations, small establishments are intentionally prevented from being included in successive ASM panels.

These and many other survey operation decisions have been made each year without regard to what, if any, impact they may have on a time series analysis of the data. Larger establishments, which are more likely to affect aggregate data, are more closely watched and reviewed. The sample rotation methodology which breaks the time series for small establishments, has no effect on the larger (TE $\geq$ 250) establishments. More effort is expended on the large establishments to obtain reported data. Edit changes made to large establishments are reviewed more closely and questionable responses are more likely to be resolved by an additional telephone contact with the respondent. The overall result of these conditions is that the data limitations of the LED file have far more impact on small establishments (TE $<$ 250) than on large ones.

Thus it could be said that the LED file, as it exists today, includes two distinct sub-series:

1. An essentially complete establishment time series subset covering 10 years of high quality manufacturing data for establishments with 250 or more employees. This portion of the file includes approximately 20,000 establishments covering 67 percent of the 1977 value of shipments.

2. A fragmented time series subset consisting of at least 3 separate time series of smaller establishments. This subset is substantially impacted by sampling, survey methodology, and data review decisions. The consistency and appropriateness of this subset file for use in time series analysis is, therefore, much more suspect. Potential users should satisfy themselves that their analysis will not be adversely affected by this condition before they undertake an analysis using the LED file. This portion of the file covering the 1974-1978 time frame includes 8,200 establishments accounting for 2 percent of the 1977 value of shipments.

When analysis of the time series data is confined to a comparison of census data only, the dual nature of the file is even more pronounced. No coverage work is done for single establishment companies that are not a part of the ASM panel. Thus it is not uncommon for an establishment to have a change of Employer Identification number between census and that change not be reflected in the linking operation. The 60 percent match rate between 1972 and 1977 for small establishments (TE < 100) not only reflects a measure of birth and death activity but also includes many EI changes for which no linkage was provided.

Specific problems and how they effect data are further discussed below. These specific problems may be broadly grouped into four categories: (1) characteristics due to ASM sampling procedures, (2) characteristics caused by our coverage and sample maintenance rules, (3) effects of editing and imputation, and (4) data content limitations.

Characteristics Due to ASM Sampling Procedures

The ASM is a sample survey. It is resampled every 5 years to more accurately represent the changing manufacturing universe and to more equitably distribute the reporting burden associated with the survey. The samples are changed following a census and the census serves as the sample frame.

The 1973 ASM data was obtained from a sample selected from the 1967 census. ASM samples were reselected in 1974 and 1979.

The manufacturing universe is a highly skewed distribution. Relatively few establishments account for a major proportion of the production. This concentration combined with the basic objective of providing U.S. level estimates has led to ASM sample designs that have included high proportion of large establishments.

From 1973 through 1978, "companies" were defined as the sampling unit. That is, the annual survey sample included as certainty cases all establishments of any company having one establishment with 250 employees or more plus major producers of each of the product classes covered by the ASM. These cases were continued from sample to sample. The other "small" noncertainty cases (approximately one-third of the ASM panel) were rotated in and out of the sample panel every 5 years. The implication of this rotation feature for the development of a time series file is that a subset of small establishments will be available for continuous time series for only the 5-year intervals corresponding to the length of the ASM samples.

A second major characteristic which may affect your work concerns the quality of sub-U.S. area level data. The individual establishment sample weights are a function of the establishment's relative importance at the U.S. level and are not appropriate at the State or county level. The estimation methodology used in the ASM utilizes census benchmarking adjustments to the weighted data at each cell. At the U.S. level, these adjustments are typically less than 3-4 percent; however, at sub-U.S. levels they can easily be in the neighborhood of 25-30 percent. These adjustments are not part of the LED file. Without these adjustments, attempts to reproduce any ASM published data will not be possible. These adjustments are used to minimize the variances of the ASM year-to-year estimates and are recomputed with each change in the sample. With the absence of these adjustments in the LED file, there will be significant breaks in the time series aggregates caused by the changes in samples.

