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Providencia

A Case Study in Economic Censuses

(Prepared under a Resources Support Services Agreement with the Office of International Training, U.S. Agency for International Development)

International Statistical Programs Center

U.S. Department of Commerce
BUREAU OF THE CENSUS

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Providencia: A Case Study in Economic Censuses

Unit I. Content and Design of Economic Census
Unit II. Administrative Requirements and Resources
Unit III. Concepts, Questionnaires, and Table Outlines
Unit IV. Data Collection Operations
Unit V. Data Processing Operations
Unit VI. Review of Tabulated Data

PREFACE AND ACKNOWLEDGMENTS

This document is an instructional booklet on methodology for implementing economic censuses in developing countries. Although many procedures are common to various segments of economic censuses, this document is limited specifically to censuses of manufacturing, mining, electricity, and gas industries. The materials cover all aspects of planning and executing a census—from selecting the topics to be investigated and determining the methods for collecting the information to processing and tabulating the results. The development of the case study has been prompted by the recognition that economic statistics are becoming increasingly important to developing countries. It also fills the need for a set of instructional materials on the conduct of industrial censuses that will meet the requirements of a wide variety of countries. It is intended for statisticians who would be responsible for carrying out economic census programs in their countries.

To provide a practical framework for presenting the concepts and procedures inherent in an industrial census, the case study approach was used. A mythical country called Providencia was created and provided with administrative subdivisions, social and economic characteristics of the population, industries, and a national statistical organization in the process of planning an industrial census for 1975. Conceptual and procedural guidelines were developed for this undertaking, using the recommendations of regional and international agencies (particularly the United Nations) as well as the experiences of various nations in similar census programs. Since most countries conducting industrial censuses will be guided by such recommendations, this case study provides a conceptual and procedural bridge which can be edapted by a country planning to take an industrial census.

Units I to VI of the case study discuss the major operational steps in the development of an industrial census program. The units are divided into chapters and exhibits, the latter comprising tables, maps, charts, worksheets, questionnaires, and other forms. Each unit is identified by a Roman numeral and each chapter is identified by an Arabic numeral preceded by the unit number; for example, chapter IV-2 designates chapter 2 in Unit IV. Exhibits are numbered in sequence within the chapter to which they are related. The exhibit number consists of three parts—unit number, chapter number, and sequence number of the exhibit within the chapter; thus, exhibit I-2-5, for example, designates the fifth exhibit in chapter 2 of Unit I.

The case study was prepared by the International Statistical Programs Center (ISPC) of the U.S. Bureau of the Census, under a Resources Support Services Agreement with the Office of International Training, U.S. Agency for International Development. **Nina Pane Pinto**, Survey Statistician, assisted in the overall direction of the project. **Richard Robinson**, Special Assistant to the Associate Director for Economic Fields in the U.S. Bureau of the Census, was responsible for the original conception of the project.

Units I to VI were developed and written by a team of four consultants, former U.S. Census Bureau statisticians who played major roles in the conduct of industrial censuses and surveys and who had census experience in developing countries. Unit I was prepared by **Edward D. Gruen**, Units II and IV by **Willis K. Jordan**, Units III and VI by **Owen C. Gretton**, and Unit V by **Irving Weiss. Jerry Norton**, Computer Data Systems Adviser in ISPC, adapted Unit V for electronic computer processing. **Linda H. Ambill** designed the exhibits and **Dorie Burch** was responsible for the text layout and final typing of the original manuscript. **Deborah Serfass** and **Teri Pepper** typed the changes in the revised version, which incorporates minor changes to the original text. A number of other persons made important contributions to the concept of Providencia and the development of the materials; the cooperation of these persons is gratefully acknowledged.

This case study supersedes the previous case study *Providencia: A Case Study in Economic Censuses,* which dealt with economic censuses for 1963.

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Unit I

CONTENT AND DESIGN OF ECONOMIC CENSUS

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Chapter I-1. STATISTICAL OBJECTIVES OF PROVIDENCIA'S INDUSTRIAL CENSUS

1. *INTRODUCTION*

As the decade of the 1970's got under way, the Statistical Office of the United Nations announced its recommendations for the 1973 World Programme of Industrial Statistics.[1] While member countries were urged to make 1973 the reference year in their conduct of industrial inquiries, it was recognized that this might not be possible in a number of cases owing to the overriding necessity of concentrating limited resources on completion of their decennial censuses of population, agriculture, and housing. Against such an event the United Nations (UN) designated 1978 as the target year for publishing aggregative statistics from those industrial inquiries that would represent internationally comparable data. In keeping with that objective, Providencia chose 1975 as the reference year for its next Industrial Census following the 1963 Census.

Unit I of the case study discusses the decisions and guidelines that were settled upon by the National Statistical Office (NSO) of Providencia. Additionally, it gives a summary of the plan that was developed for the conduct of Providencia's mid-decade industrial census.

In its continuing program of economic censuses, Providencia plans to cover a range of inquiries--manufacturing, mining, wholesale trade, retail trade, foreign trade, construction, services, etc. For purposes of this case study, discussion will be limited to Providencia's Industrial Census. Many of the principles and procedures, nevertheless, apply to other economic censuses.

2. *ACCEPTANCE OF UNITED NATIONS RECOMMENDATIONS*

An industrial census should be sufficiently comprehensive and accurate that it will serve as the basic framework for surveys of the industrial sector taken at more frequent intervals or with more limited goals. When successfully conducted, an industrial census thus truly becomes a benchmark inquiry that is worth the time it takes because it stands the test of time. Since the UN's international recommendations for benchmark inquiries into the industrial sector[2] have for more than two decades adopted this definition of the underlying purpose for taking an industrial census, Providencia decided to accept UN guidelines for its mid-70's economic census.

3. *LESSONS LEARNED FROM PROVIDENCIA'S 1963 CENSUS*

By adopting the UN recommendations, Providencia believes that it will not only assist in the program to improve international comparability of the information collected, but that it will at the same time avoid some of the mistakes which it encountered in 1963. That census was faulted for attempting too many inquiries and setting goals too high. By restricting the scope of its industrial inquiries in the present census to manufacturing, mining, and the production and distribution

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[1] United Nations. Statistical Office. *Recommendations for the 1973 World Programme of Industrial Statistics* (New York, 1973), Statistical Papers, Series M, No. 54, Parts I-III.

[2] *Ibid*, Part I, pp. 4-5.

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of gas and electricity,[3] the NSO of Providencia felt confident that it could produce the detailed profiles along with the broad arrays of information on the nation's industrial activity which the country needs.

4. *STATISTICAL OBJECTIVES IDENTIFIED*

The specific statistical objectives are: (a) to measure the contribution which each industry and region makes to the country's employment and output; (b) to furnish benchmark figures for revising and updating its economic series covering mining, manufacturing, and energy;[4] (c) to obtain data on the structure of these fields of activity needed for government and business decisions and analysis; (d) to provide a frame for planning and designing future surveys of these activities to be conducted at more frequent intervals; (e) to obtain data on the structure and activities of the industries covered that will be internationally comparable; (f) to obtain measures of relative importance for the principal industries within the major divisions (mining, manufacturing, and energy) which could serve as the weighting system for a comprehensive index of wholesale prices; and (g) to obtain a series of value weights by industry (preferably on a value-added basis) to be available for the construction of an aggregated index of industrial production. For many industries, output can be measured only in value terms. For these industries output values must be deflated to remove the influence of price changes; wholesale price indexes are commonly used to produce this deflation.

5. *COMMITMENTS TO ACCURACY AND TIMELINESS*

Providencia recognized that respondents and the general public, upon learning that the scope of the new census was being held to "manageable limits," would not take kindly to data that contained inaccuracies nor would they be likely to tolerate any delays in issuance of the published results beyond what seemed reasonable. Accordingly, the NSO determined that it should make the following explicit commitments in advance with respect to this census:

(1) Published results will in all essential respects attain the degree of accuracy set forth as ideal or optimum goals by the United Nations in its Recommendations for the 1973 World Programme of Industrial Statistics.[5] To be more specific, the preliminary statistics published by industry for such critical items of inquiry as employment and sales (or value of receipts) will not contain error levels exceeding two percent for totals published at the national level, nor over five percent for such totals published at the provincial level.

(2) Preliminary results believed to be accurate within these error tolerances will be published no later than one year after the end of the reference year to which they apply.

(3) Final results incorporating all the product detail and presenting the cross-tabulations by industry and province will be issued within two years of the end of the reference year.

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[3] United Nations. Statistical Office. *International Standard Industrial Classification (ISIC)* (New York, 1968), Statistical Papers, Series M, No. 4, Rev. 2, major divisions 2, 3, and 4.

[4] For brevity, the term "energy" is substituted for the "production and distribution of gas and electricity."

[5] United Nations. Statistical Office. *Organization and Conduct of Industrial Censuses* (New York, 1973), Statistical Papers, Series M, No. 54, Part III, page 82.

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Chapter I-2. DEMOGRAPHIC AND ECONOMIC DESCRIPTION OF PROVIDENCIA

1. BACKGROUND

The Providencia NSO recognizes that economic statistics are becoming increasingly important to the progress of their country. As indicated earlier, Providencia conducted economic censuses in 1963. In this program, they included censuses of mining and quarrying, manufactures, construction, production and distribution of electricity, wholesale trade, retail trade, and selected services. Their experience showed that they would have better results if they limited their undertaking in 1975 to inquiries on manufacturing, mining, and the production of gas and electricity.

2. URBAN AND RURAL DISTRIBUTION BY PROVINCE

There have been few marked shifts within the country in Providencia's population since 1963. Of the 14.5 million total population estimated for mid-year 1974 (see exhibit I-2-1), about 40 percent or 5.7 million live in urban areas (in 1963 the corresponding ratio was 36 percent). Moreover, the province of Estrella continues to be the only area with a predominantly urban population; it contains the capital and is the center of industrial and commercial activity in Providencia.

3. AGE DISTRIBUTION OF POPULATION

Based upon its 1970 Census which the NSO has projected to mid-year 1974 (see exhibit I-2-2), Providencia is still a 'young' country with more than half its people less than 19 years of age. While the country's net growth rate is now estimated to have risen slightly in the decade since 1963 (from 2.0 to 2.3 percent per year), the age distribution was virtually unaffected owing to a modest decline in the death rate. The age of 14 is broken out as a separate age class since the statutes of Providencia prescribe 14 years as the minimum legal age for gainful employment.

As indicated in exhibit I-2-3, the number of persons age 14 or over is now believed to be 8.7 million. This represents 60 percent of the total population and is to be compared to the 59 percent estimated to have attained the legal working age in 1963 when the number aged 14 or older was given as 6.7 million persons. Of more direct concern to this case study, of course, is the number representing the "economically active" population.

4. ECONOMICALLY ACTIVE POPULATION BY ACTIVITY

Again using a straight-line extrapolation at 2.3 percent per year from its 1970 Population Census, the NSO estimates that in mid-year 1974 Providencia had a total of 5 million persons who were considered economically active (see exhibit I-2-3), roughly 35 percent of the total population. To serve as a working guide for the industrial census, the NSO has broken down this total by activity (see exhibit I-2-4). We find more than half in agriculture, with just 16 percent (or 803,000) engaged in mining, manufacturing, production and sale of gas and electricity.

Since the data in exhibit I-2-4 have resulted from projections of the 1970 Population Census where enumerators generally were

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instructed to accept the respondents' replies (and the answers were evaluated in the post-enumeration survey), projections of the number of persons who are "economically active," as reported in the census, should probably be interpreted as having an inherent upward bias. It should also be borne in mind that a population census, by the nature of its coverage, tends to be more inclusive of "home" (cottage) industry than an economic census. For these reasons, the projections help to set upper limits on the expected universe of responses to the industrial census and thus are of some value in setting workload targets (Unit II). But they are not to be taken as valid universe counts against which the NSO should calculate nonresponse rates when it makes its final evaluation of the census results.

5. *ADMINISTRATIVE STRUCTURE OF PROVIDENCIA*

The major geographic division of Providencia is the province, of which there are 12, subdivided for administrative purposes into 216 counties and 1500 wards (see exhibit I-2-5). The form of government is national or centralist rather than federal, with the seat of the country's government in the capital city of Estrella (province of Estrella) possessing extensive executive power and authority over the country as a whole. For example, when the legislature is not in session, the President of the country may sign a decree or the Council of Ministers may pass a resolution affecting the duties of the county officials. The NSO is also located in Estrella.

6. *GEOGRAPHICAL CONCENTRATION OF MANUFACTURING ACTIVITY*

It has already been observed that Providencia contains one province, Estrella, where the population may be considered heavily urbanized with 70 percent of its population residing in urban centers; no other province had more than 40 percent of its population so classified (see exhibit I-2-1). It is also recalled from the country's 1963 economic census that manufacturing activity was less widely dispersed. For setting tentative work assignments in the field as well as for determining central office supervisory arrangements, it was deemed advisable to have the NSO make estimates of the distribution of manufacturing establishments by provinces.

The table identified as exhibit I-2-6 presents the results of this effort. Whereas in 1963 Providencia's census reported slightly over 28,000 manufacturing establishments, there are now expected to be 37,500 establishments whose principal economic activity is manufacturing. Of this total it will be noted that about 35 percent are expected to be found in Estrella, roughly the same degree of concentration as in 1963. For a centralized government such as Providencia, with its NSO as well as other ministries headquartered in the capital province, there are obvious advantages to be gained because of this concentration.

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Chapter I-3. ADMINISTRATIVE ORGANIZATION OF THE NATIONAL STATISTICAL OFFICE

1. *ORGANIZATION IN 1963*

When the 1963 Economic Censuses were being planned, the NSO was a part of the Ministry of Finance. At the time, this arrangement seemed appropriate for budgetary control and had some appeal for administrative reasons. It was only after the mail responses to the long-form questionnaires in 1964 became so burdensome that the close identification with "Finance" served to lessen the NSO's appeal to the public that the Economic Census was not a Tax Census.

2. *FUNCTIONAL VERSUS SUBJECT MATTER ORGANIZATION*

In 1963 the NSO believed that centralized control, as well as efficiency in operation, would be improved if the distribution of authority and responsibility was made strictly along functional lines (see exhibit I-3-1). Other countries, including some that have conducted several industrial censuses, have found after experimentation with different plans of organization that some subject matter fields can be handled more efficiently when each has its own operating organization. Among these fields are foreign trade and manufacturing. In these fields the more specialized functions such as editing, coding, and tabulating possess such unique characteristics because of the subject matter treated that over-centralization of the functions has proved self-defeating.

Providencia concluded in 1970 that a reorganization of the NSO was needed which would give more recognition to subject matter requirements. The structure which was agreed upon for Providencia's 1975 Industrial Census represents a compromise between the functional and subject matter interests.

3. *REORGANIZATION OF THE NSO IN 1970*

To avoid having people suspect that a connection existed with the taxing authority, the NSO was made a part of the new Ministry of Economic Planning and Development (EPD) in 1970. All statistical functions of the NSO were transferred into EPD with the following exceptions: foreign trade remained in the Ministry of Finance in recognition of the critical role exports and imports played in the country's balance of payments, agriculture was assigned to the Ministry of Agriculture, and wages and employment were the responsibility of the Ministry of Labor. It will be observed from exhibit I-3-2 that the organization of the NSO for the 1975 Census provides separate but equal divisional status to the principal subject matter areas such as population and housing, manufacturing and mining, and trade and services. This was done primarily to profit from the experience in the 1960's that functions like editing, coding, analysis, and evaluation are handled more competently by personnel who have specialized knowledge and training

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in those fields. The economic fields delegated to other ministries (foreign trade, agriculture, wages and employment) follow similar organizational distributions of the work in their respective Ministries of Finance, Agriculture, and Labor.

On the other hand, the NSO recognized that the expertise as well as technical and administrative skills required in the conduct of an efficient data processing organization argue quite strongly for their being kept together in a single division. Thus we find the tabulating functions centralized in the Data Processing Division regardless of the subject matter to be processed. The Field Division is also established as a separate entity, and its responsibilities cut across subject matter lines. One special problem in the organization of field activity is how best to coordinate the NSO's work with Agriculture's county agents.

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Chapter I-4. INITIAL DECISIONS

1. NEED FOR ADVANCE PLANNING

Planning for an industrial census should be started well in advance of the enumeration, whether it is decided to rely upon direct field canvassing through personal interviews or to use self-enumeration through mail responses to questionnaires. The broad outlines of the program must be established at an early date in order to provide the framework for the detailed plans and procedures to follow. Decisions need to be made not only regarding the method of enumeration, but with respect to the scope and coverage of the census, legislative and budgetary requirements, timing of the census program, organizational responsibility, enumeration plan in the field, recruitment and training of field staff, method of processing the data, and publication plans. These elements are closely interrelated, and an initial decision on one aspect of the program is likely to affect several others. To mention only two examples: questionnaires cannot be designed until the content of the census has been decided, and editing and coding procedures can only be determined in the context of considering costs in relation to standards of accuracy considered to be attainable. In the planning stage, various alternatives should be considered. Decisions which are made initially by NSO's Executive Committee should reflect both the circumstances and requirements of the country.

2. SCOPE OF THE 1975 INDUSTRIAL CENSUS

As with a census of population, housing, or agriculture, the matter of scope for an economic census should be answered, with top priority given to the needs of the country at the time. Due consideration should be given to maintaining comparability with previous economic censuses and then to international comparability; but these requirements should be accorded a lower priority. In the case of Providencia, no conflict between its national requirements and its international responsibilities had to be resolved for its NSO had become convinced from its review of the country's experience with its ambitious program of 1963 that it should accept the more limited objectives set forth by the United Nations in its 1973 World Industrial Statistics Programme. With this decision, the scope of Providencia's Industrial Census covering 1975 was confined to those firms and persons found to be primarily engaged in manufacturing, mining, and quarrying, and the production and distribution of energy (electricity and gas).

Substantial savings in the total budget were anticipated by eliminating from the scope of the census such large and difficult-to-measure economic fields as construction, retail and wholesale trade, and services. At every stage in the planning and in the execution, Providencia expects that the gains from holding the scope of the new census to more manageable limits will result not only in savings but also in greater accuracy of the data.

3. LEGISLATIVE AUTHORITY

In the Census and Statistics Act of 1953, as amended in 1963, the Director of the NSO was delegated authority to conduct a national census of industry every 10 years. The 1970

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law contained strict provisions to guarantee the confidentiality of the information obtained in the census, stating that publication of the information collected would be only in the form of summaries or statistical tables in which no reference to individuals or enterprises appears.

4. BUDGET FOR THE CENSUS

Once the legal authority has been established, the planning staff responsible for laying the groundwork for conducting a census must then turn its attention to the budget. It is of course beyond debate that the amount of funds made available for the census will largely determine what can be expected in the way of results. Although less well recognized, it should also be noted that the quality and depth of the pre-planning operation itself has a great effect on whether the budget can accomplish the declared objectives. All elements of the economic census operation--from enumeration through processing to final tabulations and publication--play an important part in determining both the size and components of the census budget. One element that tends to be overlooked as a budgetary consideration is the simple matter of timing--that is, the overall time limit set in advance for accomplishing the task.

One of the major budgetary considerations, in terms of the labor costs involved, is the method of enumeration. For population censuses, the field enumeration costs in some countries often amount to one-half or more of the total census budget. While the number of industrial establishments which Providencia expects to enumerate in its field canvassing is only in the tens of thousands (as compared to the several million households if this were a population census), every one of the country's 216 counties are to be canvassed, as well as most of the 1500 wards. Thus, the funds needed for field personnel, including reimbursement for services rendered by the Ministry of Agriculture's county agents, will constitute a substantial fraction of Providencia's industrial census budget.

Other elements which affect the total cost significantly, and which therefore must also be separately appraised in drawing up an overall budget for an industrial census, include the following:

(1) Method to be used for processing the data, particularly whether new equipment is to be purchased or leased.
(2) Plans for establishing and maintaining quality control at key steps in the operation.
(3) Number and length of publications planned.
(4) Costs of analysis and evaluation.
(5) Funds for personnel engaged in the planning and pretesting stages.
(6) Publicity needed for good response.

5. METHOD OF ENUMERATION

Basically, there are two methods of collecting data--the direct interview method and the self-enumeration method. The direct interview method is referred to as the canvasser method; self-enumeration is usually a mail response.

Sometimes a combination of the two methods is used. For example, in population censuses during recent years a number of countries have turned to self-enumeration (by mail) for obtaining the basic information required for all households, and then have obtained additional detail on income, housing characteristics, etc., from a sample of households by direct interview. While there has been less experimentation in the economic census field with combinations of

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the two methods, yet there are instances where supplemental inquiries are directed to the larger establishments only. For example, detail on materials consumed by product line for input-output tables and information on horsepower and electric generating equipment have been collected by mail for the largest establishments, whereas the basic data called for in the United Nations recommendations were obtained from field canvassing.

The most suitable method of enumeration for any given country depends upon a number of factors: (a) the nature and extent of the inquiries; (b) the literacy level of the population; (c) the mail distribution system's effectiveness; and (d) where self-enumeration is depended upon, the existence of a central directory with proper mailing addresses of industrial establishments; and (e) degree of public cooperation.

This important element in the cost of taking any national census was in the forefront of NSO's planning in 1963. It was announced then as the first of its initial decisions that, for budget reasons primarily, the personal interview method used in Providencia's earlier census of industry (1954) should be replaced by the use of mail questionnaires. It was the NSO's conclusion that significant savings could be made by using self-enumeration with mail questionnaires, after paying all personnel and other costs for preparing a central directory for mailing purposes, and that the savings could then be used to hire clerks and analysts in the NSO to improve the quality of response.

When the planning group reappraised the 1963 calculations in the light of NSO's actual operating experience with that census, the conclusion was inescapable; the expected savings did not in fact materialize. In the first place, the costs involved in developing the central directory of establishments had been seriously under-estimated. Another major reason for failing to realize any savings from the mail questionnaires was the number of follow-ups by direct field interview that had to be undertaken. Personal follow-ups proved necessary, as expected, to reduce the non-response rates to tolerable levels. In addition to improving coverage, follow-ups by personal interviews were made to many large establishments whose questionnaires failed the critical editing tests for processability--either because critical items were omitted from the returns or were entered in such a way as to give clear indications that the terms used in the questionnaire were not understood.

In view of these disappointments with self-enumeration by mail, it was only natural that the NSO would think seriously about reversing its 1963 decision and turning to direct enumeration by field interviewers for its 1975 Census, except for large establishments.

Providencia reached this decision, based on the following reasons:

(1) The cost would not be excessive, since the best NSO estimates indicated the total number of establishments in the new census would run about 40,000 cases, with more than one-third of these to be found in the capital province of Estrella (exhibit I-2-6).

(2) The Census Directory of Industrial Establishments for Providencia, which was completed in 1964 at considerable cost in time and effort, had not been kept up-to-date; hence it could not be depended upon as more than a point of departure for developing a mailing list.

(3) The 12 Provincial Census Offices, which were established for the 1970 Census of Population and Housing, had been made permanent adjuncts of the central NSO in Estrella and could serve to facilitate the training of field personnel as well as to handle the distribution of materials to the field and NSO.

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6. *RECRUITMENT AND TRAINING OF FIELD STAFF*

The method of recruitment of field personnel varies with the literacy levels, employment situation, and other conditions in a country. Similarly, training programs must be tailored to the duties and responsibilities assigned to enumerators. The first decision to be made is whether the field staff will be essentially a group of volunteers or will consist of paid employees. The advantages of using volunteer workers (reduced budget without loss of motivation, assuming a successful appeal of national or civic pride) must be weighed against the loss of a certain flexibility in assignments, delegation of responsibility, commitments to fixed work schedules, etc. Often a "best of both worlds" type of solution is available by making arrangements with employees of other government agencies to serve as census enumerators. The more successful of such recruits have been school teachers, agricultural agents, public health and social field workers; even then, paying them a small bonus produces better motivation.

NSO's Executive Committee staff decided to build upon the experience gained in its 1970 Census of Population and Housing and use only paid enumerators. In Estrella city, where more intensive coverage is specified, piece-rates would be used; hourly rates would be paid in all other geographic areas where the establishments to be covered in this census were more scattered.

7. *SAMPLING AND SAMPLE PLANS*

A basic consideration in any economic census is whether to use sampling in the enumeration and processing or to conduct these operations on a complete-coverage basis. It is often desirable, considering the demands for data and budget limitations, to ask only the priority questions of all respondents and to limit the coverage of other items to a sample. Alternatively, when the scope of the census is very broad and a large number of establishments is to be covered, a size cutoff may be used whereby the smaller establishments will be accounted for by sampling a predetermined percentage on a random basis. In all cases the sample design must represent the population which is being enumerated and have measurable reliability. As to the reliability of the data obtained by sampling, this depends largely on the number and type of cross-tabulations to be developed. A general rule to be followed in weighing costs against reliability is that, the larger the sample in relation to the universe being measured, the smaller the area for which data can be tabulated.

For the 1975 Census, the NSO's planning group decided to use sampling only in connection with its coverage of household industries. The NSO sampling staff chose the area-type of sample as the most efficient approach with its advantages in lower travel costs over a random sample plan (see further discussion in chapter IV-6). The areas sampled were enumeration districts (ED's), as defined for Providencia's 1970 population census. The sample consisted of 30,000 households (or about one percent of the 3,000,000 households) in Providencia's 216 counties. The individual counties were stratified into three groups according to the proportion of households with industrial activity as indicated by the occupational data gathered in the 1970 census.

In drawing the sample of ED's, proportional rates were based on the number of households reporting self-employment in

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pursuits other than agriculture. A standard statistical textbook can be consulted for a detailed treatment of the theory and practice of area sample design.

8. METHOD OF PROCESSING THE DATA

During the initial stages of planning an industrial census, a decision must be made regarding the method of data processing to be employed. This decision is critical not simply for budgetary reasons (provision in the budget for the purchase or rental of any new equipment required), but also because the method of processing the data will have a direct bearing on other aspects of the program such as questionnaire design, editing and coding, and publication plans. The type of equipment and procedures which are best suited to census operations for a particular country will be determined in part by the volume of cards (or individual records) and the number of cross-tabulations that are required. Another consideration in the choice of equipment is its potential for use in intercensal and other government programs.

For many decades the processing of census data confronted statisticians with the task of painstakingly completing one sequence after another of manual operations; later, electromechanical equipment was used. The development of electronic computers has now resulted in the substitution by many countries of electronic data processing equipment (EDP) for manual operations or EAM. Initial plans for Providencia's 1975 Industrial Census called for the use of the computer. Benefits from computer processing are many: dramatic reductions in processing time; the opening up of new possibilities for producing cross-tabulations and analyses of economic census data; direct use of output as printer copy for photo-offset reproduction; and improvements in the quality of data, once the programmers and their intended beneficiaries have learned to "communicate" with each other and their computer.

9. OTHER FEATURES OF THE INDUSTRIAL CENSUS

9.1 Pretesting

It is imperative the the questionnaires developed for any census should be tested before being used, irrespective of the data collection method to be employed. Pretesting should also be applied to the field enumeration techniques and the data processing procedures to be used. Advance planning of the census program should allow time for analysis of the test results and any necessary revisions of plans and materials. Providencia's experience in 1963 provides a good case in point. If its questionnaires had been pretested in the field, the poor reportability of several data items would have been revealed. Pretesting would also have exposed the weaknessess in the preparations for central directory mailing.

9.2 Preliminary tabulations

Planning for the census should resolve the matter of what preliminary (advance) publications will be issued. Considerable good will can be gained if the initial decisions regarding the census contain firm commitments to provide summary tabulations at an early date. To maximize the credibility which will be assigned to the final census results, those summary totals issued in advance should be reasonably close to the final totals--probably within 2 percent at the national level and 5 percent at the province level, for the critical or priority items of inquiry. Considerations of the time involved in preparation and

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review, as well as of the general reliability of the data, argue against much detail in advance releases.

9.3 *Analysis and review of preliminary data*

Most countries, whether or not they have had much prior experience with an economic census, readily acknowledge that the steps of data processing previously discussed in Unit I play an important role in the success of the undertaking. Unfortunately, though, there has often not been equivalent recognition of the necessity for an adequate review of the preliminary tabulations. The result of treating this review in a casual manner can have very serious consequences. Too brief a review of the tabulated data at this stage can result in the publication of tables that bring the credibility of the entire national statistical organization into question.

Often, preliminary figures are not carefully reviewed (screened). Poor results are generally produced by the following:

(1) Failure to perform sufficient checks to avoid disclosing any confidential information (based on a reasonable interpretation of the enabling statute or other legal basis for the census).

(2) Failure to establish a reasonable consistency of the results with comparable data published by another agency of the government (for example, data produced by the Bureau of Mines and the NSO's preliminary industrial census results for mining), or compared to a sample survey by the NSO of the same field for a recent time period.

(3) Failure to make tests to assure internal consistency of the data, especially for the relationships between critical items.

9.4 *Disclosure of confidential information*

The necessity for testing preliminary census data against comparable results from external sources as well as checks to be made for internal consistency of the data are apparent. But the tests or checks required to avoid an inadvertent disclosure of confidential data deserve further elaboration. To be sure, the importance or stress to be accorded this exercise will depend upon the language and intent of the statute authorizing the statistical agency to collect private, confidential information in the first place. It may be, as with Providencia, that the law specifies that publication of the data collected is to be restricted to broad aggregate totals which neither directly reveal individual company information nor permit such data to be derived by subtraction. If the census enabling act is written so strictly, then the tests to be made to protect the privileged information would extend to the comparison of cross-tabulations, geographic and industry, to make certain that totals containing a possible disclosure by subtraction have been suppressed.

9.5 *Disclosure of procedures*

In the analysis and evaluation of final results, no effort should be spared to resolve inconsistencies in the data collected and to reconcile significant differences with other statistical series which are comparable with the industrial census data. To assist users in understanding the published statistics, final releases should include technical statements dealing with the reasons for conducting the census, the scope

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of the present census compared to that of previous industrial censuses taken in the country, the methods of enumeration and establishment classification systems employed, together with discussion of the follow-up methods used, the application of sampling, and data processing procedures. Finally, the comparability with previous censuses should be clearly set forth and documented as fully as possible.

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Chapter I-5. FINAL DECISIONS

1. CONCEPTS AND QUESTIONNAIRES

After balancing data needs against the practical considerations of recordkeeping practices and the organization of business in the country, the NSO decided that the 1975 Industrial Census of Providencia would follow the recommendations of the United Nations for the 1973 World Programme.

1.1 Selection of unit of reporting

One of the first decisions was to use the establishment as the statistical or reporting unit. In simplified form, this meant that, for its manufactures census, Providencia defined an establishment as a single physical location where manufacturing is performed (a factory, mill, or plant). For the mining sector, however, a modification was found necessary; but here too the decision was consistent with the UN recommendations. For its Minerals Census, Providencia defined a mineral establishment as a single physical location where mineral operations were conducted (for example, a mine, group of oil or gas wells, preparation plant or natural gas liquids plant, with any preparation plants located at the mine site being included as part of the mining establishment).

In its instructions for reporting oil and gas field operations, Providencia treated as a single establishment all oil and gas field activities operated in one province by the reporting company, and specified that any off-shore oil and gas operations which are adjacent to each province constituted a separate establishment. In the case of the electricity and gas industries, Providencia's definition of the establishment embraced the producing plant and its associated distribution system, thereby including transformer stations with generating plants for electricity units.

1.2 Exclusion of enterprise statistics

The collection and publication of enterprise (or company) statistics was not an objective of Providencia's NSO in its 1975 Industrial Census. This omission was deemed acceptable first on the grounds that, in a developing country such as Providencia, the enterprise and the establishment for the most part are the same; and secondly, that a future round of censuses--particularly when wholesale and retail trade were included in the scope of economic activity covered--would be more likely to yield enterprise statistics worthy of the time and cost involved in their collection and tabulation. Similarly, it was reasoned that the use of a separate reporting form applicable to ancillary units such as warehouses, central administrative offices, research centers, etc., could be deferred to a future census.

1.3 Inclusion of all in-scope establishments

Although the UN recommendations for the 1973 World Programme of Industrial Statistics suggested that, in the case of developing countries, complete enumeration of establishments should be restricted to those with five or more persons engaged, this course was not adopted by Providencia. The primary reason for this decision was the absence of an up-to-date industrial directory which could

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serve as a frame for drawing a sample of industrial establishments engaging fewer than five persons in 1975. Consequently, the NSO reaffirmed its initial decision that full enumeration should extend to all manufacturing and mining as well as electricity and gas establishments found to be in scope. The key items of information obtained from each establishment were expected to provide Providencia with an industrial directory that could serve as the sampling frame for conduct of current statistical programs in manufacturing and mining as well as furnishing the basis for sampling the smaller establishments in future Industrial Censuses, provided the directory is kept up-to-date.

1.4 Adoption of UN guidelines

While an earnest effort was made by its National Statistical Office to adhere to the UN guidelines for the reporting of item detail, several minor departures from the recommendations were made. In no instance did the NSO omit any United Nations priority items that were applicable to developing countries. Man-days worked were substituted for man-hours worked as a measure of labor input, but this had been deemed an acceptable alternative by the UN Statistical Commission when it drew up its revised standards for the 1973 World Programme of Industrial Statistics. It will be noted that Providencia decided to omit the collection of data on the horsepower (HP) capacity of equipment in place in its manufacturing and mining establishments. This decision was made only after reference to its 1963 experience brought to light the convincing evidence that the proliferation of fractional horsepower equipment and self-propelled lifts, hoists, etc., made the collection of such data impractical; in addition, the UN recommendations had assigned HP data a Priority II. Also, for practical reasons, Providencia omitted the reporting of sales of fixed assets, another UN Priority II item, and its planning staff took pains to point out that its omission did not affect the computation of "value added," at least in the conventional manner that "value added" is calculated for industrial censuses.

Providencia followed the UN guidelines fully in setting 10 persons engaged as the dividing line between "large" establishments reporting full item detail, and "small" establishments reporting only key items.

1.5 Use of long and short questionnaires

Providencia settled upon the use of two basic questionnaires to cover the manufacturing and mining sectors. For manufacturing, the long form ECP-1 contained all items of inquiry collected from the so-called large establishments (those engaging 10 or more persons during the reference period, which was the week that ended nearest 15 November 1975). The short form ECP-101 was an abbreviated version, and its use was restricted to establishments found to be engaging less than 10 persons during the same reference period. By using common item numbers and key-punch coding for the various items of inquiry, it was possible to identify at a glance exactly which data items were to be collected from all establishments regardless of size, and which items of inquiry were not to be collected from the smaller establishments. In this way, data collection and editing in the field and data processing in the central office were simplified.

For the mining sector, the same basic procedure was employed; the long form was used for enumerating and tabulating data from establishments engaging 10 or more persons, while the short form was used for the smaller

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establishments. The short form clearly indicated which of the long form items of inquiry were not applicable. The only difference to be noted in the mining questionnaires were those required by the special nature of mineral industries; for example, item 18 called for "value of production" rather than "value of shipments" as in manufactures.

In both manufactures and mining, an exception was made to the strict rule of size (persons engaged) in determining the appropriate form for multi-unit establishments; that is, those belonging to a company or enterprise which operated two or more establishments found to be in scope of the 1975 Industrial Censuses. Enumerators were instructed to use the long form for all such multi-unit establishments regardless of their size.

For the Census of Electricity and Gas Industries, only a long form (ECP-3) was employed. Such plants characteristically are capable of providing data for all items of inquiry from their normal recordkeeping, even in those few instances where fewer than 10 persons are engaged at a particular site.

2. *SUPPLEMENTARY SURVEY OF HOUSEHOLD INDUSTRIES*

Providencia decided against taking a sample survey of its household (cottage) industries simultaneously with the collection and processing of data for its 1975 Industrial Census. The NSO ruled instead that such a survey would be conducted 6 months after the close of enumeration of the regular census. The results of the sample survey of household industries then would be published as a supplement to the Industrial Census. The reasons why the NSO felt compelled to postpone the conduct of a sample survey of its cottage industries were as follows:

(1) Providencia's 1970 Population Census did not provide information on households containing self-employed persons in sufficient detail or sufficiently up-to-date to yield an efficient sampling frame.

(2) Trained enumerators, particularly the county agents detailed from the Department of Agriculture, could not be expected to initiate and supervise the sample survey of household industries at the same time they were involved in field operations in the industrial census.

Of these two reasons, the first was the more compelling; as sampling specialists have pointed out, the success with which multi-stage stratified sampling of the area probability type can be pursued depends directly on the frames (area listings and tabulations) which are available.[6]

The plan was to conduct an area sample of one percent of all households in the country--that is, 30,000 out of the estimated 3,000,000 households in Providencia. In the early planning stages, the NSO had anticipated that the incidence of household industrial activity with significant income would be around four percent of all households. For sampling purposes, this is a relatively low proportion and presents problems bordering on "rare events" cases.[7] Later studies indicated that the proportion might be higher.

In designing the sample, the NSO estimated that about six percent of the households would have major industrial activity. The 216 counties were classified into three groups depending upon

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[6]U.S. Bureau of the Census, *Supplemental Courses for Case Studies in Surveys and Censuses, Sampling Lectures* (Washington, D.C., December 1968), ISPC Supplemental Course Series, No. 1.

[7]Leslie Kish, *Survey Sampling* (New York, John Wiley and Sons, 1965), p. 408 and later pages.

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the proportion of households with industrial operations, as brought out in the 1970 Population Census. Admittedly based on rather sketchy and out-of-date information it was then estimated that the sample survey, when completed, would turn up 1800 households engaged in some form of manufacturing or mining activity and $500 or more income from the activity during 1975.

3. DATA COLLECTION

3.1 *Rejection of test of long form for small establishments*

In the initial planning for the industrial censuses, Providencia had thought it would provide useful sampling experience for its enumerators if every tenth small establishment would be given the long form (Form ECP-1) to complete. The idea was that in this manner the field staff would not only gain some experience in sampling but some data worthy of publication would be obtained in the process. (It should be recalled that Providencia was going ahead with full enumeration of all in-scope establishments, rather than sampling the smaller ones as permitted in the UN guidelines for developing countries.) Prior experience, however, indicated that only a minor percentage of the smaller establishments kept records which would enable them to answer the detailed inquiries carried on the long form. Another point made by the NSO staff in rejecting the plan was that the supplementary survey of household industries would provide a more useful experience in sampling for the supervisory staff and key interviewers.

3.2 *Enumerator's Pocket Manual*

Inasmuch as the previous economic censuses conducted by Providencia (reference year 1963) were based exclusively on the use of mail questionnaires, no instruction manuals or training materials for enumerators were in existence. This made it necessary for the NSO to develop all of the instruction material that would be needed by supervisors and enumerators without benefit of previous experience.

The most important document was the Field Enumerator's Pocket Manual (exhibits IV-4-1 and IV-4-2). The manual brings together in one document all the rules of conduct and related instructions, the field procedures (including use of maps for the areas assigned for enumeration), a complete set of questionnaires, instructions, and other details.