With any sample that is used for a length of time, there is deterioration in its ability to provide accurate estimates. There is no guarantee that a sample that is representative of the universe when it is selected will be representative three years later. Industries undergoing unusual rates of expansion or ones that have insignificant capital equipment entry barriers typify industries where the sample is likely to deteriorate. In addition, despite extensive sample maintenance procedures, there is some loss in the sample structure. The dynamic nature of the manufacturing sector combined with the occasional difficulties in interpreting information provided by respondent results in a small number of errors in maintaining an accurate sample file.

In 1979, the design of the ASM sample was significantly changed. As mentioned earlier, up until this time the company had served as the sampling unit. A company probability had been developed using information from each of its manufacturing establishments and if the company was selected for the sample, each manufacturing establishment was considered to be selected. In 1979, we changed the definition of the sampling unit from the company to the establishment. Each establishment of a company was assigned a separate probability based upon its own relative size. The size of the company was not a factor in the probability arrangement or in the sample selection operation.

From a sampling viewpoint, this change is considerably more efficient as relatively small establishments of large companies are not automatically included in the sample. This increased efficiency allowed us to reduce the sample from 70,000 to approximately 56,000. The major impact of this change in the time series data base is that company level data cannot be developed from 1979 and later data files. In addition, most of the reduction in the sample size was at the expense of smaller establishments, thereby reducing the pool of small establishment data in the time series file.

Partly in response to LED file considerations and partly for internal survey reconciliation concerns, the 1984 ASM sample will resume company coverage for the very large companies (total value of shipments greater than 500 million dollars). The rest of the file will continue the use of an establishment sample.

A second major change in the sample design concerned the treatment of small single location companies. Historically, every active establishment was given some chance of selection for the ASM. However, for purposes of reducing the reporting burden, approximately 130,000 very small single location companies were excluded from the sample frame. These cases contributed less than 3 percent to the U.S. level aggregates for most industries, but may comprise a larger segment at sub-U.S. geographic levels. For ASM estimation purposes block imputes are created annually for these excluded establishments using IRS payroll data. However, no separate establishment records are created for inclusion in the ASM data files, and no representation of these cases exists in the LED file. This special treatment further limits the amount of small establishment data available.

Characteristics Related to Our Coverage and Sample Maintenance Rules

Sample maintenance is conducted for two primary purposes. The first of these is for mailout file updating. Information provided to us by respondents involving address changes or changes in ownership need to be carried to a central file for mailout purposes. Secondly, changes in the manufacturing universe, new plants opening or old plants closing, need to be reflected in the sample.

There is a unique coverage code assigned to each establishment which indicates the operational status of the establishment during the reporting period. The coverage codes are available in the LED file and would be useful in the identification of a particular class of establishments each year.

The major changes an establishment can undergo are outlined below:

A. File Updating

1. Company vs. Establishment Coverage Procedures

During the years 1972 to 1978 different coverage procedures were used than those used in 1979 to the present. This was largely due to the change from the company sample to the establishment sample in 1979. The company rules required that any plant that changed ownership assumed the ASM status of the acquiring company. This meant that the plant was added to the ASM when it may have previously been a nonselect case and was assigned the new company's weight. These rules caused the ASM to grow as these non-birth were added to the ASM sample.

The establishment sample rules introduced in 1979 require that each establishment maintain its ASM status and weight throughout the life of the sample regardless of the number of times it may have changed ownership. Establishments that were not selected for the ASM are not added as a result of a change in ownership, and selected establishments are not dropped. These rules allow the sample size to remain relatively stable throughout an ASM panel.

2. Small Ownership Changes Without Linkage

Since 1979, ASM establishments with less than 35 employees that indicate a change in ownership are dropped from the sample. A sample of small

acquired plants is added to the sample each year; however, no attempt is made to match or link these to the previous owner.

3. Large Ownership Changes With Linkage

For large ASM cases that undergo a change in ownership, the successor company is identified and is required to report for the operation in subsequent years.

B. Changes in Manufacturing Universe

1. Deaths

The cases that go out of business are often times difficult to identify on a timely basis and many cases have to be imputed. This is due to the fact that a company could receive the report form up to a year after it ceased operations. The company may no longer exist or may not bother to respond since there would no longer be any active data to report.

2. Geographic Changes

When a plant moves its physical location from one geographic area to another, the linkage is broken. This is done because there is no assurance that either the major activity or scale of operation of the new location will be similar to the old location.