3.3 *Identification of establishments for enumeration by mail*

Each Field Enumerator's Pocket Manual included a field kit which contained, along with the maps and control record (Form 123) for the area assigned, a skip-list which identified the establishments the enumerator was not to attempt to interview. Establishments on these skip-lists were reserved for mail canvassing directly from the NSO central office in Estrella. Five types of establishments appeared on these skip-lists:

(1) Multi-unit establishments (establishments of companies operating at two or more business locations).

(2) Establishments with 100 or more employees.

(3) Electrical power plants and distribution stations.

(4) Gas manufacturing and distribution plants.

(5) Government owned-and-operated establishments.

Enumerators were given instructions that, if they encounter any very large (100 or more employees) which were not on the skip-list, they should complete the enumeration of such establishments in the usual way and make the appropriate notation on their control

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record (Form 123) so that the NSO could update its file of these large establishments promptly.

3.4 *Use of Agriculture County Agents*

From the beginning, it had been decided by Providencia that the county agents of the Department of Agriculture would make good candidates for field interviewers in the 1975 Industrial Census. Not only did this prove true but in the majority of cases these agents, despite their being detailed to census duties for only two-thirds of their average work-week, demonstrated their capacity for the role of key interviewers and supervisors in their respective counties. This had the result of allowing the NSO Field Division to concentrate its attention on overall supervision, handling the field work in the county of Estrella (the capital), and seeing to the mail-out and check-in of the large cases identified on skip-lists. The census officials in the 12 province offices were responsible for the field enumeration outside Estrella county.

3.5 *Field editing*

It was decided that the field supervisory staff should perform completeness tests, which were defined as making sure that all questionnaires turned in by interviewers possessed certain minumum data for processability, such as entries for persons engaged and payrolls and shipments and receipts (see chapter IV-5, Field Office Procedures, for a complete list of editing checks).

4. *DATA PROCESSING*

The field staff became directly involved in the first stages of editing by being asked to perform completeness and processability tests of the questionnaires they were responsible for filling. (This represented all the questionnaires entering the processing stream except those of multi-unit establishments; those engaging 100 or more persons; government owned-and operated plants; and the electricity and gas industries establishments.) Thus, for the vast bulk of the cases, manual editing was used at that stage to test, by scanning, for the presence of the minumu information needed. This avoided sending to the computer punched questionnaires that would be certain to be rejected on the first edit pass because they did not possess the minimum data needed for processability. It may be said that manual processing was used effectively to prevent the buildup of an unnecessary number of rejects, the correction of which would require reference back to the field.

Similar checks for the presence of the minimum data needed for further processing were made manually in the NSO for the cases enumerated by mail. In addition, the questionnaires received from the electricity and gas industries were processed in the NSO entirely by hand, since their special characteristics and small number (approximately 100) did not justify special machine edits.

Not to be lost sight of in the day-to-day processing operations was the fact that, as the initial planning had revealed, Providencia badly needed an up-to-date directory of manufacturing and mining establishments to serve as a sampling frame for current surveys of industrial activity. The NSO kept this objective in mind; as a result the 1975 Industrial Census produced a comprehensive and up-to-date directory of establishments as a valuable by-product of its work. Finally, the NSO decided: (1) data processing should develop, as a by-product of its work, a comprehensive and up-to-date directory of manufacturing and mining establishments to serve as a sampling frame for future current surveys; and (2) arrangements should be made for the use of compatible stand-by equipment in the event its own computer was out of operation for any length of time.

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5. PRE-PUBLICATION REVIEW

5.1 Need for review of tabulated data

The planning and management staff of the NSO were faced with difficult decisions when the preliminary tabulations were run off and the date for advance publication of key data approached. Among the questions were these: What purposes are these data to serve? Brought down to the vantage point of the individual analyst, what do these data tell me? Do the machine checks, with their capability of detecting errors and inconsistencies in statistical data, make the critical reivew of data by professionals unnecessary? Providencia learned that the answer to this last question was "No," as indeed the most advanced industrial countries have already learned. As is set forth in Unit VI, the mechanical editing reduces but does not eliminate the need for professional detection of large or widespread errors or the critical review of tables prior to their publication.

5.2 Objectives of the final review

The NSO planning staff had occasion to consider the need for post-tabulation review when it evaluated the country's experience in conducting its 1963 Economic Censuses. In this appraisal it became clear that a principal shortcoming then had been the inclination to neglect professional review until the final tables had been prepared, at which time it was very costly to make the corrections--if indeed all the errors could be detected at that late stage. For the 1975 Industrial Census, it was resolved that the objectives of making the analytical review at the post-tabulation stage, but prior to posting of the tables, would be clearly set forth.

The general objectives for such review were seen to include internal consistency checks, comparability with prior census data, comparability with current surveys, adequate description of the limitations of the data, and, to the extent possible, measures showing the statistical effects of professional review (see chapter VI-3). Described in detail in that chapter are the methodological steps to be followed in post-tabulation review; for example, data relationship checks, zero balance checks, and comparisons with related data. In addition there is cited the need for using such statistical aids as listings of rare or extreme values ("outliers"), establishment records, and control totals.

5.3 Correction of data

Lastly comes the tedious chore of correcting both the tabulations and the underlying detailed establishment records. Providencia had not considered these final steps essential when it completed its work on the 1963 Economic Censuses and, as a consequence, only limited use could be made of the data files after the census.

As chapter VI-5 points out, it is all too easy to try shortcuts and compromises, such as merely correcting the tabulation totals to agree with final publication totals. But if the underlying establishment records are not changed and records or disposition listings are not maintained to show the nature and reason for the analysts' corrections, the data cards cannot be re-run to produce special tables whose totals can be reconciled with the final publication totals at the cell level.

Admittedly, the drain on staff professionals' time which these housekeeping functions impose can appear at the time of final review to be too great, especially given the usual pressures to meet publication deadlines. That is why Providencia recruited and trained para-professionals (clerks or newly trained statisticians) who could carry corrections back to the basic records.

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Chapter I-6. CALENDAR OF OPERATIONS

1. PRELIMINARY DECISIONS

Basic to settling upon a calendar of operations are the decisions as to when the data obtained are to be published. In the case of Providencia a critical decision affecting deadlines was whether or not to plan for a series of advance publications. The NSO decided that the issuance of publications in advance of the final reports would provide useful data from its 1975 Industrial Census at the earliest possible date. Accordingly, the NSO announced the date for advance publications to be one year after the enumeration of in-scope establishments had been completed. The calendar of operations was then geared to the accomplishment of this objective. It was made clear to the entire staff--data processing as well as field operations--that no matter if slippage occurred elsewhere, this 1-year time span should hold.

2. TIME SCHEDULE

In its final decisions the NSO made two changes with respect to its sampling plans that had the effect of easing the burden on its field staff during the critical period of enumeration (see preceding chapter). The first was to cancel the early plan for sampling every tenth small establishment and having its enumerators complete long form questionnaires covering them. The second was to defer the survey of cottage industries until some months after the enumeration of in-scope industrial activity. The effect of these decisions was felt most noticeably by the field supervisors and such key interviewers as the county agriculture agents. This latter group, on detail from the Department of Agriculture for two-thirds of their working time, had been designated as the nucleus for screening the 30,000 households selected for the survey of cottage industry activity (see section 2 of chapter I-5). With that survey deferred from the time when regular industrial establishments were targeted for enumeration by the field staff, these county agents and other experienced interviewers were left free to handle follow-ups for incomplete reports and those containing inconsistent entries.

It should be noted, from an appraisal of decision-making by Providencia's NSO, that success in carrying out a tight schedule or calendar of operations depends upon care in planning to avoid conflicts or overloading at any phase. A census is a complex, large-scale operation. Not only must plans and specifications be drawn up early but starting and completion dates must be set. Even small oversights in planning can lead to serious defects and inefficiencies, particularly in the time and cost estimates for large operations.

Many tools have been developed to aid management in its job of planning and control. A simple calendar of operations is one of the tools. It can be graphically represented (similar to exhibit II-5-6) to show where there may be gaps or overloading. The calendar can also serve as the basis for preparing reports on the progress of the census.

The Providencia NSO decided on another way of setting up a time schedule; that is, to work all of its scheduling of operations

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forward and backwards, calculating the time from the month selected for the beginning of field enumeration. Thus, the month of February 1976 became the E/Month (enumeration month) around which its calendar of operations was constructed. In Unit II where administrative requirements and resources are presented, a budget in terms of man-weeks required by operation is shown (see exhibit II-5-7). A translation of this budget in terms of a time schedule with February 1976 taken as the E/Month is presented in simplified form below. A plus (+) or minus (-) indicates time before or after E/Month, respectively.

Operation	Scheduled month	Months before or after E/Month
Planning begins	July 1973	-31
Questionnaire and control sheet preparation begins	July 1974	-19
Advance planning ends	December 1974	-14
Pretesting of questionnaires and control sheets ends	September 1975	-5
Training of field personnel	December 1975	-2
Publicity begins	December 1975	-2
Enumeration begins	February 1976	0
Enumeration ends--		
in Field Offices	April 1976	+2
in National Statistical Office (NSO)	May 1976	+3
Receipt and check-in of long and short form ends	June 1976	+4
Editing of forms begins	March 1976	+1
Data punching begins	May 1976	+3
Editing ends	July 1976	+5
Data punching ends	August 1976	+6
Preliminary tabulations run	September 1976	+7
Review of preliminary tabulations ends	November 1976	+9
Posting and typing of tables for advance publication	December 1976	+10
Issuance of advance publications	April 1977	+14
Survey of cottage industries begins	October 1976	+8
Survey of cottage industries ends (field work)	December 1976	+10
Final tabulations	May 1977	+15
Review of final tabulations completed	August 1977	+18
Posting and typing of final tables ends	November 1977	+21
Issuance of final publications begins	February 1978	+24
Issuance of final publications ends	April 1978	+26
Supplement on results of cottage (household) industries	June 1978	+28

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Chapter I-7. PRETESTING

1. IMPORTANCE OF PRETESTING

Although Providencia did not pretest each item or line of inquiry in its 1975 Industrial Census questionnaires because all the inquiries had been gathered in its prior census, pretesting was applied to field and central office procedures as well as questionnaires.

Whenever a new inquiry is considered for inclusion on a report form it should be thoroughly pretested before it is printed on the questionnaire.

2. PRETESTING BEGINS WITH THE DRAFTING OF QUESTIONNAIRES

Unless there is substantial evidence from previous survey experience, no questionnaire, whether intended for mailing to respondents or for the use of enumerators in the field, should be printed in final form without its first having been subjected to a brief but thorough test under actual field conditions. In the case of a mail census, the custom in the industrialized countries is to print a small number of specimen copies for examination by a representative panel of respondents for whom the form is intended. For example, where tailored forms are used in a Census of Manufactures for each large industrial group, such as steel, non-ferrous metals, or chemicals, the usual practice is to ask the trade associations concerned to send spokesmen from their respective industry groups to the National Statistical Office (or its equivalent) to go over the proposed census form and criticize it. Often in this manner terminology is found to be ambiguous or subject to more than one interpretation, instructions to the intended respondents are deemed unclear or incomplete, etc. It is then up to the statistical office in charge of that census to make appropriate clarifications and modifications.

In the case of a field enumeration such as Providencia's, the procedure is to send a few trained interviewers out into the field to try out the draft questionnaire on a cross-section of establishments. For Providencia, most of its pretesting could be confined to Estrella Province and adjoining counties. The Province of Estrella contained the widest range of manufacturing activity of any in the country, and, of course, the savings in time and personnel costs from concentrating on that province and nearby areas would be considerable. For its survey of household (cottage) industries, however, Providencia's NSO would have pretested the regular manufactures short form (ECP-101) in areas along the coastline some distance from its headquarters in Estrella, in order to have a more representative sample of households engaging in manufacturing activity.

3. PRETESTING EXTENDED TO FIELD ENUMERATION TECHNIQUES

It is not enough to design and test questionnaires for use in the field to make them clear and understandable to the respondents or interviewees. Instructions must also be prepared for the enumerators which anticipate as fully as possible the sort of problems most likely to be encountered. Of these problems probably the most bothersome are questions of scope--that is, determining whether a given establishment is in scope of

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the economic censuses being conducted. These questions are particularly difficult to answer when a country is taking its first industrial census (section 5 illustrates how a country pretested certain problems of scope in its first industrial census).

4. PRETESTING OF DATA PROCESSING OPERATIONS

The applications of pretesting in data processing are not as obvious as those in questionnaire design and field enumeration techniques. Yet, as the most advanced industrialized countries have learned, computer programs for editing economic census data are seldom placed in operation without pretesting. For example, the determination of the appropriate tolerances for computer rejection and listing of rare or extreme values rests upon pretesting, usually in two stages.

The first stage involves running a test deck of establishment simulated data cards through the computer, with the tolerances or limits for acceptance or rejection having been set by reference to "normal" expected ranges provided by a previous census or survey. Initially, these tests may produce too high a rejection rate or, if the limits are set too wide, too small a proportion of rejects for good editing. The second stage, which involves performance of the computer, editing on an actual set of establishment cards is usually applied against a revised set of tolerances or limits which are thought to yield about the right proportion of rejects to acceptances.

A country utilizing computer processing in its industrial census should see that its Data Processing Division sets aside both the funds and time required for pretesting early returns from the field to determine the limits or tolerances to be applied in its computer editing of manufacturing and mineral industry questionnaires. The time and money spent in this type of testing (to develop workable editing limits at the card input state) are offset many times over when the preliminary tabulations are reviewed. Careful attention should be paid to the findings of the United Nations Statistical Commission that detecting errors and inconsistencies in editing the establishment punch cards are the surest way to reduce errors and inconsistencies in tabulations run from those cards.[8]

5. ILLUSTRATION OF PROBLEMS OF SCOPE IN THAILAND'S FIRST INDUSTRIAL CENSUS

5.1 Statement of problems of scope

Field enumeration for Thailand's first industrial census was scheduled to begin in April 1964 and to be completed by June. The two basic questionnaires, a long and a short form similar to those used by Providencia in its 1975 Industrial Census, had been prepared to the satisfaction of the Central Statistical Office. The enumeration plan had already been agreed upon. The plan called for intensive block-by-block listing and enumeration of the in-scope establishments (manufacturing and mining) in the Bangkok-Thonburi metropolitan area, where a half or more of Thailand's manufacturing was thought to be concentrated, and progressively less intensive enumeration as the field staff moved out into the hinterlands and the remote changwads (provinces).

A few months before enumeration was to begin, there remained the resolution of several scope cases. These were cases that were hard to classify. They involved a decision whether the classification should be manufacturing as opposed to trade or services.

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[8] United Nations. Statistical Office. *Recommendations for the 1973 World Programme of Industrial Statistics* (New York, 1973), Statistical Papers, Series M, No. 54, Part III.

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This was Thailand's first industrial census, and none of the enumerators had any prior experience with this kind of undertaking. It was felt that, as a minimum, all questions regarding scope should be answered with certainty. In order to provide such guidelines for the field enumeration staff, the planning staff of the central statistical office decided to resolve the more difficult problems of scope by personal observation and interviewing in Bangkok. By this process, the staff hoped to develop some enumeration techniques employing visual scanning (observation) of the premises that would automatically provide interviewers with the answer to whether a mixed or doubtful classification was in scope of manufacturing; it was expected that this scanning would eliminate the need for oral questions to the proprietor.

The four most difficult problems of scope were selected for this on-the-spot pretesting. Expressed as questions, they were:

(1) Can an interviewer tell visually when an establishment that repairs shoes, as well as sells them, is in scope?

(2) Similarly, how about radio or small appliance shops that both sell and repair these items?

(3) When was a packager of tea for sale at retail to be treated as adding value to the product and thus should be considered in scope of manufacturing?

(4) Similarly, when was the preparation of food at the point of sale to be considered as "manufacturing?"

5.2 *Decisions on test cases*

After sampling a small number of establishments which were considered representative of each of these "scope" cases, the planning staff made decisions as to when such establishments were to be rules "in scope of manufacturing." Equally important for the purpose at hand was the question of how the interviewers were to apply these decisions.

5.21 Shoe repairing.--Since shoe repairing was considered manufacturing by the United Nations Statistical Commission, and inasmuch as Thailand had elected to follow the UN guidelines, the interviewer need only scan visually for the presence of shoes without brand-name tags or price tickets but with customer names or repair order numbers. Then, if such shoes were present along with new shoes for sale, the interviewer was to ask simply, "What brings you in the most money--repairs or sales of new shoes?" This line of questioning brought clear responses in every case, and it did not touch any sensitivities against "opening the books to strangers." If the answer was "repairs," then the establishment was to be enumerated as a manufacturing establishment; if the response was "sales," then the proprietor was thanked and told that in a future census his shop would be covered in the enumeration.

5.22 Radio and small appliance shops.--The case of radio and small appliance shops that sold items at retail as well as operating a repair business was resolved in a manner almost identical with the one just described for shoe shops. The only difference was that these establishments were larger and furnished more visual evidence for interviewers to arrive at a decision. Again, the single question as to which part of the business--sales or repairs--brought in more revenue served to settle the matter of scope. As expected, most answered "sales" and thus were "out of scope."

5.23 Tea packaging.--The matter of tea packaging presented a problem of deciding whether the breaking down of large bulk shipments (which were typically 100 kilos) into small 1 kg. bags or packages created a utility value and was not merely a convenience. Thailand ruled that it did create a utility value; thus, these shops or stores were enumerated as in scope of manufacturing. The interviewer was asked only to verify by

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observation that this was the nature or the activity by the establishment.

5.24 Food preparation at point of sale.--Preparation of food at the point of sale was a common sight in Bangkok during the noon hours. Typically this was done in small, portable open carts equipped with rice cauldrons, sauce, and condiment jars and trays, and either a kerosene burner or a pan for holding burning coals. The planning staff of the Central Statistical Office decided that such operations constituted "food processing" and thus were in ISIC Group 20 (as of 1964) of Manufacturing, provided only that the rice or other raw food was cooked on the spot where it was sold.

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Chapter I-8. QUALITY CONTROL

1. INTRODUCTION

Quality control can be usefully employed in a census program at several stages in the operation, from data collection to data processing and tabulation review in the central office. Maintaining acceptable quality is especially important in a comprehensive census, since there is not the same opportunity to correct an error in subsequent surveys as there is in a survey that is repeated monthly or quarterly. However, before the investment is made in applying quality control procedures of a formal mathematical nature, the census or other statistical survey should be of sufficient size to justify the effort. Formal quality control is usually more pertinent to the management of periodic surveys than single-time endeavors.

The Providencia Industrial Census has been conducted at intervals of roughly 10 years and is consequently regarded as the equivalent of a one-time operation. For such a project, although its data content is more complex than for a population census, the operation is much smaller and thus requires fewer controls (see Chapter II-6, Administrative Control System).

2. QUALITY CONTROL AND FIELD ENUMERATION

Quality control techniques have been developed to a high degree of reliability (confidence limits) in the control of variability of products and processes in manufacturing. In order to predict that the product is being produced with a given minimum reject rate (for example, 2 percent) and to state this with 95 percent confidence of being right (5 chances in 100 of being wrong, at the 2-sigma limit), the engineers charged with monitoring the production operation must take samples from lots selected at random.[9] Often these are taken at n^{th} intervals, as for example every 10th "lot" coming down the assembly line. Then sub-samples are drawn at random from these lots and item-by-item inspection of the product is performed. Sometimes sequential sampling is believed to be more productive, enabling those in charge of the process to determine more readily which lots are faulty or produce intolerable rejection rates. In sequential analysis, if X sub-lots in succession pass inspection (that is, show no more than the acceptable rate of rejects), then it may be inferred that the entire lot or production run from which they have been drawn is acceptable.[10]

Quality control is more than simply spot-checking of an operation to see that things are "going all right." If predictions are to be made with given levels of confidence in a statistical sense, the rules of random sampling must be observed. If a country such as Providencia desires to use quality control techniques to determine whether the enumeration process has gone out of control in a particular phase of data collection such as the proper maintenance of field control records (Form 123), it would select first a province at random, then several counties in that province as a lot and finally, also at random (using a table of random numbers), a number of

[9] See any standard textbook of statistical methods which contains chapters on business and engineering applications.

[10] *Ibid.*

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wards within those counties as "sub-lots." By inspecting the control records for such wards ("sub-lots"), the NSO statisticians can determine the error rates in this key phase of field enumeration. Field supervisors can then be dispatched to the counties ("lots"), represented by the wards which turned up unacceptable error rates, to correct the problem right on the spot before the errors accumulate to unmanageable proportions.

This is the essence of statistical quality control applied to the production process that we in economic census work know as data collection by field enumeration. In the true meaning of the term, the field system is a process of gathering and recording raw data drawn from thousands of sources by hundreds of interviewers, thus permitting human errors to arise which must be constantly monitored for quality control.

3. *QUALITY CONTROL AND DATA PROCESSING*

The use of statistical quality control to verify and improve the punching of data cards was developed in the pre-computer age of data processing. It remains today probably the single most widely-employed application of these techniques, and certainly it is the one most readily understood. As all countries learn from their own experience, punching of data cards cannot be error free; slide punches, omitted entries, etc., have a way of occuring under the tightest supervision. What is worse, even 100-percent verification by trained clerks checking cards against original data records, such as questionnaires, is no guarantee that all errors have been detected and marked for correction. The use of quality control methods, either the sampling of batches of punch cards at random intervals, or sequential sampling, permits savings in costs vs. 100-percent verification.

Less easy to visualize are the means of quality controlling various manual or mechanical editing and coding operations. Nonetheless, quality control techniques have been extended to these phases of data processing too.

4. *QUALITY CONTROL AND REVIEW OF TABULATIONS*

With the realization that review of preliminary tabulations is the key to production of error-free final tables, many industrialized countries have concentrated on finding ways to devise inspection at critical points in this review that will expose any systematic errors that may have crept into the processing of the data. As the discussion in Unit VI makes clear, one of the most effective tools for this monitoring has been the development of data relationship checks (see exhibit VI-3-1). Statistical quality control can be utilized here by selecting one or two key ratios and running these on the computer against selected 2-digit major group tabulations. In the United States, this technique has been applied with success in its review of advance data to be published from the Annual Survey of Manufactures. Statistical sampling has also been productively employed in the development of the rates of imputation for zero and omitted entries (see exhibit VI-3-2).

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Chapter I-9. EVALUATION AND USES OF PUBLISHED DATA

1. INTRODUCTION

Now we have come full circle in this opening Unit of the Providencia Case Study. In chapter 1, the statistical objectives of taking industrial censuses were outlined. In chapters 2 and 3, the mythical country of Providencia was described and its administrative organization was outlined. In chapter 4, the initial decisions of its National Statistical Office respecting the conduct of the 1975 Industrial Census were identified and the rationale for each decision was given. In chapters 5 and 6 appeared a summary plan for the census and the calendar of operations which had been adopted. Then in chapters 7 and 8, techniques of pretesting and quality control were discussed. Chapter 9 will now review how the NSO re-examined what had gone before and affirmed the goals set for itself as it proceeded to evaluate the data to be published. This involved agreement at the top staff level regarding the uses to be made of the final published results.

2. OBJECTIVES OF 1975 INDUSTRIAL CENSUS RE-EXAMINED

The planning staff of NSO re-examined the statistical objectives which it originally established and believed they were still valid. The objectives were:

(1) To follow the United Nations guidelines as applied to the manufacturing and mining, electricity and gas industries.

(2) To profit from the mistakes made in Providencia's 1963 Economic Census.

(3) To make firm commitments regarding both the accuracy and timeliness of the data to be published.

(4) To define explicitly the objectives being sought.

A restatement of the data objectives of the 1975 Industrial Census also is in order at this point:

(1) To furnish benchmark figures for revising and updating current economic data on manufacturing, mining, electricity and gas.

(2) To provide a sample frame for use in future surveys of these activities to be conducted on an annual or more frequent basis.

(3) To obtain data on size, ownership, employment, and regional distribution of these economic sectors to serve as a guide to policy decisions by government and investment decisions by business.

(4) To obtain data on the structure and activities of the industries covered that will be internationally comparable.

(5) To obtain internally consistent measures of employment and value added for at least the principal industries within the three economic sectors covered. These can serve as the weighting system for construction of a comprehensive index of wholesale prices and, if the need arises, for construction of an aggregated index of industrial production employing price deflators where physical output measures are lacking.

3. EVALUATION OF THE DATA TO BE PUBLISHED

Evaluation of the data to be published should be uppermost in the minds of the professional staff during the post-tabulation analytical review. A summary of the general objectives of the final review is outlined in chapter VI-3 of this case study. Some of the objectives are outlined below.

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(1) Internal consistency checks

(2) Comparability with prior census data

(3) Comparability with current surveys

(4) Description of limitations of data

(5) Measures of effect of professional review

In Unit VI there appear three important exhibits. The first of these, which lists the data relationships to be examined in review of tabulation, has been referred to previously in this Unit. The second, which shows the effect of imputation for blanks and zeros from recent U.S. experience, has also been cited as an application of statistical quality control. The third can be described as an example for developing countries when they have mastered the programming and sampling necessary to produce such a table. It presents, from United States experience in its 1963 Census of Manufactures, the effect of computer editing and analysts' corrections in the professional review of tabulations before publications. This kind of analysis presents in one summary table what computer programmers and professional analysts have contributed to the refinement of their product--the industrial census statistics that are being offered to the consuming public.

4. *USES AND LIMITATIONS OF THE PUBLISHED DATA*

The uses of the published data will vary from country to country depending upon the degree of detail published, the needs of government and private consumers of the data, and the ability of the national statistical offices to respond to requests for special tabulations after the census. As noted in chapter I-5, requests for special tabulations cannot be effectively honored unless corrections have been carried back to the basic data records. While the general purpose uses of a country's industrial census data can readily be inferred from the statistical objectives it set for itself in its publication plans, the same cannot be said for the data limitations.

Discussion of the limitations of the data that are published in reports on industrial censuses is given in Unit VI of the case study. Providencia was mindful of the strong exhortations made by the UN in its "Recommendations for the 1973 World Programme of Industrial Statistics" that all participating countries should calculate and publish in their final reports technical statement to disclose the extent to which imputations might effect the validity of their published data. (See especially the final paragraph of Part III to UN Series M, No. 54, pp. 83-84.)

In these technical statements the Statistical Commission of the UN set forth a series of upper limits for publication, and urged participating countries not to exceed these limits knowingly without appending measures to warn intended users of biases in the data. In conclusion, it is pertinent to quote several of the objective quality standards which the United Nations proposed in their manual on Organization and Conduct of Industrial Censuses (op. cit., p. 84, para. 232):

(1) If more than 5 percent of employment in an important 4-digit industry is underrepresented, a measure of bias should be provided users for the key data items.

(2) No more than 10 percent of employment in 4-digit industries should be estimated without call-back for key data items.

(3) Where external consistency checks are made against independent sources of data for key items, the results should be reported when discrepancies of 10 percent are uncovered.

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Chapter I-10. ROLE OF ANNUAL AND MORE FREQUENT SURVEYS IN AN INDUSTRIAL STATISTICS PROGRAM

1. BACKGROUND

As noted in chapter I-1, above, Providencia decided to adopt the UN recommendations for a program of industrial statistics. These recommendations define the underlying purpose for taking an industrial census as providing a benchmark inquiry that will serve as an essential part of an integrated system of national industrial inquiries. The planning group of the NSO was therefore charged with initiating plans for utilizing the census results, as well as the staff and other resources used in the census, as the basis for developing an ongoing, integrated national industrial statistics system.

2. OVERVIEW OF AN INTEGRATED SYSTEM OF INDUSTRIAL STATISTICS

An integrated system of industrial statistics should include periodic censuses of each industrial sector. These censuses should be updated by annual canvasses of a sample of establishments for the more important data items and by monthly or quarterly sample surveys for a few critical measures subject to cyclical or other short-term changes.

The censuses provide a measure of the structure of economic institutions in terms of employment characteristics, capital invested, energy used, inputs, output, and value created. Detailed information is obtained from all large establishments and from a sample of the smaller establishments on consumption of materials, fuels, business services, etc., and on production and sales of products and services. This makes it possible to measure in depth at census intervals the internal characteristics of each industry as well as the interindustry flows. Since key items of data are obtained for all establishments, it is possible to tabulate and publish such information in great detail by industry, by geographic area, by size of establishment, and in terms of other characteristics. The census also serves as a "benchmark" for such derived measures as indexes of industrial production, prices, and productivity.

Annual surveys serve a similar but somewhat more limited objective than do the censuses. Information on total consumption of materials, fuels, and electric energy, on capital expenditures, and on stocks is obtained, as well as data on employment, wages and salaries, and total production and sales of product groups and serivces. The annual surveys provide data at the national level for all industry groups and for important individual industries. Such data are essential for national accounting purposes and afford interim benchmarks for indexes of production; they are not available in sufficient detail for input-output matrices. The annual program also provides data at the industry-group level for major geographic regions and at the all-manufacturing and all-mineral activity level for other significant geographic areas. Monthly or quarterly surveys should be limited both in terms of data items and respondent coverage.

3. DATA ITEMS TO BE COLLECTED

In developing an industrial statistics program, the international recommendations for the collection of data should be followed. Exhibit I-10-1 specifies the data items to be

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gathered in periodic censuses and in annual and quarterly or monthly inquiries, as prescribed with minor modifications in the United Nations' recommendations for the 1963 World Program of Industrial Statistics[11] and as amended for the 1973 Program.[12] It should be noted that the 1963 Program was reduced somewhat, as experience in using it revealed shortcomings in some countries' programs due principally to overambitious inquiries. The list of data items in exhibit I-10-1 constitutes a program which most countries can expect to complete with a satisfactory degree of accuracy and comparability. Nations with well-developed statistical programs may wish to add additional detail or data items not shown in exhibit I-10-1 (e.g., in benchmark censuses, the cost of non-industrial services rendered by others--legal, insurance, and communication costs; in monthly or quarterly surveys, net new orders received and unfilled orders on hand).

Slight modifications of the data items listed in exhibit I-10-1 need to be made for the minerals sector. The category for operatives or workers should be expanded to read "Production, development, and exploration workers." The fixed-asset item for new "Buildings and other structures" should be broadened to add "including development and exploration of mineral property." In order to permit the inclusion of mineral development and exploration in the calculation of value added for the mineral industries, another item "Cost of materials, supplies, fuels, electricity, etc. used." Stocks are usually negligible at mining and oil or gas extraction sites, and typically should not be requested for the minerals sector.

To ease the burden for smaller establishments, certain data items (e.g., stocks) and the detail in certain categories (e.g., the subcategories of "Fixed assets," and some of the detail under "Cost of materials, supplies, etc.") should be omitted from the short form used for such establishments in the benchmark censuses.

The annual and more frequent inquiries depend upon the establishment of an adequate register, the development of a statistical methods staff, and the application of sampling techniques. Nevertheless, it is desirable to formulate a time schedule aimed at the ultimate attainment of a comprehensive program of industrial statistics. A suggested time schedule is given in exhibit I-10-2.

The dates shown represent the years in which the collection of data would begin. The many preparatory steps necessary to meet these dates also have to be scheduled. Among such steps are: modification of the United Nations' international data recommendations to meet the needs and conditions of the individual country; preparation of a register of establishments; planning and designing a sample; preparation of staff and respondent instructions; and so forth.

4. *USE OF SAMPLING*

The data collection workload can be substantially reduced through sampling and, thereby, optimum use made of resources available to the statistical office. Usually, nonsampling errors can be reduced because more critical attention can be given to the reports. All data items in the annual and monthly programs should be requested on a sample basis with the objective of providing reasonably reliable information nationally for major industry groups and for principal geographic subdivisions on a total sector basis. Later, if resources permit, new

[11] United Nations. Statistical Office. *Recommendations for Industrial Statistics* (New York, 1968), Statistical Papers, Series M, No. 48.

[12] United Nations. Statistical Office. *Recommendations for the 1973 World Programme of Industrial Statistics*, (New York, 1973), Statistical Papers, Series M, No. 54, Part 1.

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items of data can be added or the sample size can be enlarged to yield data of acceptable accuracy for additional industries or geographic areas.

In particular, sampling methods should be used extensively to obtain data from small establishments. These establishments generally find it difficult to supply some types of data or significant amounts of detail. Moreover, enumerating all of these units presents serious problems, not only because there are a great number of them but also because it is usually very difficult to identify and locate them. Such units usually contribute relatively little to total production, while the cost of collecting, reviewing, and processing their data is frequently excessive.

In countries where household (cottage) industry amounts to a significant proportion of all manufacturing activity (e.g., over five percent), production in households should be covered in the annual survey as well as in the census of manufactures. A small-area sample should be used to canvass household activity, with a special short form which calls for a very limited amount of information.

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Unit II

ADMINISTRATIVE REQUIREMENTS AND RESOURCES

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Chapter II-1. MANAGEMENT AND LEGAL CONSIDERATIONS

1. MANAGEMENT PRINCIPLES

Much of the success of the Providencia Industrial Census can be attributed to the fact that the National Statistical Office (NSO) believes in adhering to fundamental principles of good administration. The NSO staff has some experience with planning and administering population censuses, but they are aware that there are marked differences between a population census and an industrial census. In the population census, all the statistical units are similar; while in an industrial census it is a rare occurrence to find two units with the same characteristics. Consider, for example, a small manufacturing establishment with two or three persons engaged and with simple records; then compare it with a large factory employing several hundred persons and maintaining elaborate and complex records of its activities. Obviously, the enumerator assigned to obtain a census questionnaire from the large establishment would have to be much more experienced and better qualified. The first interview may take only a few minutes, while the second could easily require several hours.

In the population census, the statistical agency is organized to handle large numbers of similar questionnaires with questions that are not unduly complicated. In the industrial census, several kinds of questionnaires must be used, some of them quite complex and others relatively simple. Enumeration of the population must be completed in a short period to minimize duplication and omission. In the industrial census, the collection period can extend over several months with no great difficulty because the units of inquiry (establishments) are much more stable and less likely to move about. Finally, some difficult enumeration problems are associated with the concepts used in the industrial censuses, such as the "value added" concept.

Providencia's NSO is taking advantage of their experience in managing large statistical undertakings. Many basic principles of management are the same, regardless of the type of census that is carried out.

1.1 *Fostering communication*

Frequent communication among organizations and individuals is considered essential. The use of staff meetings to discuss projects contemplated or under way is encouraged. If more than one division is concerned in any project to be discussed, representatives of each division are expected to be present and to participate in the discussion.

1.2 *Merit system*

Hiring and promotions are based on merit and performance on the job. Employees are rated regularly by their supervisors, using a rating schedule which is as impartial as such a schedule can be. Ratings are carefully reviewed by the Personnel Division, and efforts are made to detect and correct any evidence of bias or favoritism.

1.3 *Delegation of authority*

A supervisor's ability to delegate authority, responsibility, and accountability is considered one of the important elements of his performance. The attitude "in order to get a job done right, I've got to do it myself" is never encouraged.

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1.4 *Target dates and production goals*

On nearly all projects, target dates for completion are set, and employees are required to explain if the job is not completed on time. Production goals, in terms of number of interviews, questionnaires, punch cards, and the like, are set wherever feasible. The person who is expected to be in direct charge of the project or sub-project in question participates in setting production goals. Such participation is considered important, because production targets handed down from above are likely to arouse resentment and less likely to be met.

1.5 *Management training*

Training programs for management personnel are hold at intervals, and supervisors are expected to attend. The topics discussed in these sessions include delegation of responsibility, creation of goals, need for praising good work, discussing poor work with employees, developing and encouraging incentive, giving prompt decisions, setting goals, and establishing quotas. In Providencia's NSO, management is defined as consisting of persons with responsibility for supervising a specified number of individuals. In other countries, management may at times also include persons who are invited to discussions of management problems. The term includes in all cases those on the executive staff such as directors, assistant directors, and bureau heads.

1.6 *Employee Organizations*

Management is aware of the existence of employee organizations, such as trade unions, and has learned as much as possible about them, for example requirements for membership, number of members, and background of leaders. In discussions with representatives of such organizations, the managers of the NSO are fair-minded in listening to all proposals and insofar as possible will agree, but they are constantly aware of management problems and the goals of censuses and surveys.

2. *LEGAL BACKGROUND*

In the administration of its statistical programs, the NSO is guided by the provisions of the 1970 law which created the Ministry of Economic Planning and Development. All of its activities are authorized, and many of them specified, in this law.

2.1 *Confidentiality of reported information*

The law contains strict provisions guaranteeing the confidentiality of data collected from businesses, other organizations, and individuals (Exhibit II-1-1). In particular, it emphasizes that no tax-collecting agency may have access to the completed questionnaires. The published statistics, likewise, are compiled in such a way that no data pertaining to an individual or to a firm is revealed. For example, if in a given province there are only two firms in a certain industry, the data for that industry and province are combined with broader totals and never shown separately. This provision of law is strongly emphasized in NSO's publicity regarding censuses and surveys and, in abbreviated form, is shown prominently on every questionnaire. The law provides heavy penalties for employees of NSO who willfully fail to carry out these provisions. In enforcing the law, the NSO constantly reiterates the principles involved. Business groups seeking to find 'soft spots' in the confidentiality provisions are told emphatically that these provisions are inviolable and that employees of NSO are sworn to secrecy.

2.2 *Obligation to report*

The obligation of businesses and individuals to respond to inquiries in censuses

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and surveys is also written in the law, which provides penalties for failure to report. Although these provisions of law are rarely invoked by NSO, the fact that they exist is an incentive for those who would otherwise be reluctant to report.

2.3 *Duplication of surveys*

Other provisions of the law require the NSO to maintain liaison with data-gathering agencies in Providencia--both public and private--to attempt to minimize duplication between its objectives and those of other organizations. For example, the Ministry of Labor collects monthly information on employment and wages from industrial firms (as well as other businesses). Such data are basic to the industrial census and in other economic censuses as well. However, the census is taken only once every 10 years; and the Ministry of Labor Survey is confined to a sample of about 2,000 industrial establishments in contrast to the 40,000 establishments and 30,000 households included in the 1975 Industrial Census. The results of the monthly sample survey are adjusted every 10 years to benchmarks developed in the industrial census. In planning for the industrial census, an agreement on common definitions (such as the definitions of "production workers" and "other employees") was reached between the two agencies. The fact that identical definitions are employed tends to minimize the reporting burden on firms which might otherwise have to develop new data for the census. It also facilitates comparison of semple survey and census results for benchmark purposes.

2.4 *Separation of collection and analysis functions*

The law also establishes the principle that, within the Ministry of Economic Planning and Development, data collection and compilation should be separated from data analysis. This legislative provision was inserted largely because of administrative considerations; it was felt by those who drafted the law that censuses and surveys would be more efficiently conducted if they were under separate direction, since their aims and requirements (particularly the requirement of timeliness of publication) were quite different from the objectives of data analysis. For example, input-output tables have long-term uses which make it more desirable to perfect the data than to meet early publication goals. To a large extent, the professional skills needed to data analysis are also different from those called for in data collection and compilation.