3. Multi- and Single-Unit Births and Plants Under Construction

Multiunit births are difficult to identify due to definitional problems. For ASM purposes we would like to be able to identify multiunit births

when the capital expenditures are initially made. However, many companies do not provide new plant information to the Bureau until operations begin. By the time the establishments have been identified as births and added to the sample, the initial data collected for the establishment is likely to be more representative of an on-going operation than a new operation.

The single-unit birth procedure also changed when the sample design changed in 1979. Prior to 1979, a sample of approximately 2,500 new single unit employment identification numbers (EI) were sampled from the lists of new employment identification numbers that are obtained annually from IRS. This procedure was not very efficient due to large numbers of non-births being included in the IRS files and the poor quality of industry coding.

With the change to the establishment sample only true births with TE $\geq$ 35 have been added to the sample. Approximately 200 establishments have been added each year. These have been identified through the mailing of an industry classification card to all new EI numbers. These SU births have the same data problem as the multiunits in the sense that the initially collected data is for the reporting period after it was a birth. The remainder of new EI cases became part of the small imputation block. These cases are not included in the LED file.

4. Combined or Split Out Reports

It is often requested by companies that they be allowed to combine the data for two or more of their plants on one report form. Even though this is highly discouraged, there are still some cases that have to be combined. An intensional break in the link is made since the data for an individual plant would no longer be consistent from one reporting period to the next.

For the same reasons, another intensional break is made when two or more plants that have been reporting on one form now wish to report the plants separately. It is not considered necessary for the ASM purposes to also split out the plants in the previous reporting periods.

5. Changes in Major Activity

If a plant changes its major activity to something outside of manufacturing, then the establishment is dropped from the sample and considered out of scope of the ASM. No attempt, however, is made to identify or add to the sample those establishments that convert to manufacturing.
If a plant classified in a manufacturing industry changes its activity, but remains classified in manufacturing, we maintain the linkage from year to year.

Effects of Editing and Imputation

As a regular part of census and ASM processing, establishments are subjected to edits for internal consistency, as well as for consistency in year-to-year growth patterns. As a result of these edits, reported data may be changed by the computer without further contact with the respondent. Analysts do have an opportunity to see large changes and can verify these changes with the respondent if they feel that it is necessary, but this is not always done. When these edit changes occur, the revised data replaces the originally reported data on the file. Although flags on the record will alert a researcher that the edit has initiated a change, no record of the original or raw data is kept on the file.

Another major concern of LED file data use is the manner in which we impute for delinquent establishments and for items which fail our edits. As stated before, our regular survey operations are focused on how best to produce aggregate data. When we are faced with a need to impute an item, we approach this task in different ways depending on the information available. For single-unit establishments, we have a current year payroll figure obtained from the Internal Revenue Service or the Social Security Administration. If we have a prior year record (ASM case) we then compute the rate of year-to-year change in payroll for the establishment and allocate a rate of change based on that to all other items reported in the prior year. If no prior year record is available, which is the case for all non-ASM cases in a census year or births to the ASM panel, we use the current year payroll and industry average relationships of payroll to the

other items to obtain the imputes. Thus, all delinquent non-ASM single units within a given SIC in a census year will have the same ratio of variable a to variable b. This ratio has been derived for the industry as a whole and is heavily dominated by the reported ratio of the large plants within the industry.

For delinquent establishments of multi-unit companies, no establishment level payroll figure is available. The payroll seed is derived for these cases by applying an average growth factor for the industry obtained from BLS. Then depending on whether or not prior year data is available, we follow the same procedure as was followed for single units.

The result of these procedures is that the overall distribution of the reported cases is distorted by spikes of imputed records. This problem is particularly troublesome when it is considered in light of the fact that the industry averages are primarily large establishment averages and the recipients of the imputes are primarily small. Analysis which was designed to compare operating ratios of small versus large establishments within a given industry classification would be particularly affected by this.

Data Content Limitations

A. Use of Short Forms

Beginning with the 1978 ASM, we have used a short form for the smaller single-unit establishments. This short form differs from the normal ASM schedule in the sense that less detailed data is requested. While most of the basic data

items are included, payroll, employment, cost of materials, inventories, etc., requests for the detailed components that make up these items are not included. The ASM edit system utilizes historical establishment data, industry parameters, and the reported basic data to impute a complete establishment record. These complete data records are included in the ASM data files and are indistinguishable from non-short form establishments. The short form approach is also followed during the census for selected industries.

B. ASM Only Items

In a census survey year ASM establishments are mailed a different form than non-ASM establishments. The ASM form includes all the items that are included on the non-ASM form as well as several additional items. The additional items include beginning and ending assets, depreciation, retirements, rental payments, and supplemental labor costs. This information has not been requested of all establishments because of the complex nature of the items and for reporting burden considerations.

During the computer editing of the non-ASM records, these ASM only items are imputed using the available reported data and industry parameters. This imputed data will be present in the non-ASM establishment records in the LED file but is not of sufficient quality for inclusion in the census publication. The published census data for these items are essentially ASM estimates.

C. Part Year Reports

Data problems arise when full year data is not reported for the year of the transaction. The part year data is annualized based on the number of quarters of data that were reported. In addition, assets revaluation by the acquiring company may cause breaks in the time series.

D. Definitional Changes in Items

Since the LED file is essentially a byproduct of an existing survey and census complex, changes both to scope of coverage and to definition of variables that have evolved over time are present in the file. For example, beginning in 1977, data on detailed expenditures and retirements were required. This changed the instructions given to respondents about reporting the capital items. No work on the effect of this change on the time series was done and no attempt to adjust data for year prior to 1977 was made. Similarly in 1982 we begin collecting inventory data on a current cost basis. Prior to 1982 inventory data was collected on a book basis. This change will no doubt affect the inventory time series and a researcher will need to take this into account when analyzing the data.

Attachment

Description of Annual Survey of Manufactures and Census of Manufactures
(Extracted with minor modification from project description submitted to the National Science Foundation by Nancy and Richard Ruggles)

The Annual Survey of Manufactures (ASM) for 1973-1976, 1978-1981

The ASM was first collected in 1949, and was first put into machine-readable form in 1954. The number of establishments reporting each year has changed from the 70,000 for the period 1972 through 1978 to 55,000 for the new sample drawn for 1979. For the years between 1972 through 1978, the annual survey sample included as certainty cases all establishments with 250 employees or more, as well as all the establishments for any company having one such establishment. For the 1979 sample, the certainty cutoff of 250 employees has been extended but the inclusion in the sample of all establishments for any company having one such establishment has been eliminated (see further description of the new establishment-based sample in the text).

In order to produce longitudinal records of establishments, it is necessary, of course, that data be available for a given establishment in the surveys for different years, and that the Census records should include adequate means of identification so that the records can be merged over time. A number of features of the ASM should be helpful in producing such a longitudinal link. Each survey includes information on almost all items for both the current year and the previous year, linking a minimum of two years' information for a given establishment, and greatly facilitating the linkage over longer periods. Furthermore, since the census of manufactures is used as a sampling frame, a sample of identical establishments is continued for a 5 year period. Finally, as already noted, large establishments will be included as certainty cases in each sample.

The identification of specific establishments is quite complete. The identification number includes a company number (6 digits) and a plant number within the company (4 digits). Employer identification numbers used for reporting social security taxes are also included. Finally, each establishment is assigned a permanent plant number which remains the same even when a plant changes ownership, as may occur in the case of mergers. It should be noted that although the ASM is a sample, the nature of industrial concentration in establishments of large size is such that the value added of establishments in the sample is equal to 70 to 85 percent of total value added in manufacturing.

The data items included in the ASM have shown considerable stability over the years. The specific items covered in each year are shown in the table at the end of this attachment. The basic information on employment, payrolls, supplementary labor costs, worker hours, cost of materials, electricity, inventories, capital expenditures, rental payments, and value of shipments is available for all years. In recent years, a number of new items have been added, including the consumption of specific types of fuel (Item 11). This information was first asked for in 1971, and was included annually from 1973 through 1978. Considerably more information has also been obtained in the last few years on methods of valuation of inventories, purchases of used structures and machinery, and retirements and depreciation. Conversely, some questions relating to force account construction available in 1966 and 1967 have been dropped, and other

information has been available only in specific years. Thus, for example, cost of purchased services such as repair of structures, machinery and communication services, and the specific equipment expenditures on vehicles and computers were asked for in 1977 but no other year. In 1975, there was a question on plant history (this will be repeated for the 1981 ASM).