It follows that, in general, NSO confines its analysis to projects designed to improve its statistical methods, such as sampling, or in other ways to improve the quality of the data it produces. It is not engaged in business forecasting or in the compilation of broad-based economic measures, such as the gross national product (GNP). In the industrial census, however, benchmark indexes of industrial production are compiled, because the computations require the use of confidential data not available to the data analysis staff. Publication of GNP and in fact all aspects of the national income accounts are the responsibility of the Office of Demographic and Economic Analysis, which like the NSO is part of the Ministry of Economic Planning and Development. Under the legal provisions for confidentiality, only employees of the NSO are allowed to see individual reports, and the employees of the Office of Demographic and Economic Analysis are not, even though they are under the same Ministry.

2.5 *Excerpts from the law*

Provisions of the law applicable to industrial censuses and surveys are shown in exhibit II-1-1.

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Chapter II-2. ADMINISTRATIVE STRUCTURE AND FUNCTIONS

1. INTRODUCTION

As the statistical arm of the Ministry of Economic Planning and Development, the NSO is responsible for collecting and compiling basic statistics on such subjects as housing, population, internal trade, manufacturing, and mining. Except for the Census of Agriculture, which is conducted by the Ministry of Agriculture, the NSO is responsible for all of Providencia's censuses and compiles most of its current statistics. It does not, however, analyze published data nor forecast economic conditions, since these activities are functions of the Office of Demographic and Economic Analysis in the Ministry of Economic Planning and Development. The same Office is responsible for compiling the national income accounts.

The NSO performs the full range of activities associated with its many statistical projects. It collects, processes, and publishes statistics for general use as well as supplies the statistical needs of other government agencies. It conducts surveys and studies requested by other government agencies, subject to its usual rules of confidentiality and to its requirement that they meet other standards such as statistical need, nonduplication, reportability, etc. It develops and maintains standards for statistical methods, classification systems, and tabular presentation. It recruits and trains its own personnel. It maintains liaison with other data-gathering agencies in Providencia (private as well as public) and, in planning its programs, attempts to minimize duplication of collection effort among such organizations. The NSO recognizes that its statistical projects, although varied in content, have many features in common. It has, therefore, created divisions to centralize functions such as data processing, distribution of publications, personnel and payroll management, collection of data by field enumerations, and the preparation of maps.

2. FIELD OPERATIONS

The Field Operations Division (FOD) is responsible for all collection of data by personal enumeration in various censuses and surveys conducted by the NSO. The responsibility applies not only to provinces other than Estrella, and to portions of Estrella Province outside the city of Estrella, but also to field collection within the city itself. Although from time to time the staff of the subject divisions, such as the Manufacturing and Mining Division (MMD), may call on respondents either in person or by telephone, or may write to respondents about data collection problems, they may do so only as representatives of FOD and with the full knowledge and approval of that division. The head of FOD believes that the Division is responsible for all contacts with respondents, and if there are direct contacts between the staff of subject divisions and respondents, FOD should approve them in advance and know exactly what they are, just as if those making the contacts were employees of FOD.

FOD thus has become known throughout Providencia as the representative of NSO for data collection. When respondents have problems requiring discussion with NSO they bring them to FOD, either to one of the provincial offices or directly to the central office. In this way, continuity in the relationships between respondents and the NSO has been developed and maintained.

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Although FOD does not have direct responsibility for the content of questionnaires, its staff is considered to have expert knowledge and experience in the matter of collectibility or reportability of data. In discussions on the data content or design of questionnaires, therefore, FOD is often called on for advice, and frequently a representative of the division is asked to be present at meetings where proposed new inquiries or the design of questionnaires are discussed. If formal pre-tests of new inquiries are considered to be necessary, FOD participates in the planning of the pre-tests and usually conducts all of the necessary field work.

3. *MAPPING*

The Geography Division (GEOG) is responsible for preparing all maps of Providencia for use by enumerators in the field or in the various offices, and for preparing maps and charts for reproduction in the statistical publications. In order to keep maps up to date, GEOG is responsible for maintaining, through FOD, a constant flow of information from sources in the field, and for maintaining files of the accumulated corrections and additions, which are usually used to correct maps when a new census calls for use of maps in the field. Since the censuses and other surveys are the main source for information on local developments affecting maps, GEOG is considered the major source in Providencia for general-purpose maps of local areas. Such general-purpose maps are sold through the Publications Division for use of the public. They are revised about every 5 years. Since these maps are not detailed enough for use in enumeration, special large- and intermediate-scale maps are prepared for censuses. In chapter II-3, the existence of such maps prepared for use in the 1970 Census of Population and Housing and their adaptation to the uses of the 1975 Industrial Census are discussed.

4. *CLERICAL WORK AND TABULATION*

The Data Processing Division (DPD) is responsible for check-in and control of receipt of questionnaires from the FOD, editing and coding, and for card-punching, transfer of data on cards to computer tape, and tabulation. The Division maintains close liaison with the subject matter divisions in the planning and designing of questionnaires, principally to see that the inquiries are designed to facilitate punching and tabulation. In discussions of questionnaire design, DPD frequently offers advice differing from that of the FOD representative, whose principal interest is to facilitate the work of enumerators and respondents. The subject matter divisions are responsible for resolving such conflicts, since they make the final decisions on data content as well as questionnaire design. A balance between the FOD and DPD interests is usually sought.

The top management of DPD is expected to keep up to date on developments in data processing equipment and the availability of such equipment in other agencies and organizations in Providencia. Management should also foster research on improving the efficiency of data processing operations, including the use of new programming techniques and new mechanical devices. From time to time, the head of the Division will recommend the purchase of new or additional equipment.

5. *FORMS DESIGN, REPRODUCTION, AND PUBLICATION*

The Publications Division (PUB) is responsible for typing, printing, assembly, and distribution of all NSO publications. It maintains NSO standards with respect to table titles, headnotes and footnotes, indentation, style of column and stub captions, and symbols such as footnote designations. In its preparation of publications for printing, it inserts title pages, tables of

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contents, page headings, page numbers; it designs covers where needed. It is responsible for the marking of copy with instructions to the printer, reviewing proofs, and checking on the assembly and binding of publications. It also sets up questionnaires and internal-use forms for printing, and the divisions of NSO have been instructed to refer any material to the Publications Division that requires the reproduction of more than 50 copies. The Forms Design Staff of PUB offers advice to the subject divisions during the developmental stages of questionnaires and other forms, and is expected to point out potential deviations from NSO standards. Responsibility for both the content and general design of forms for outside use, however, rests with the subject divisions.

6. *PERSONNEL AND PAYROLL*

The Personnel Division (PERS) is responsible for maintaining personnel records on all employees of NSO. It is also responsible for interviewing certain applicants for employment and making recommendations to the various NSO divisions as to the qualifications and other matters concerning individual applicants. The latter functions apply only to clerical employees of the central office in Estrella. Professional and other higher-grade employees are interviewed by the supervisory employees in the various NSO Divisions, and the field personnel, such as enumerators, are interviewed by the provincial field offices.

PERS also maintains payroll records and distributes pay checks to NSO employees. The funds for these disbursements originate with the Ministry of Finance, and authority for distribution of pay comes from the Director through his administrative aide.

7. *ADMINISTRATIVE SERVICES*

The Administrative Services Division (ADMS) services the other Divisions of the NSO. Its primary responsibility is to consolidate the budgets, cost reports, and activity reports that originate in the other Divisions. Other responsibilities of ADMS include custodial, repair, and supply purchase functions.

8. *DIVISION RESPONSIBILITY*

In the early planning stages, agreement on the division of responsibility among the divisions and other organizational units was reached. FOD agreed that certain types of establishments (establishments of multi-unit companies, single units with 100 or more persons engaged, electricity and gas plants, and government owned-and-operated plants) would be canvassed by the staff of MMD. The major reason for this decision was to simplify data collection. The NSO believed there were less than 500 establishments of these types, and the planners reasoned that the writing of complex instructions to the field staff could well be replaced by oral instructions to a small group of experts plus brief written instructions. Field operations would, however, be under the direct control of the head of FOD in conformity with the policy of NSO on data collection.

As to editing of questionnaires, it was agreed that all long forms would be edited by the MMD staff. The short forms, on the other hand, would be edited by clerks in the DPD in accordance with specifications to be furnished by MMD.

Tables for publication would be hand-posted by clerks in DPD or printed by computer, according to MMD specifications.

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Exhibit II-2-1 lists the various functions to be carried out in the industrial census. The exhibit gives the name of the organizational unit in the Providencia NSO having major responsibility for the function.

9. *COORDINATOR AND EXECUTIVE COMMITTEE*

In recognition of the need for liaison among divisions, the Director appointed a senior staff member of MMD to the position of Industrial Census Coordinator. The primary responsibility of this position is to be aware of the progress of the various phases of work in the census, and to consult with the heads of divisions when delays develop, when staff have too much or too little work, or when disagreements arise among staff members as to their responsibilities. Although the Coordinator's primary contact is the head of MMD, the function calls for frequent consultation with other division heads as well. For the most part, the Coordinator's responsibilities are advisory rather than administrative.

All NSO major decisions are made or approved by the Executive Committee. This committee, which consists of the Director and the heads of NSO divisions or offices, meets regularly once a week and at other times as necessary. This regular review of ongoing projects is vital to the success of the census. Regular review not only assures top-level attention to problems but it keeps minor matters from developing into problems.

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Chapter II-3. MAPPING

1. IMPORTANCE AND CHARACTERISTICS OF CENSUS MAPS

Maps are important and essential tools in the conduct of any census in which personal enumeration is the chief method of collecting data. They are of use in preventing overlapping of jurisdictions and in avoiding omission and duplication of work and of data--all the way from the enumerator's level up to the central office. Maps help to locate places and assist in defining boundaries for general administrative purposes. They can also be used effectively in preparing budget estimates of travel costs, location of field offices, and number of employees required in the field. If maps are not available or if the maps are not very accurate, the progress of the field work can be seriously hampered.

Many maps are constructed for specific purposes such as naval charts, military field maps, urban planning projections, geological maps, sales quota maps, etc. A census agency also has special needs. The maps required will vary, depending on the type of unit to be enumerated, the kind of area involved (particularly, whether the area is urban or rural), and the needs of the individuals working with the maps. In general, large-scale maps are needed by field enumerators and their supervisors, whose basic objective is to canvass a small area completely and without duplication. Intermediate-scale maps are needed by employees whose scale of operations embraces a larger area such as a county, while small-scale maps may provide overviews of a province or the entire country for management personnel. There is not, then, one standard map which can be used effectively by enumerators, provincial supervisors, and top management. Furthermore, maps that are adequate for a population census or a census of distribution may be inadequate for an industrial census. Maps that are serviceable in rural areas may be completely inadequate for the enumeration of urban areas.

1.1 General characteristics

Certain general statements can be made in regard to the requirements of all census maps. The more important items are listed below:

1.11 Distance.--Showing the exact distance between two features is not as important as reflecting the relationship between them. Whether a factory is shown 50 meters or 75 meters from the road is less significant than whether it is shown on the correct side of the road.

1.12 Areas to be tabulated separately.--All boundaries which define areas for which data are to be shown separately in the census tabulations must be clearly and accurately shown on the maps. In the industrial census, considerable emphasis was placed on the correct delineation of county boundaries in relationship to industrial establishments and other features of the landscape, because the county was the smallest geographic area for which separate data were published.

1.13 Unnecessary detail.--Maps should be simple and contain little information which is not pertinent to the needs of the user. A detailed and complicated map may only serve to confuse the user, because some temporary employees, particularly enumerators, have had only brief training in map use prior to their work in the census.

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This principle was violated to some extent in the industrial census because, as explained below, all of the maps used were adapted from those prepared for the 1970 Census of Population and Housing. They contained some detail which was not needed for the industrial census enumeration. To a considerable extent, this disadvantage was compensated by the fact that many of the enumerators and supervisors in the industrial census had been employed in the 1970 census and were trained in map use.

1.14 Graphic scale.--Map distance should be shown by means of a graphic scale (see the exhibits for this chapter). Maps can readily be enlarged or reduced in size by modern copying methods. Graphic scales, as opposed to those which state a fixed relationship, such as one centimeter equals 500 meters, do not need to be altered if the size is changed.

1.2 Physical and "cultural" features

Features shown on census maps are of two kinds--physical (or natural) and cultural (or man-made). Natural features such as mountains, rivers, marshes, deserts, lakes, etc. are included when they are expected to be of assistance in locating the boundaries of an area or place to be enumerated. Contour maps showing gradual changes in land elevation are generally not useful, but very prominent elevations such as abrupt ridges should be shown.

Man-made features such as highways, roads, canals, and trails should be carefully delineated on industrial census maps, because places to be enumerated are usually located along them. The kind of road (trail, graded dirt road, gravel surface, paved, etc.) should be indicated if possible because it provides a clue to the accessibility of places and is of help in estimating travel requirements. Knowing the kind of road may be particularly important if the period of enumeration coincides with a rainy or very cold season. For the industrial census, man-made features such as cemeteries, churches, schools, apartment buildings, etc., were of less importance but were allowed to remain on the maps adapted from the population census because they were considered to be useful in identifying roads and streets, which were seldom named on street signs. Features such as industrial establishments, which were added when adapting the map, were also of considerable value.

1.3 Boundaries

Normally, the best boundaries to delimit an area are those which can be seen easily on the ground, such as roads, streams, and railroad tracks. Nevertheless, since it is necessary to hold to administrative area limits, imaginary lines must often be used. Sometimes, property lines may be followed in order to define areas; at other times, imaginary lines connecting visible features must be drawn to complete a boundary.

Between 1970 and 1975, there were many changes in the boundaries of wards and counties, but none in the province boundaries. Fairly accurate information on the boundary changes was obtained from the Ministry of Finance, and the census maps were revised accordingly. To allow time for the reproduction and distribution of maps, the Geography Division established a cut-off date of 30 June 1975. Changes received later than that date were not carried through to the maps.

2. KINDS OF MAPS USED IN THE INDUSTRIAL CENSUS

The maps used in the industrial census, as pointed out above, were adapted from those used in the 1970 Census of Population and Housing. Some of their features were of no particular value in the industrial census, but

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the cost of deleting these features from the maps led to a decision to retain them. For example, some maps described below included crew leader area boundaries. Crew leaders were first-level supervisors employed in the population census but not in the industrial census.

Most of the exhibits show only enough of the entire map to indicate its features. The standard size of the map, in most cases, was 60 by 72 cm. Maps of this size to be carried in the field could conveniently be folded to 10 by 24 cm., a size which would readily fit into pocket or purse.

2.1 *Large-scale map for rural areas (exhibit II-3-1)*

These maps were used in the field by enumerators, both for the canvass of "regular" establishments and for the household area sample. Although ED boundaries are shown on the maps, the ward was sometimes treated as the smallest enumerator assignment. Usually, each map covered a complete ward, and two maps were needed for some of the larger wards.

2.2 *Large-scale urban map for household sample areas (exhibit II-3-2)*

These maps were used by supervisors to record and control the enumeration of urban areas included in the household sample. The enumerators in urban areas did not carry whole maps but were given portions of maps together with a written description of the boundaries of the areas they were expected to canvass. The estimates of the number of household units in each block, recorded in the 1970 census, provided an approximate idea of the number of interviews to expect from each block.

2.3 *Large-scale urban map for general use (exhibit II-3-3)*

These maps were used by enumerators and supervisors in the canvass of "regular" establishments. Enumerators were assigned to ED's and were expected to list industrial establishments on NSO Form 123 (exhibit II-6-1).

2.4 *Intermediate-scale map for general use (exhibit II-3-4)*

These maps were used principally by county agents to locate ward boundaries. Streams, highways, roads, and trails are shown, as well as place names, but not the locations of individual establishments. ED's are shown on the maps; these were used as the basic control units for both urban and rural areas in the industrial census.

2.5 *Small-scale county map (exhibit II-3-5)*

These maps were not prepared specifically for the industrial census, but were in continual use in the provincial field offices for many data collection projects. By fitting several of these maps together, it was possible to create a large wall map of the entire province. Such maps were useful in discussions of the progress of the industrial census, because they provided a convenient source of information about each county. Flag pins were used to indicate progress.

2.6 *Small-scale province maps (exhibit II-3-6)*

These also were not prepared specifically for the industrial census. Their principal use was in the central office, to locate counties and record the progress of collection by means of flag pins. There was also prepared a map of the entire country (see exhibit II-3-7).

3. MAP PREPARATION

In the Providencia Case Study, it has been convenient to assume that maps had been prepared for the 1970 census. Also, they are assumed to be reasonably complete and accurate.

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4. MAPS AND CHARTS FOR CENSUS PUBLICATIONS

The publication of data in map and chart form is an advantageous way to advertise some of the results of the census. Those which were to be included in the industrial census publications (the final reports and the bound volume) are described below.

4.1 *Location of industrial establishments*

This subject was treated in a series of maps showing the location of establishments for the country as a whole by county. The number of establishments was indicated by circles, the size of the circle indicating the number of establishments within the county. Separate maps were published for each major industrial group.

4.2 *Value added, by industry and province*

This series of maps showed, for each province, value added for all industries combined, then for each major industrial group separately. Each map portrayed the entire country showing province outlines; the circles, by their size, indicated the importance of the industrial group within the province.

4.3 *Industrial activity, 1963 and 1975*

This chart consisted of a series of bars showing the size of industrial activity for 1963 and 1975. The first pair of bars represented all industries combined, and subsequent pairs each represent a major industrial group. Size was based on value added.

4.4 *Industrial employment, by province, 1963 and 1975*

This bar chart indicated the changes in industrial activity for each of the 12 provinces. Activity was again represented by value added.

4.5 *Industrial employment, by province*

This was also a bar chart, with one bar for the country as a whole and one for each of the provinces. Each bar was subdivided to represent the number of persons engaged by major industrial group, and the length of the bar indicated the total for the province.

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Chapter II-4. BUDGETING

1. INTRODUCTION

The success of Providencia's 1975 Industrial Census was due in large part to the care taken in advance planning, not only in the formulation of broad objectives and concepts, but in the detailed forecasting of each operational step. An important feature of this detailed planning was the development of cost estimates. One reason for their need is that without an approximate idea of what each step would cost, all the available funds could have been spent long before the work was completed. The preparation of step-by-step cost estimates, and their consolidation into larger totals representing intermediate phases of the entire project, is the process called budgeting.

1.1 *Coordination of budget estimates*

NSO's Budget Coordinator, who is administratively attached to the Office of the Director, is responsible for reviewing the budget estimate prepared by the NSO divisions, advising the divisions on accepted techniques for preparing budget estimates, advising the Executive Committee of problems which may have arisen in the course of their preparation, and advising all concerned individuals of progress made in their preparation. In his review, the Coordinator makes certain that the budget statements are clear and understandable, that they include all operational steps, that they delineate the areas of responsibility of each division, and that the cost estimates are realistic.

1.2 *Participation of supervisors*

It is NSO policy to have persons with administrative or supervisory responsibility for carrying out an operation participate in preparing the budget estimates for that operation. This is not always possible, because of the long lead time required for the preparation and review of budget estimates. In the 1975 Industrial Census, the budget estimates were completed and approved in October 1974, but the major part of the work began in February 1976. In the meantime, some of the supervisors who had helped prepare budget estimates had either left NSO or had been transferred to other positions so that they were no longer responsible for carrying out the operations covered in their budget estimates.

2. ESTIMATING TIME AND COST

The basic form used by NSO for budgeting all projects (except small jobs which can be completed rapidly and informally) is Form 120, which is the Time and Cost Schedule. An example of this schedule, partially filled out to illustrate how it is used, is reproduced as exhibit II-4-1. In the industrial census, Forms 120 were filled out for all individual operational steps, and later consolidated into group totals and grand totals for the entire project. A useful feature of the individual Forms 120 is the number of physical units, such as the "screening interviews" shown in exhibit II-4-1. The number of physical units is not normally carried forward to the group totals or the grand total. For operational steps involving payment to outside organizations (such as printing or equipment rental) the number of man-weeks is not applicable and is omitted. In the case of the county agents employed in the industrial census, the Forms 120 included estimates of their time even though they were not

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NSO employees; payment for their services was made in one sum to the Ministry of Agriculture.

Man-weeks were used for estimating purposes in the 1975 Industrial Census rather than man-hours or man-days, because it was felt that the latter figures would imply a degree of precision in the estimates which was in fact not there. Man-months could have been chosen instead, but for some of the operational steps weekly forecasts were felt to be necessary.

2.1 *List of operational steps*

The total list of operational steps for an industrial census is shown in exhibit II-4-2. In this list, the "operational steps" are defined as sub-projects which could be readily described and which were the responsibility of one NSO division. The group totals, such as "advance planning" and the "preparation of materials" often involved several divisions.

2.2 *Summary of estimated costs*

A summary of the budget estimates, rather than the full detail, is usually sufficient for presentation to officials who will approve the project and release the necessary funds. Such a summary for the 1975 Industrial Census is shown as exhibit II-4-3.

2.3 *Revisions to budget estimates*

Throughout the census period, the budget was frequently re-examined and compared to actual performance. Some items of quantity or cost were found to have been incorrectly estimated, and the budget was revised accordingly. Where cost estimates had to be revised upward, funds could be transferred from the amount "not specified," shown in exhibit II-4-3. Eventually, however, this fund was exhausted and it was necessary to transfer some funds from other budgeted NSO projects. A carefully prepared budget should require no more than 10 to 20 percent of the total to be allocated to unexpected costs.

2.4 *Overhead charge*

An important addition to each time and cost schedule is the overhead charge. An example of the application of this item is shown in exhibit II-4-1. For the industrial census, the overhead cost was estimated at 15 percent of the direct cost of each operational step. This percentage covered a part of the salaries of individuals attached to the Office of the Director, of the heads of divisions, and of others who were called on for occasional work in connection with the census. The charge also included a proportionate amount of incidental expenses such as office supplies, informational services, transportation (but not the transportation of enumerators in the field, which was included in the estimates as a direct cost), communications, and other miscellaneous expenses not charged as direct costs.

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Chapter II-5. PERSONNEL

1. INTRODUCTION

As noted in Unit I, the NSO was charged in the 1970's with responsibility for collection, processing, and publication of basic statistical data in all fields except foreign trade, agriculture, and employment. To carry out its programs in the economic fields, NSO has a permanent staff of about 40 statisticians and other professional staff such as computer specialists. In addition, there is a more-or-less permanent nonprofessional staff in the central office consisting of punch-machine operators, clerks, typists, and clerical supervisors. The field staff, which was greatly expanded during the 1970 Census of Population and Housing, was later reduced to about 30 persons attached to the 12 provincial field offices.

To meet its requirements for the 1975 Industrial Census, the NSO management could draw on (a) statisticians in the Manufacturing and Mining Division, available for the industrial census because of changing work requirements; (b) statisticians to be transferred from the Trade and Services Division, available for the industrial census because of the completion of a survey of the distributive trades; (c) part of the time of the 30 persons attached to the provincial field offices, available for the data collection period by postponing other survey work such as population and housing surveys; (d) the 216 county agents whose services were made available by the Minister of Agriculture; and (e) selected non-professional personnel. Before making specific assignments, it was necessary to estimate the personnel requirements, both in total and in detail. For these estimates, an essential preparatory step was the completion of the time and cost schedules discussed in chapter II-4.

2. BACKGROUND INFORMATION

Since the magnitude of the collection and processing workload is directly related to the number of industrial establishments, and personnel requirements are related directly to workload, the MMD planning staff had prepared estimates of the number and size of establishments to be covered in the census. The estimates were based primarily on the 1963 Industrial Census, plus whatever information could be gathered from governmental and private sources on changes since 1963. These estimates are shown below in exhibits II-5-1 through II-5-4.

2.1 *Number of establishments and value added, by industry and size*

The number of industrial establishments for the country as a whole is presented in exhibit II-5-1. Establishments not operated as part of households are termed "regular" and separate estimates are presented for each type. In addition, estimates of value added are presented, because they measure economic importance and provide a yardstick against which to judge the reasonableness of the costs of data collection, processing, and publication. It will be noted in exhibit II-5-1, for example, that the 24,800 "regular" establishments with less than 10 persons engaged account for nearly 16 percent of the total value added by all the "regular" establishments. Certainly this is too large a percentage to consider omitting this group of establishments from the census. However, further analysis might have revealed

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that the smallest group (for example, establishments with 3 or fewer persons engaged) could have been omitted without seriously invalidating the results. Their omission could have accounted for a substantial saving in collection and processing costs. However, the MMD planning staff did not recommend omitting the smallest establishments, because there was uncertainty about the accuracy of the estimates, particularly when comparing narrowly defined size groups. To illustrate, the planning staff could have recommended omission of the smallest group because they estimated that it accounted for only 2 percent of value added, when in fact it accounted for a substantial 4 or 5 percent. By the time this discovery would have been made, it would have been too late to change the cut-off point. In view of this and similar uncertainties, it was decided to try for 100-percent coverage of the "regular" establishments in the 1975 census.

The MMD planning staff recognized in advance that collection of data from households would be a costly feature of the census, even though limited to a relatively small area sample. The decision to cover households was based largely on consideration of the magnitude of the estimated value added--121 million dollars. That this estimate was not far from the true figure was borne out by the limited amount of data on household industry gathered in the 1970 Census of Population and Housing.

The data in exhibit II-5-1 on electricity and gas plants formed the basis for another decision affecting personnel requirements--that of enumerating them entirely from the central office of NSO. The cost of training field personnel in the special features of the electricity and gas questionnaire was thereby eliminated; instead, the part-time services of a small group of experts in MMD were enlisted to survey this group. These individuals were well-trained in data collection procedures, and they required only brief written instructions. The enumeration of these establishments, all of which were large, was conducted almost entirely by mail and telephone; less than 10 personal follow-up visits were required when the establishments had not returned their questionnaires by the due date.

2.2 *Number of establishments, by province*

In exhibits II-5-2 and II-5-3, the number of "regular" establishments in each province is shown. It will be seen at once that the most important province in terms of its industries is Estrella, with over a third of the establishments. For a centralized government such as Providencia, with its NSO as well as other government agencies located in the city (county) of Estrella, there were obvious advantages in having so many of the reporting units nearby. Fewer enumerators were required because distances between establishments were shorter; where establishments were widely scattered, much of the enumerator's time was taken up with traveling from place to place. In data collection, the accessibility of senior management personnel in the central office facilitated obtaining decisions on new problems; and in the planning stages of the census, pretesting of questionnaires was made easier.

Over 80 percent of the country's mining activity is concentrated in Catedral, Girardot, Tres Hermanas, and Zapata. Because of this, FOD made a special effort to secure the services of enumerators with experience in the mining field. With minor exceptions, such individuals were found among the county agents in these four provinces.

2.3 *Rural and urban enumeration*

Exhibit II-5-4 shows estimates of the number of rural long and short manufacturing forms, by province, compared with the total number of forms. These estimates are very important in

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calculating personnel requirements during the data collection phase, because there are marked differences in the time required to enumerate urban vs. rural areas. Since the interview time for the long forms is considerably longer than that for the short forms, separate estimates of the number of each type of form is also important for the calculation of personnel requirements.

2.4 *Other factors*

These are only a few of the data items needed to estimate personnel requirements accurately. Since transportation is an important item of cost, the kinds of roads and the availability and cost of various types of transportation (rail, bus, boat, private car, etc.) should be known for each province. In the Providencia Industrial Census, the questionnaires were left with the manager, owner, or other person in charge of the establishment in most cases, and the question arises as to whether the completed questionnaire should be mailed to the field office or to the enumerator directly, or held until picked up on another personal visit. Mail is, of course, less costly but may be considered unacceptable for other reasons.

Much of the relevant information may be brought out by the maps described in chapter II-3, but consideration should be given to the consolidation by province of the data needed in estimating personnel requirements. Such summary information is useful to management in trying to forecast the overall needs for manpower.

3. *ESTIMATING MAN-WEEK REQUIREMENTS*

Exhibits II-5-5 to II-5-8 provide the means to estimate personnel requirements in terms of number of man-weeks and, in the case of exhibit II-5-7, the equivalent number of full-time positions that are needed in each phase of the census.

3.1 *Travel and completed interviews*

In exhibit II-5-5, there are presented estimates of the number of kilometers of travel required in specific situations--mining forms, manufacturing forms, urban vs. rural, and household interviews. These were based on NSO's travel experience in the 1970 Census of Population and Housing. They are useful in this study because the number of kilometers travelled has an important bearing on the number of interviews expected to be completed per week. Note, for example, that in rural areas the long form manufacturing establishments are expected to be more scattered than are the mines or oil wells--about 33 kilometers of travel per completed mining form, as against 50 for the manufacturing long form. These figures may seem high but it should not be forgotten that they include allowances for check interviews, revisits to pick up the forms or to resolve editing problems, and any other personal contact with respondents. In urban areas, as expected, the travel requirements are considerably less.

Such travel estimates are useful not only in computing the man-week requirements, but in computing the cost of travel for the budget (chapter II-4).

3.2 *Total man-weeks required*

In the first two columns of exhibit II-5-5, there are shown the number of establishments to represent the physical workload and the estimated man-week requirements for each type of interview. In the case of the mining long form, for example, there are an estimated 1,200 forms to be collected at a rate of 12 per week, or a total 100 man-weeks. For

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urban areas, there is no differentiation between manufacturing and mining forms, since there are relatively few mines in urban areas. In the case of households, the estimates are based entirely on the screening of interviews (during which eligibility for an in-scope questionnaire will be determined) because the number of "good" questionnaires is expected to be very small.

3.3 *Operations calendar*

Exhibit II-5-6 consists of a list of industrial census operations, consistent with that shown in exhibit II-4-2 where the NSO Division responsible for each operational step is given. It also shows the time period when the operational step was to be performed. Exhibit II-5-7 presents the personnel requirements in terms of man-weeks and number of equivalent full-time persons. In the data collection phase, the number of man-weeks is consistent with the estimates shown in exhibit II-5-5, while those under data processing and publication are new and are not presented elsewhere in the Providencia Case Study. They are consistent with the dollar budget estimates shown in exhibit II-4-3. Exhibit II-5-7 could be expanded to include two more columns showing the numbers of man-weeks and equivalent full-time employees available.

3.4 *Man-weeks required, by quarter*

Exhibit II-5-8 presents a summary of man-week requirements for each calendar quarter--from the advance planning phase to the publication of the final reports. It is a useful type of summary because it identifies possible problems; it was evident, for instance, that regular employees of NSO could be expected to perform all operational steps except possibly those which took place during the first and second quarters of 1976. Requirements during these critical periods were analyzed, as described below.

Each operational step in exhibit II-5-6 and exhibit II-5-7 was re-examined in an effort to determine whether permanent employees of NSO would be able to fulfill the indicated task, or whether other individuals would be needed. In the case of data collection, which represented the largest item of cost, the county agents could perform most of the work. The item "FOD regular employee" would, however, require 1,000 man-weeks. In the assumed 10-week collection period, this meant that at least 100 individuals would be needed. Of these, the provincial field offices could supply the services of 20 full-time equivalent persons (roughly two-thirds of the time of the permanent field staff). Therefore, a recruitment and training program would be necessary, with training for the county agents as well as for FOD employees.

The two items under "Data Processing and Publications" which appeared to require special attention were the editing of long forms (250 man-weeks) and editing of short forms (150 man-weeks). Other requirements, it was found, could be met by transferring employees, either full-time or part-time, from other work. In the operation of long form editing, six of the statisticians required were found within MMD, and another six were transferred from the Trade and Services Division. The editing of short forms was taken care of by the permanent staff of DPD (five persons) and by transfer from FOD (four persons). Thus the only recruitment and training required was in the data collection phase.

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Chapter II-6. ADMINISTRATIVE CONTROL SYSTEM

1. INTRODUCTION

Control over expenditures of human energy, as well as money, is of profound importance in any rational undertaking. Although courses of action are sometimes dictated by emotional or other irrational decisions, the existence of a comprehensive and well-thought-out plan may tip the scales in favor of sounder approaches to problems. The NSO had such a plan for Providencia's 1975 Industrial Census, which contributed greatly to its success.

1.1 NSO control system

In order to maintain progress and meet deadlines each operational step must be supervised closely, both by the individuals directly responsible for the operation, and by top management. Detailed records are necessary, and frequent progress reports must be circulated among the supervisory personnel. The maintenance of such records, the preparation and distribution of such progress reports, and the actions taken by supervisors as a result, constitute the NSO administrative control system described in this chapter.

This system was not developed exclusively for the industrial census. It is a general-purpose system which has been employed by NSO for several years, although the details are usually adapted to specific projects rather than used without change. At the heart of the system are detailed records reflecting the location and movement of census materials, and the expenditure of funds. In general, records are kept for each operational step named in Form 120, which is entitled Time and Cost Schedule (exhibit II-4-1). The individuals in charge of maintaining the detailed records prepare progress reports, which are forwarded to the Control Staff of the Administrative Services Division (ADMS), with copies to supervisory personnel as needed. The ADMS Control Staff does not actually exercise control but provides the data needed by management personnel to supervise and control the progress and flow of work, to control expenditures, and to keep all features of the project consistent with its time and cost schedule. Consolidated progress reports are prepared by the ADMS Control Staff (daily during crucial periods, weekly or monthly at other times) which are circulated among members of the Executive Committee and others concerned with the status of the project.

The system reports on the status and movement of census materials and the expenditure of funds at all stages. It permits management personnel to determine the location of materials, to oversee the progress of the work, to make decisions regarding priorities and the flow of materials to each operation, to identify trouble spots where special attention may be required, and to observe and regulate the outflow of expenditures in comparison with the budget and with the available funds.

2. APPLICATION OF THE SYSTEM TO THE INDUSTRIAL CENSUS

The Providencia Industrial Census has been conducted at intervals of at least 10 years, and is consequently regarded as the equivalent of a one-time operation. For such operations, control systems are not as elaborate as those required for monthly surveys, where materials are constantly flowing to and from the field, and where

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detailed accounts of enumerator performance are used to build up and maintain a more-or-less permanent field staff. Furthermore, the Providencia Industrial Census, although more complex in its data content than a population census, is a much smaller operation requiring fewer controls. The Census of Population and Housing for 1970 employed 15,000 individuals at the peak, and the 1975 Industrial Census only 300. Fifteen million individuals and three million households were enumerated in 1970, compared with 70,000 reporting units in the 1975 project, with less than 15,000 of them on the relatively difficult long form.

The top management of NSO is aware from experience that great restraint is necessary in adapting the control system to individual projects. Otherwise, over-enthusiasm about the importance of keeping up the flow of information may lead to the maintenance of unnecessary records, and supervisors may spend so much time on records and progress reports that the flow of work suffers. To eliminate unnecessary record-keeping and to adapt the system to the industrial census, the Executive Committee provided guidelines to each NSO Division to indicate which records were to be kept.

In general, those operational steps involving few questionnaires or other physical units, and those requiring only a short time for completion, need only a few simple records. In the industrial census, the entire canvass of multi-unit enterprises, single-unit establishments with more than 100 persons engaged, government owned-and-operated plants, and electricity and gas plants, was conducted by the experts in the Manufacturing and Mining Division. There were less than 500 reporting units in total and, except for a simple check-in file to control receipts, the only written records were the regular progress reports to the Control Staff of ADMS.

It should be borne in mind that, in terms of economic importance and consequent effect on the published results of the census, these establishments constituted by far the most important group included in the census. They accounted for about one-third of the total industrial output (value added).

2.1 Determination of current status of work

An important use of the control system was to enable management personnel to determine the current status of work in any operation at any time. Records of work that were moving in and out of an operation (such as records of long forms passing through the editing process) were so maintained that reports on status could be readily compiled when they were needed. For the long form editing operation, which took 5 months altogether, the regular progress reports were prepared weekly. Other summary reports, such as the reports of questionnaires received and edited by province, were prepared only once a month. Special reports related to quality of returns, answers to specific inquiries, etc., were prepared occasionally on request from the Director or from the head of the Manufacturing and Mining Division.

During most of 1976, which was a critical year for collection, processing, and publication, the industrial census was an item on the agenda for the regular weekly meetings of the Executive Committee. Summary progress reports, as up to date as possible, were circulated in advance to those expected to attend the meeting. The heads of the divisions which were directly concerned with the census not only answered questions from other staff members, but reported to the group orally on the current status of the project. Toward the end of July, as the bulk of the processing neared completion, discussions of the industrial census became shorter and less frequent.

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2.2 *Measurement of costs; comparison with budget*

Important features of the summary progress reports were the current and cumulative expenditures for the census, together with similar figures projected from the budget. A frequent occasion for investigation by management personnel was when any of the expenditure figures differed from the budget by excessive amounts. During the course of conducting the census, it became evident that there were some poor estimates in the budget, and these were amended as necessary. Since it was not possible at this stage to change the total allocation of funds for the census, it was necessary to "transfer" funds from one budget account to another in order to revise the budget. Until it was exhausted, the "not specified" fund was the source of such transfers; afterward, transfers were made from other NSO accounts.

Payroll charges and other payments for personal services assignable to the industrial census were reported by the Personnel Division to the ADMS Control Staff for inclusion in the progress reports. Special reports from the Ministry of Agriculture accounted for a proportion of the salaries of the county agents during the time when they were active. ADMS Control Staff also received special reports on the proportion of time spent on the industrial census by the few employees who worked on it part-time. The salaries of heads of divisions and other top management personnel were not allocated but were included in the progress reports in the form of an overhead charge.

Non-payroll costs, such as the cost of paper, printing, and supplies, were named specifically in the progress reports where they could be directly allocated to the industrial census. Other costs of this kind were presumed to be included in the overhead charge.

2.3 *Preservation of records*

Many of the basic records, and all of the summary progress reports, were preserved for their historical value. These documents will provide very useful data for preparing the budget for the next industrial census, and will assist in planning that census. Since these materials consist of a running record of the census, and reflect its failures as well as its successes, they will provide an excellent starting point for a discussion of improvements.

2.4 *Control of printed material*

One of the first tasks of the ADMS Control Staff in the fall of 1975 and early in 1976 was the preparation of progress reports showing the flow of printed material. These reports showed, for example, the transfer of material from PUB to FOD, from FOD to the provincial field offices, etc. FOD was responsible for seeing that supplies of printed material, consisting of maps, training material, pocket manuals, blank questionnaires, progress report forms, enumerator's records, etc., reached the provincial field offices well in advance of the beginning of enumeration on 1 February 1976. From the field offices, the materials were further distributed to enumerators, either directly or through the county agents. Except for Estrella city, all operations were conducted directly or through the county agents, who acted not only as enumerators but occasionally as supervisors. In Estrella, all operations were conducted through the provincial field offices and the field supervisors who were in charge of the enumerators.

The distribution of all of the material was under the direction of one person in FOD, who maintained simple records showing the date of shipment, kind of material, number of copies, methods of transportation, and destination. A similar record was maintained in each field

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office, and daily reports were made to the central office providing the same kind of information about each shipment to enumerators or county agents. Regular reports informed the Executive Committee of the progress of this operational step, and in particular the head of FOD was assured, prior to the beginning of enumeration, that all of the necessary materials had been supplied to the field.