The Census of Manufactures for 1972 and 1977

The census of manufactures is the universe from which the annual survey is drawn, and the Census Bureau does create an annual survey for the census years. The censuses not only cover establishments not included in the annual survey, but they also contain much more information for each establishment than is provided by the ASM. Approximately 200 different census forms are used for a census of manufactures. These forms are tailored to specific industries, so that detailed information can be obtained on output of commodities at the 7-digit product level and materials consumed. Other questions relating to water usage, legal form of organization, and special inquiries relating to specific industries are also included.

The census of manufactures files do constitute a separate and important body of information. The number of establishments is about five times as many as in the ASM, and the volume of information is much greater. The value of the annual survey longitudinal record would be greatly increased if the benchmark information of the census years is integrated with the ASM to provide complete establishment coverage and supplementary detailed information.

Table 1. General Content of Census/ASM Establishment Records: 1972 - 1981

X = data available na = not available

Description	Years									
	72	73	74	75	76	77	78	79	80	81
Identification										
a) SIC - 4-digit industry	X	X	X	X	X	X	X	X	X	X
b) Establishment ID number	X	X	X	X	X	X	X	X	X	X
c) Permanent plant number	X	X	X	X	X	X	X	X	X	X
d) Sample weight	X	X	X	X	X	X	X	X	X	X
e) Employment size code	X	X	X	X	X	X	X	X	X	X
f) Primary product class code	X	X	X	X	X	X	X	X	X	X
g) Percent specialization in industry	X	X	X	X	X	X	X	X	X	X
h) Percent specialization in primary product class	X	X	X	X	X	X	X	X	X	X
1. Location										
a) State	X	X	X	X	X	X	X	X	X	X
b) SMSA	X	X	X	X	X	X	X	X	X	X
c) County	X	X	X	X	X	X	X	X	X	X
d) Place	X	X	X	X	X	X	X	X	X	X
2. Number of Employees, Total	X	X	X	X	X	X	X	X	X	X
a) Production workers, average	X	X	X	X	X	X	X	X	X	X
(1) March	X	X	X	X	X	X	X	X	X	X
(2) May	X	X	X	X	X	X	X	X	X	X
(3) August	X	X	X	X	X	X	X	X	X	X
(4) November	X	X	X	X	X	X	X	X	X	X
b) All other employees	X	X	X	X	X	X	X	X	X	X
3A. Payrolls, Total	X	X	X	X	X	X	X	X	X	X
a) Production workers	X	X	X	X	X	X	X	X	X	X
b) Other employees	X	X	X	X	X	X	X	X	X	X
3B. Supplementary Labor Costs, Total	X	X	X	X	X	X	X	X	X	X
a) Legally required	X	X	X	X	X	X	X	X	X	X
b) Voluntary	X	X	X	X	X	X	X	X	X	X
3C. First quarter payroll	na	X	X	X	X	X	X	X	X	X
4. Worker-hours of Production Workers, Total	X	X	X	X	X	X	X	X	X	X
a) January-March	X	X	X	X	X	X	X	X	X	na
b) April-June	X	X	X	X	X	X	X	X	X	na
c) July-September	X	X	X	X	X	X	X	X	X	na
d) October-December	X	X	X	X	X	X	X	X	X	na