3. *CONTROL OF COMPLETED QUESTIONNAIRES IN THE FIELD*

To illustrate the use of control records, one of the basic records prepared in the field is discussed in this section. This is NSO Form 123, the Establishment Control Record, which is reproduced as exhibit II-6-1. (Form 123 should of course be adapted to the needs of the country; for example, the name of the owner could be added if considered necessary.) These control forms were filled by enumerators, reviewed and completed by the county field offices (county agents in most cases), and forwarded to the Field Operations Division in the central office together with a group of completed questionnaires (25 or less in each group) covered by the form.

The procedures used in data collection are discussed in detail in Unit IV, Data Collection Operations. A brief summary is appropriate here, to provide the background for a discussion of the use of Form 123.

All aspects of the collection of data from industrial establishments were under the supervision of FOD including the mail/telephone canvassing by MMD employees of multi-units, large single-units, electricity and gas plants, and government-owned and -operated plants. In planning the census, it was decided that the county agents (who were employees of the Ministry of Agriculture but who reported to FOD on industrial census matters) would act as supervisors of collection activities in their respective countries, with the one exception of Estrella city. Becuase of the high concentration of industrial activity in Estrella city, the Executive Committee decided that FOD would supervise the collection activities through the provincial office. Therefore, all completed questionnaires and control forms were routed to the NSO by way of the provincial office.

The training of enumerators in the field, including training of the county agents, is discussed in Unit IV, Data Collection Operations. It may be noted here, however, that the decision to allow the county agents to supervise data collection was influenced by the fact that they had previously acted as field supervisors in the 1970 Census of Population and Housing.

Although the completed questionnaires, progress reports, and other materials flowed directly from the county agents to the Field Operations Division of the NSO, the provincial field offices were kept informed of progress, and were prepared to provide assistance in cases where a county agent was falling behind schedule or in other ways was failing to perform the required tasks. The province offices also conducted training classes for the county agents and other enumerators.

The ward was the unit of enumerator assignment in rural areas, while in cities the enumeration district (ED) took its place. Prior to the beginning of enumeration, the county agents had received a supply of the revised large-scale and intermediate-scale maps showing ward and ED boundaries (see chapter II-3 for a detailed description and examples of these maps). The enumerators were instructed to cover each ward/ED completely before proceeding to another, and in no case were they to list establishments in two or more wards/ED's on the same Form 123.

In Estrella city, the procedure was similar to that followed in other urban places except that the enumerators reported directly to the field supervisor instead of to the county agent.

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The following discussion of each item on the Establishment Control Record will serve not only to describe Form 123 but will bring out features of the data collection methods as well.

3.1 *Identifying information*

The names of the province and county were entered in Items (a) and (b). In Item (c), the name of the ward and the ED No. should be entered, although in some rural areas the ward was the enumerator assignment. The field office in Item (d) was usually the city or other place in which the county agent was located. The name of the enumerator appeared in Item (e), while in Item (f) the reviewer, who was usually the county agent, was identified by name or initials. In many instances, the county agent was both the enumerator and the reviewer. When Forms 123 with the same name appearing in Items (e) and (f) were received in the central office, they were given a special review, following the general principle that at least two individuals should approve the record before its acceptability was established.

3.2 *Information "for office use only"*

After the review, the counts indicated in Item (g) through (j), and the total in Item (m) were entered. The nature of each of these counts will become apparent from the discussion below of entries in the body of the form.

As each Form 123 was completed, a control record number, Item (k), was assigned, serially. To control duplication and omissions, the number was entered also on the county agent's running record of shipments of completed questionnaires to the central office. The latter record, for which no special form was provided, showed the control record number, the date of shipment, and the number of completed questionnaires. In addition to this running record of shipments, the county agent retained a copy of Form 123 for reference purposes.

3.3 *List of establishments*

In the body of Form 123, there is provision for listing up to 25 establishments. The information was entered originally by the enumerators, modified as necessary by changes made in the review process. These changes, and the reasons for them, will be brought out in the following discussion.

3.31 Serial number.--A serial number was assigned in sequence within each ED. If a line was later deleted (as, for example, where further contact with the respondent was necessary and it was felt desirable to forward the rest of the questionnaires covered by the Form 123), the serial numbers of the other establishments were not changed. The serial number provided a convenient source of reference to establishments in correspondence or in discussions among staff members.

3.32 Name of establishment.--Enumerators were instructed to enter the name as it appeared in Item 1 of the industrial census questionnaire, if one was obtained. If the establishment has no name, the name of the owner was entered instead.

3.33 Location.--Since the province, county, ward, and possibly ED, appeared in Items (a), (b) and (c), the only additional information needed here was the building number, name of the street, or other physical location description as it appeared in Item 2 of the census questionnaire. If there was no building number, the nearest road or street intersection was named. The enumerator was instructed also to enter the post office box number, if any, or other mailing address differing from the physical location of the establishment.

3.34 Skip-list.--Each enumerator was given a list of establishments in his area to be canvassed directly by the NSO central office. These were of five types: establishments of

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companies operating two or more establishments, any establishment with 100 or more employees, power plants, gas manufacturing or distribution plants, and government owned-and-operated establishments. The enumerator was instructed to list, but not to visit, establishments on the skip-list. During the course of an interview with a place not on the skip-list, the enumerator may find that the establishment was part of a multi-unit company; he was instructed to terminate the interview, treat the establishment as a skip-list case of Form 123, and notify the field office as soon as possible. The field office, in turn, notified the central office. If the enumerator encountered other manufacturing or mining establishments eligible for the skip-list but not included, such as plants with 100 or more employees, he completed the enumeration in the usual way. He was instructed to list, but not to enumerate, electricity and gas establishments, and government owned-and-operated plants.

3.35 Number of persons engaged.--For establishments with completed questionnaires, the entry for the column was the total given on the questionnaire for the pay period ended nearest 15 November 1975. For other cases (except skip-list establishments), the number was obtained by estimation or otherwise.

3.36 Type of form.--The form number of the appropriate questionnaire (such as ECP-101 for the manufacturing short form) was entered here. This column was left blank if the establishment failed to give the needed information or the interview was not completed for other reasons.

3.37 Industrial activity.--Where appropriate, the enumerator entered the standardized brief description given in his Pocket Manual (exhibit IV-4-2).

In general, the enumerator was instructed not to list out-of-scope establishments such as retail shops, restaurants, etc. In cases where the primary activity was not apparent, he was told to enumerate the establishment but indicate in the "Remarks" column that its status was in doubt.

3.38 Interview dates.--Dates in columns 8 and 10 were coded to indicate the action taken; for example, code letter "L" indicated "questionnaire left with respondent to be picked up at a later date" and "C" meant "completed questionnaire received." Dates entered in column (10) represented cases where the completed questionnaire was received in the mail rather than at the conclusion of an interview.

3.39 Field office review.--The reviewer entered dates in this column to indicate that the entries were acceptable.

The "Remarks" column was used by the enumerator or other staff members to enter any additional facts not covered by the columnar entries. In out-of-scope cases (the only ones listed, of course, would be those where the true primary activity was not apparent to the enumerator), the date the case was determined to be out-of-scope would be shown as well as the name or initials of the individual who made the determination. Refusals were not only noted in the "Remarks" column but usually further documented by a narrative description of the efforts made to obtain a completed questionnaire. If the listed establishment had 10 or more employees, refusals reported to the central office were normally those where initial efforts by the enumerator, and subsequent efforts by the county agent or perhaps a trouble shooter (specialist in solving problems) from the provincial office, had failed to obtain a report.

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3.4 Household survey

Form 123H, a record similar to Form 123, was filled by enumerators performing the household interviews in the sample areas. Unless the household had industrial activity valued at more than $500, Form 123H (exhibit II-6-2) constituted the only record of the interview. A brief description of the form is discussed below.

3.41 Identifying information.--Like Form 123, the household form provided for entry of the province, county, ward, and enumeration district. Since the ED was the basic unit for control of enumeration, it was entered in all cases. One Form 123H contained entries pertaining to only one ED.

3.42 Entries for individual households.--Form 123H provided for the address of the household, name of the head, name of person interviewed, date of interview(s), type of dwelling (house, apartment, hotel, rooming house, convent, hospital, etc.), and the nature and value of industrial activity during 1975.

Up to 25 households or other units could be listed on one Form 123H. Part of the quality control system called for check interviews or re-interviews of five percent of the units. In order to facilitate such checking the enumerator was instructed to list all structures, including factories, retail stores, etc., not used as dwelling units. He was also instructed to check his own listing for the inclusion of structures shown on the large-scale maps based on the 1970 Census of Housing, and if possible to account for those missing (burned, torn down, converted, etc.).

3.43 In-scope households.--For households which qualified, Form ECP-102 was also filled, preferably during the same interview. The form, 1975 Census of Household Industries, is reproduced as exhibit III-4-6.

3.44 Review and forwarding to central office.--These procedures were similar to those for Form 123. Brief instructions for Form 123 are given earlier in this chapter.

4. LABOR COSTS

Most of the staff for the 1975 Industrial Census were regular employees of NSO, and the customary system of certification of attendance to the payroll clerks in the Personnel Division was in effect. The only special measures were:

(1) The Ministry of Agriculture paid its county agents in the normal way, but submitted a request for reimbursement of labor costs to the Ministry of Economic Planning and Development. Such requests were based on reports of time spent on the industrial census by the county agents, copies of which were submitted to the NSO central office. By checking these reports against the Forms 123 submitted by the same individuals, the reasonableness of the reimbursement claims was verified by the NSO staff.

(2) Outside of Estrella city, the temporary enumerators were paid by the hour and their claims for payment were certified by the county agents to the provincial field offices. Actual payment was made by the provincial offices, to which funds had been transferred in advance for this purpose by Personnel.

(3) In Estrella city, about 30 temporary enumerators were hired, who were paid according to the number of completed questionnaires, with differential rates for long and short forms. Claims for payment were filled out by the enumerators, and certified by the Estrella provincial field office. In this procedure, the claims were verified by comparison with Forms 123 for the same enumerators.

5. NON-LABOR COSTS

Non-labor costs which could be allocated directly to the industrial census were certified as correct by the heads of divisions of offices within NSO and paid from the central office. An exception was the travel expenses of enumerators; these were paid to them by the provincial field offices based on claims certified as correct by the county agents.

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Unit III

CONCEPTS, QUESTIONNAIRES, AND TABLE OUTLINES

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Chapter III-1. CENSUS CONCEPTS

1. INTRODUCTION

Censuses taken at periodic intervals are an essential part of an integrated system of national industrial statistics. Benchmark surveys of the census type provide information on the structure and level of activity of a country's industrial sector. Appropriately constructed, such inquiries also contribute to the international comparability of industrial data. The role played by the periodic census and its relationship to annual and more frequent inquiries are fully discussed in Chapter I-10.

The items for which data are collected are only one segment of the total census picture. Basic as they are to the census, the items of data are framed in a setting which describes the scope and coverage of the census, its reference period, statistical unit and classification structures for collecting and tabulating the information. In this case study, all of the elements involved in the taking of a census are treated as concepts.

The success of a benchmark census is measured by the care with which the concepts are selected and the skill employed in defining them and in translating them into questionnaire design, processing procedures, and table outlines. The first step a country such as Providencia must take in embarking on a periodic program of industrial censuses is to decide upon and define clearly all the concepts to be used. In this regard, effective guidance is available from the United Nations Statistical Office which has issued a series of international recommendations for industrial statistics. Providencia used those guidelines as the frame of reference in formulating its 1975 Industrial Census Program.

2. BASIC CENSUS CONCEPTS AND RECOMMENDATIONS

Decisions on concepts are always influenced by the framework of the census. Inevitably, they involve the weighing and selection of options.

In arriving at the nature and scope of the census the initial constraints are the funds and number of trained personnel available to take the census. The budget request for the census directly relates to the subject areas and topics to be covered. Objectives for the census must be studied and choices will emerge.

Providencia explored these basic issues carefully in planning its industrial census. The primary goal was defined as the successful completion of the census within the funds available, with the results meeting prescribed standards of accuracy and being issued on a timely basis. In a country such as Providencia, with a relatively brief history of industrial statistics, achieving this goal called for limiting data requests to key items only and designing inquiries consistent with industry record-keeping practices.

The decision was reached for Providencia to encompass manufacturing, mining, and the production and distribution of electricity and gas in its industrial census. There would be complete coverage of all establishments but this would be realized through the use of short as well as long forms. Existing international recommendations for industrial statistics would be followed in order to improve the usefulness of the census results for national purposes as well as to increase international comparability. The census was designed as an

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integral part of a national system of industrial inquiries. The enumeration of units was done in a manner that contributed to the creation of an industrial directory of establishments for other current and periodic surveys. Establishment counts were built into the table outlines to facilitate the later selection of samples and determination of budgets for other industrial surveys. The product and materials inquiries, the definition of the statistical unit, and the system of classifying data provided for the compilation of input-output studies (at broad aggregative levels), physical production indexes, and weighting factors for price indexes--all are factors which affect the content and design of the census.

3. *INTERNATIONAL RECOMMENDATIONS FOR INDUSTRIAL STATISTICS*

Various international organizations have developed concepts, principles, and recommendations for the taking of industrial censuses. These bodies have issued comprehensive lists of topics to be investigated in industrial censuses together with their definitions. The principal source of such guidelines is the United Nations Statistical Office, but significant contributions have been made also by the Inter-American Statistical Institute (IASI) and the Organization for Economic Cooperation and Development (OECD), with specialized efforts by other groups.

3.1 United Nations (UN) guidelines

Providencia made extensive use of the UN principles and recommendations in the planning of its industrial census. The treatment of concepts in this case study conforms mainly with the presentation made in United Nations publications. Benchmark inquiries of the industrial census type are specified in a 1968 United Nations publication.[1] That document covers infrequent comprehensive inquiries, annual inquiries and more-frequent-than-annual inquiries on industrial activity (mining, manufacturing, electricity, gas and water). The system of industrial statistics discussed is limited to data appropriate to the establishment or establishment-type units. Enterprise statistics are not considered, nor are they included as part of Providencia's Industrial Census.

The 1968 guidelines were updated and modified by the UN in a three-part publication developed for the 1973 World Programme of Industrial Statistics.[2] In these publications, recommendations are presented not only on the objectives and content of the program but also on the organization and conduct of the census and the individual commodity and material detail to be collected. Regional working groups of the United Nations made important contributions to the drafting of those recommendations.

The 1968 UN Recommendations for Industrial Statistics makes a distinction between items of data to be collected and tabulated for all establishments and those to be collected and tabulated for large establishments only. Within these categories, each item is indicated as being of first or second priority. The 1973 UN Recommendations further subdivided the data items between those suggested for countries with developed industrial statistics and those applicable to countries beginning to develop their industrial statistics programs. Providencia,

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[1]United Nations. Statistical Office. *International Recommendations for Industrial Statistics* (New York, 1968), Statistical Papers, Series M, No. 48.

[2]United Nations. Statistical Office. *Recommendations for the 1973 World Programme of Industrial Statistics* (New York, 1973), Statistical Papers, Series M, No. 54.

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in its industrial census, generally adhered to those data items proposed as first priority for countries with developing programs. There were a minimum number of departures from the UN recommendations. Likewise, Providencia generally conformed to the UN placement of items on the long (large establishments) or short (small establishments) forms. It is recognized that these UN guidelines allow for modifications reflecting the special characteristics of particular regions or countries.

The UN statistical programs are designed to encourage the orderly development of national inquiries into the structure and activity of the industrial sector. At its forty-fourth session, the UN Economic and Social Council recognized "the need for data on the structure and activities of industry on a world-wide basis for the purposes of economic and social development" and noted that "the Statistical Commission has made recommendations for a system of industrial statistics for use by Member States."

3.2 *Inter-American Statistical Institute (IASI) guidelines*

Standards for the concepts, definitions, classifications, and tabulations of industrial statistics were formulated by IASI's Subcommittee on Industrial, Internal Trade, and Services Statistics to the Committee on Improvement of National Statistics (COINS). Consisting of representatives of both the producers and users of industrial statistics in the American region, the Subcommittee held its deliberations in April, 1967 and its conclusions were issued in an IASI document three years later.[3]

[3]Organization of American States. Inter-American Statistical Institute. *Report of the First Session of the Subcommittee on Industrial, Internal Trade and Services Statistics to the Committee on Improvement of National Statistics* (Washington, 1970).

The COINS Subcommittee's recommendations are in basic agreement with the UN guidelines with respect to the topics that should be investigated but they differ in some cases on the extent of classification detail. Where differences do occur between UN and IASI in concepts or data items to be reported, such variations are noted in this case study. The IASI Subcommittee members placed special emphasis on the need for improvements in the quality of data and for achieving prompt and efficient publication of the statistics. Furthermore, they stressed the importance of continuing programs to train specialized personnel in industrial statistics.

3.3 *Organization for Economic Cooperation and Development (OECD) guidelines*

The OECD's main contributions to standards for industrial statistics have stemmed from the activities of its Working Party No. 9 on Industrial Statistics. That group of principal industrial statisticians from more than 20 industrialized countries has concentrated its efforts on the definitions of the statistical unit, the computation of value added in the manufacturing sector, and on product classifications in the iron and steel, paper, chemicals, textile, and metal products industries.

4. *INITIAL DECISIONS FOR PROVIDENCIA*

Providencia followed the international recommendations of the UN in the industrial sector (Series M, Nos. 48 and 54) not only with respect to the items of data to be collected but also as to scope and coverage, definition of the statistical unit, and the classifications to be employed. In the past, comparability of statistics on an international basis has often been impaired by the variations from country to country in the classifications used and in the coverage of sectors of the economy.

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Although basically the UN recommendations were followed, it was necessary for the planning staff in the National Statistical Office to evaluate each concept in relation to Providencia's economic and social development programs. Also, the concepts used in the previous Industrial Census of Providencia (1963) were retained wherever possible so as to provide historical comparability.

4.1 *Scope of the census*

The 1975 Industrial Census of Providencia covered all establishments within its territorial boundaries which were engaged primarily in mining, manufacturing, and the production and distribution of electricity and gas. These activities correspond to major divisions 2, 3, and 4, respectively, of the International Standard Industrial Classification of All Economic Activities (ISIC)[4] except for the exclusion of water which is a part of ISIC major division 4. In Providencia, as in many other countries, especially those with developing economies, the maintenance of a water system and its distribution to users is a governmental rather than a private function. Information on the activities associated with the supply, storage, and distribution of water (or waterworks), is provided periodically in reports by the government agency administering the facility.

Off-shore activities, such as the operation of petroleum and natural gas wells, are included to the extent that the activities are located inside the territorial waters of Providencia. Also included as part of the census is the processing of fish on vessels that are engaged solely in the fish processing activity, provided that such activity has its land base within the territorial boundaries of the country. For Providencia, the territorial waters include all ocean waters up to approximately five kilometers off the coast plus the outer continental shelf to a depth of approximately 100 meters.

When a significant amount of industrial activity in a particular country is performed in non-industrial establishments, efforts are made to isolate and measure that output, although usually in an abbreviated manner. Such output may be found in combination with agricultural activities, with wholesale and retail trade, or with services. As the COINS Subcommittee document states, "the statistical unit should be classified within the sector corresponding to the largest part of its economic production and, to the extent that records permit, separate data should be collected on secondary activities."[5]

In Providencia, cottage industries (units where the activity is carried out on household premises) are significant in their output of certain industrial goods and services. It is estimated that there are 180,000 of these units in Providencia. Such activities will be covered by a sample of areas, using a separate household industries questionnaire. The case of cottage industries illustrates the interacting of a decision on the scope of the census with the choice of questionnaire, use of sampling, and tabulation plans. Coverage of cottage industries is optional for a country, depending on their contribution to the output of manufactured goods.