Description	Years									
	72	73	74	75	76	77	78	79	80	81
5. Cost of Materials and Services, Total	X	X	X	X	X	X	X	X	X	X
a) Materials, parts, etc.	X	X	X	X	X	X	X	X	X	X
b) Resales	X	X	X	X	X	X	X	X	X	X
c) Fuel	X	X	X	X	X	X	X	X	X	X
d) Electricity	X	X	X	X	X	X	X	X	X	X
e) Contract work	X	X	X	X	X	X	X	X	X	X
6. Quantity of Electricity										
a) Purchased	X	X	X	X	X	X	X	X	X	X
b) Generated	X	X	X	X	X	X	X	X	X	X
c) Sold	X	X	X	X	X	X	X	X	X	X
7. Inventories (beginning and end-of-year), Total	X	X	X	X	X	X	X	X	X	X
a) Finished products	X	X	X	X	X	X	X	X	X	X
b) Work-in-process	X	X	X	X	X	X	X	X	X	X
c) Materials and supplies	X	X	X	X	X	X	X	X	X	X
8. Depreciable Assets										
a) Gross book value (beginning of year), total	X	X	X	X	X	X	X	X	X	X
(1) Structures	X	X	X	X	X	X	X	X	X	X
(2) Machinery	X	X	X	X	X	X	X	X	X	X
b) New capital expenditures, total	X	X	X	X	X	X	X	X	X	X
(1) Structures	X	X	X	X	X	X	X	X	X	X
(2) Machinery	X	X	X	X	X	X	X	X	X	X
c) Used capital expenditures, total	X	X	X	X	X	X	X	X	X	X
(1) Structures	na	na	na	na	na	X	X	X	X	X
(2) Machinery	na	na	na	na	na	X	X	X	X	X
d) Retirements, total	na	na	na	na	na	X	X	X	X	X
(1) Structures	na	na	na	na	na	X	X	X	X	X
(2) Machinery	na	na	na	na	na	X	X	X	X	X
e) Gross book value (at end-of-year), total	X	X	X	X	X	X	X	X	X	X
(1) Structures	X	X	X	X	X	X	X	X	X	X
(2) Machinery	X	X	X	X	X	X	X	X	X	X
9. Depreciation Charges, Total	na	na	na	na	na	X	X	X	X	X
a) Structures	na	na	na	na	na	X	X	X	X	X
b) Machinery	na	na	na	na	na	X	X	X	X	X
10. Rental Payments, Total	X	X	X	X	X	X	X	X	X	X
a) Structures	X	X	X	X	X	X	X	X	X	X
b) Machinery	X	X	X	X	X	X	X	X	X	X

Description	Years									
	72	73	74	75	76	77	78	79	80	81
11. Purchased Fuel (Quantity, Cost, and Stock*)										
a) Coal	na	X	X	X	X	X	X	X	X	X
b) Coke	na	X	X	X	X	X	X	X	X	X
c) Distillate fuel oil	na	X	X	X	X	X	X	X	X	X
d) Residual fuel oil	na	X	X	X	X	X	X	X	X	X
e) Natural gas	na	X	X	X	X	X	X	X	X	X
f) Liquefied petroleum gas	na	na	na	na	na	na	X	X	X	X
g) Other fuels	na	X	X	X	X	X	X	X	X	X
11B. Non-purchased Fuels Used										
a) Type of fuel	na	na	na	na	na	na	X	X	X	X
b) Percent of total fuel used	na	na	na	na	na	na	X	X	X	X
12. Methods of Inventory Valuation	na	na	na	X	X	X	X	X	X	X
13A. Status of Establishment	X	X	X	X	X	X	X	X	X	X
13B. Legal Form of Organization	X	na	na	na	na	X	na	na	na	na
14. First Year of Operations	na	na	na	X	na	na	na	na	na	X
15. Unfilled Orders (Single-Units Only)	na	na	na	na	X	X	X	X	X	X
16. Consistency Checks (On Form but not Keyed)	X	X	X	X	X	X	X	X	X	na
17. Detailed Materials Consumed and Water Usage	X	na	na	na	na	X	na	na	na	na
18A. Products and Services										
a) Product class code	na	X	X	X	X	na	X	X	X	X
b) Product (7-digit) code	X	na	na	na	na	X	na	na	na	na
c) Value of shipments	X	X	X	X	X	X	X	X	X	X
18B. Value of Shipments										
a) To other plants of same company	na	na	na	na	X	X	X	X	X	X
b) For export	na	na	na	na	X	X	na	na	X	X
18C. Other Receipts										
a) For work or services performed	X	X	X	X	X	X	X	X	X	X
b) Resales	X	X	X	X	X	X	X	X	X	X
c) Miscellaneous	X	X	X	X	X	X	X	X	X	X
19. Special Inquiries for Selected Industries	X	na	na	na	na	X	na	na	na	na

* = Included for 1978-1981 only.