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[4] United Nations. Statistical Office. *International Standard Industrial Classification of All Economic Activities* (New York, 1968), Statistical Papers, Series M, No. 4.

[5] *Ibid*, footnote 3.

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Other countries, especially highly industrialized ones, may choose to design an economic census to cover other sectors of the economy, such as construction, wholesale and retail trade, and services, concurrently with canvassing manufacturing, mining, electricity, and gas. There are several advantages in that approach, such as the avoidance of overlapping in the enumeration of establishments. However, the additional effort and pressure on available staff and other resources are so great that the broader approach was not adopted for Providencia; nor is the broader approach recommended for countries whose statistical systems are in the developing stage.

4.2 Statistical unit

Selection of the statistical unit[6] (the entity for which the required items of data are gathered) is a matter of balancing the data needs against the practical considerations of business organization and record-keeping practices. The aim of a benchmark industrial census is to provide a detailed blueprint of a country's economy. The census results should permit the analysis of economic activity by relatively narrow industry groups and in terms of relatively small geographic areas.

The kind of statistical unit chosen for economic surveys, including benchmark censuses, is very important because that unit will (a) determine the way in which the data can be compiled and published, (b) determine the extent to which the results of one survey can be related to another survey, (c) be a major factor in the relative ease or difficulty with which respondents are able to provide the required data, and (d) directly affect the speed and cost of the data collection by the statistical organization.

4.21 Establishment.--The statistical unit recommended by the United Nations for the 1973 World Programme of Industrial Statistics, and therefore the one chosen for the Providencia Industrial Census, is the establishment. The establishment is defined by the UN as the "economic unit which engages, under a single ownership or control (that is, under a single legal entity) in one or predominantly one kind of economic activity at a single physical location."[7] Data related to the establishment are readily classified to largely homogeneous industry groups--a form in which economic data are particularly useful for analysis and can be easily aggregated to virtually any level of an area classification for the purpose of regional analysis. The establishment also affords a workable unit for examining the relationship between size and other economic characteristics.

Providencia strives for a report for each separate physical location but recognizes the reality that different activities may be carried on at the same location. Accordingly, it adopted for its manufactures census the following simplified definition of an establishment: an establishment is defined as a single physical location where manufacturing is performed (for example, a factory, mill, or plant).

[6] The term "statistical unit," as used throughout this case study, is synonymous with the terms "reporting unit" and "tabulating unit."

[7] *Ibid*, footnote 1.

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In the mining sector, however, Providencia decided to follow the UN modified approach. For mining, the UN recommends that the definition of locations should be such that the establishment includes the combination of wells, shafts, or pits of the enterprise which tap a single field; any ore-processing or ore-beneficiating plants located at the mine site should be included as part of the establishment.[8] For its minerals census, Providencia defined a mineral establishment as a single physical location where mineral operations are conducted (for example, a mine, group of oil or gas wells, or preparation plant or natural gas liquids plant). The term "establishment" includes a working or group of workings at a given locality in which operations are conducted as a unit or are unified by common management or joint handling of some part of the mining or the preparation process.

In its instructions for reporting oil and gas field operations, Providencia's minerals census defined an oil or gas field mineral establishment as representing all oil and gas field activities in one province operated by the reporting company. Offshore operations adjacent to each province would constitute a separate establishment.

In the case of the electricity and gas industries census, Providencia defined the establishment as embracing the producing plant and its associated distribution system. For the electricity industry, transformer stations were included.

It should be pointed out that the typical instance, especially in developing countries such as Providencia, is that of a single economic unit engaging in a single kind of business under a single ownership at a single location. Here, the enterprise and the establishment are the same. Even where one encounters enterprises with two or more producing units, the organizational structure of such enterprises often provides sub-divisions that meet quite adequately the separate location and single activity criteria of the simple establishment concept. However, this is not always the case and, particularly with larger establishments, one encounters single locations engaged in diverse industrial activities. This phenomenon can be so serious in highly industrialized countries, affecting the validity of the industrial classification of establishments, that respondents are urged to submit separate establishment reports where a single physical location encompasses two or more distinct industrial activities. It must also be the case that the employment in each such activity is significant (usually there are 100 or more employees) and that reports can be prepared on the number of employees, their wages and salaries, and other establishment-type data.

In addition to producing units, the industry sectors of industrialized countries and to a lesser extent countries with developing economies, such as Providencia, have units engaged in auxiliary activities. Such units operate primarily or exclusively for a related establishment or a group of related establishments and provide goods or services that are normally supporting activities for most establishments. Units of this kind serving a single establishment should be treated as an integral part of the main establishment. If, however, the units are separately located in areas which are distinguished in the area classification used in the industrial census, those auxiliary units should be regarded as separate establishments and reports should be obtained for them.

[8] *Ibid*, footnote 1.

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Information should be collected on a questionnaire designed uniquely for auxiliary units. These units may be classified industrially either as a separate group or according to the predominant activity of the establishments served.

The clearest example of an auxiliary unit is a central administrative office. Other examples of auxiliary units are warehouses, garages, repair shops, and research laboratories that primarily serve their parent establishments.

As is characteristic of most countries with developing economies, Providencia has very few multi-unit enterprises. Consequently, there is no separate questionnaire for auxiliary units in Providencia. Typically, supporting or auxiliary-type operations are included as part of the establishment which they serve. A very limited number of cases required special handling by the NSO of Providencia. For example, a sizeable central administrative office located in a different geographic area from the producing establishment(s) was assigned receipts to cover its payroll and overhead; the office was coded industrially on the basis of the establishment it services. In effect, such an auxiliary unit is treated as a manufacturing (or mining) establishment doing contract work in order to have its activities tabulated in the appropriate geographic area.

4.22 Other statistical units.--Although the establishment is the statistical unit to be preferred in economic census-taking, there are three other types of statistical units to be considered--the local unit, the kind-of-activity unit, and the enterprise.

(1) The UN defines the local unit as all economic activities carried on at a single location under a single ownership or control.

(2) The kind-of-activity unit combines all geographic areas in which a given kind of activity is carried on by a single legal entity.[9] Thus, use of the local unit may invalidate the classification of data by industry whereas the kind-of-activity unit blurs the geographical distribution of data. The kind-of-activity unit is commonly used in those industries having no fixed location for their activities, such as construction, transport, and communication.

(3) The enterprise may be defined narrowly in terms of the smallest, legally defined entity engaged in economic activities or broadly in terms of effective ownership or control of economic units. In either case the enterprise is the only one of the statistical units discussed in this case study from which it is possible to obtain purely financial data. Certain costs--advertising, selected business services, interest payments, etc.--are not generally allocated among the constituent units of the enterprise. Financial data of the balance-sheet type are also strictly enterprise statistics (such as indebtedness, net worth, capitalization, etc.) Countries, in compiling national accounts and similar statistical summaries, face the task of interrelating establishment and enterprise data.

It has been decided that there will be no collection of data at the enterprise level in Providencia's Industrial Census for 1975. However, the enterprise or parent company concept will play a role in protecting the confidentiality of respondent information and in the gathering of reports from respondents.

4.3 *Coverage*

The 1975 Industrial Census for Providencia consisted of complete coverage of all establishments in the industries within scope of the census. A long form with detailed inquiries

[9] *Ibid*, footnote 2.

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was designed for large establishments (that is, those with 10 or more persons engaged) in manufacturing and mining and for all establishments in the electricity and gas industries (where units tend to be sizeable). A short form with fewer data items was used for all small manufacturing and mining establishments (that is, those with fewer than 10 persons engaged).

Although the UN suggests that, in the case of developing countries, complete enumeration be restricted to establishments with five or more persons engaged and other establishments be represented by a sample, that recommendation has not been adopted by Providencia. The absence of an industrial directory for Providencia worked against the designation of such a sample; a few key items of information are needed from each establishment in order to provide the country with an industrial directory.

Cottage industries (households) were canvassed in Providencia by a small area sample. The supplementary data from these households (reporting on a modified short form) added to the establishment coverage of selected manufactured goods and services.

Also, government owned-and-operated establishments were included in the census together with the much larger private sector. The nationalization of certain industries in the manufacturing and mineral sectors made it necessary that units owned and operated by the government be canvassed. Such operations face special reporting problems, such as valuation of output.

4.4 *Classification systems*

For industrial census results to be useful, the reported data must be classified in meaningful arrangements. The classification process is sometimes referred to as coding. The two principal methods are to classify the statistics industrially and by geographic area. In addition to these systems, economic data are often aggregated by size of establishment (as measured by number of persons engaged, value of output, or value added) or by other characteristics of the establishment such as form of ownership or legal organization.

4.41 Industrial classification.--The industrial classification structure for a country should reflect the manner in which the producing units are organized. The individual industries should group homogeneous products or services made or performed in establishments that typically do not engage to a significant extent in other activities. The system should make distinctions that are important to most of the users of the data. However, those distinctions should not be such that the information needed for assigning industry codes is very difficult to collect. Of course, the classification should encompass all industrial activities carried on in the country and be comparable to international recommendations for classifying industries.

In coding industry on the census returns, Providencia will use the International Standard Industrial Classification of All Economic Activities (ISIC)[10] developed and issued by the United Nations Statistical Office. As recommended by the UN for the 1973 World Programme, Providencia will publish the full industry detail for the data items in the census to the lowest (4-digit) level of the ISIC.

Under the ISIC, an industry is generally defined as a group of establishments producing a single product or a more-or-less closely related group of products. In some instances,

[10] *Ibid*, footnote 4.

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the classification is determined on the basis of the materials used or the types of production processes employed. The industries are so defined that the resulting groups of establishments are significant in terms of their number, value of output, value added, and number of employees. The application of these criteria in the formulation of the ISIC has led to the defining of 81 industries in the manufacturing sector, 8 industries for mineral activity, and 1 electricity and 1 gas industry. Each of these industries has been assigned a 4-digit code number.

The ISIC divides all economic activities into 9 major divisions (identified by the first digit of the codes), 33 two-digit divisions, 73 three-digit major groups, and 158 four-digit industry groups. The coding system follows the "waterfall" principle of classification, as illustrated by the following example:

Division 32: Textile, wearing apparel, and leather industries

Major Group 321: Manufacture of textiles

Group 3211: Spinning, weaving, and finishing textiles

Group 3212: Manufacture of made-up textile goods except wearing apparel

An establishment is classified in a particular industry if its production of the primary products of that industry exceeds in value its production of products of any other single industry. Although some establishments produce only the primary products of the industry in which they are classified, it rarely happens that all the establishments in an industry specialize to that extent. A statistical measure has been devised to show the extent to which the data shown for each published industry reflect the primary activities (products) of that industry. That measure is the "specialization ratio" and such ratios are shown in several of the manufacturing industry tables in the published reports. The ratio is defined as the proportion of product shipments (both primary and secondary) of the industry represented by primary products. Another relationship between the industry and product data is measured by the "coverage ratio." This ratio is the proportion of the total production of the primary products of an industry accounted for by establishments classified in the industry. The table outlines given in exhibit III-5 also provide for showing this ratio for manufacturing industries. The ratios do not appear in the tables for mining and the other sectors where the phenomenon of secondary production is considerably less significant than in manufacturing.

The census report forms must provide the information needed for classification purposes. With respect to industrial classification, this is accomplished through the inquiries on products made and materials used, but predominantly the former. This procedure requires that there be classification systems for products and materials. Providencia's Industrial Census classification systems are reflected in the Product and Materials Reference Lists which have been developed for the 1975 census. (See exhibits III-1-1 and III-1-2.)

The Product Reference List has a 5-digit list of products which are directly related to the ISIC and represent an expansion of the 4-digit industries shown in that system. The first 4-digits of each 5-digit product code in the Providencia list are those of the ISIC industry in which the product is classified.

In effect, the products (or they might more appropriately be termed product classes) sub-divide the 4-digit industries into various homogeneous groupings of products which are of sufficient economic importance to warrant separate listing.

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The use of the product data for classifying establishments by industry is only one of the reasons for gathering such information; product statistics constitute basic source material for industrial marketers and government analysts. They are essential for production indexes, price indexes, and input-output studies.

Several considerations went into the design of the Product Reference List or, to state it differently, the commodity coding structure for the industrial census. The Product Reference List used for the previous Providencia Census was taken as the frame of reference, and departures from it were made only for sufficient justification such as product changes during the intervening decade or improved international comparability. Weight was also given in the selection of products (and materials) to the List of Selected Products and Materials developed as a guide for reporting commodity information in the 1973 World Programme.[11] This UN list is limited to products that can be measured in quantitative terms as well as in value terms. It has been utilized in the census planning to select those products for which physical quantity of output would be requested in addition to value.

The definition of each product (and materials) category must clearly distinguish between the commodities included there and those included in other categories. The provision of residual categories (other or not elsewhere classified, "n.e.c.") at appropriate points in the structure accommodates items not otherwise provided for in the classification.

For the 1975 Providencia Census, there are separate Product Reference Lists for the manufacturing and mineral sectors. As in the 1963 census, there are also Materials Reference Lists for establishments reporting on the long form. As is the case of products, a separate materials list has been developed for manufacturing as distinct from the mineral industries.

4.42 Geographic area classifications.--As discussed earlier, the other primary method of classifying industrial data is by geographic area. For Providencia, the geographical classification follows the definitions of that country's administrative subdivisions. The three levels of these subdivisions, in descending order of size and economic importance, are: provinces, counties, and wards. (Refer to exhibit I-2-5, which gives the number of counties and wards for each of the country's 12 provinces.)

4.43 Size of establishment classification.--In addition to industry and geography, establishment size is a frequently employed way of classifying economic data. Providencia's previous census publications had size tables with the following class intervals: 1-4, 5-9, 10-19, 20-49, 50-99, and 100 or more persons engaged. Because of the country's economic progress during the ensuing 12 years and because of the interest of data users in the larger producing units, the top size class was expanded for the 1975 census into three classes: 100-249 persons engaged, 250-499, and 500 and over.

4.44 Legal form of organization classification.--In presenting data classified by ownership and legal form of organization, Providencia followed the categories recommended by IASI; namely individual proprietorships, partnerships, corporations or joint stock companies, cooperatives, public corporations, and others. However, they substituted the term "government enterprises" for "public corporations." For purposes of supplemental

[11] *Ibid*, footnote 2.

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analytical reports, a major separation was made between "private enterprises" and "government enterprises". This distinction reflects the strong interest exhibited by developing countries in such data. In addition, data for "private enterprises" were further separated in the reports according to the legal form classifications listed above. In planning tabulations of this type, it is recommended that each country adopt the classifications most in accord with its national modes of legal organization.

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Chapter III-2. ITEMS OF DATA COLLECTED AND TABULATED

1. INTRODUCTION

As with the other concepts involved in an industrial census, the selection of the number of items, the degree of detail for each, and which respondents should reply to the questions, required the National Statistical Office to explore a number of options.

Again, the UN principles and recommendations were taken as a major point of reference. Experiences gained in previous censuses conducted by Providencia were carefully evaluated, and the NSO judged which data were critical for detailed industry and small area tabulations, as well as for the establishment of an industrial directory; the NSO decided to gather such information from all establishments. Tabulation of a few items for all economic units is a basic statistical investment which has great future value. These items are specified as both long and short form inquiries in exhibit III-2-1, "Data Items Collected in the 1975 Providencia Industrial Census." A wider range of data, including greater detail for some of the key items referred to above, is needed to satisfy the analytical requirements of industry, government and the public. This informational package was obtained from all producing units of significant size. The specific inquiries are listed in the columns headed "Long Form" under Manufacturing and Mineral Industries and those for the Electricity and Gas Industries, where a single form will be used for all establishments.

The use of short forms enabled the NSO of Providencia to stay within its budget and reduced the reporting burden for small establishments, which typically have more limited records than the larger ones. A short form was used for each manufacturing or mineral establishment with fewer than 10 persons engaged. In the discussion of data items in this chapter the expression "from all establishments" means that the item appears on both the long and short forms, whereas "from larger establishments only" signifies that item is a long-form inquiry. Cottage industries were canvassed with a special short form. Inasmuch as most items are common to the entire industrial census (manufacturing, mining, electricity and gas) that fact should be assumed to be the case unless an exception is pointed out in the discussion of data items which follows.

In the selection of data items for Providencia's Industrial Census, priority was given to the accuracy and completeness of results over an extensive list of inquiries. A questionnaire with too many items can easily have an adverse effect on the validity of data that are critical to a successful census. In general, the items that were selected were those suggested by the UN for countries with developing statistical programs. Recommendations on specific topics were submitted to the NSO by advisory groups and interested individuals. Consultations were held with data users, in both the public and private sectors. Full consideration was given to the statistical needs of the government for the planning and conduct of a comprehensive industrial development program. Taken into account was the aim of producing a set of baseline data from which annual and more frequent surveys could be generated as key

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elements in an integrated industrial statistics program for Providencia. A number of meetings were organized with representatives of respondent groups to obtain their views on the availability of the data and cost of supplying it. Final selection of the topics to be included in the industrial census, however, as well as the phrasing of the inquiries and their arrangement on the questionnaire, were the responsibility of the National Statistical Office.

The items of data to be gathered, tabulated, and published in the census are grouped into the following seven principal subject areas: (a) identification and classification information; (b) employment and earnings, (c) inventories; (d) fixed capital formation, (e) input costs (including detailed materials, fuels, and electricity), (f) gross output (including detailed products), and (g) value added. The list includes items that will be calculated by the NSO rather than called for on the report forms (for example, value added and the energy equivalent of fuels consumed). A number of countries, particularly those with well-developed industrial statistics, will wish to go beyond this program to meet their own special requirements or to serve common regional needs.

2. DESCRIPTION OF DATA ITEMS

A census can yield satisfactory results only if the information that is collected is highly useful to the users. Providencia determined that the information contained in the seven major categories listed above was of major importance to its economic development plans. These seven major groups are discussed below.

2.1 Identification and classification information

Section I of the questionnaire deals with the description of the establishment. Included in the section are items on the (a) name of establishment, (b) its physical location, (c) its economic organization, (d) form of ownership and legal organization, and (e) period of operation and change in ownership (if any) during the census year.

All of these items except for economic organization of the establishment will be obtained from all establishments. Multi-unit operations are not a significant factor for establishments with fewer than 10 persons engaged. (See exhibits III-4-1 to III-4-5.)

2.2 Employment and earnings

This section of the industrial census is concerned with the labor element as a major factor of input. It measures the number of persons engaged as of a mid-month week toward the end of the census year together with the weekly payroll for the categories of paid labor. This is asked of all establishments in each sector as is the total payroll for the year. The payroll figures are divided between production workers (operatives) and all other employees. Payrolls include all payments, whether in cash or in kind. Payments in kind include food, clothing, and lodging provided free of charge or at markedly reduced cost by the employer.

Larger establishments are in addition asked to report supplements to wages and salaries (that is, supplementary labor costs not included in payrolls). In recent years, such payments have become an increasingly significant part of total labor remuneration (up to 20 percent of the total labor cost in many countries). The number of production workers employed during a pay period in each of the four quarters of the year is also being asked of

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larger establishments, as is the number of man-days worked by production workers. In its recommendations for the 1973 World Programme, the UN Statistical Committee stated that man-days worked would be a more practical concept than man-hours worked in the case of developing countries.[12] Experience with the 1963 Economic Census in Providencia indicated difficulty with the standard concept of man-hours worked; therefore, Providencia has adopted the flexibility in the definition of the item now provided by the UN. The National Government of Providencia does not require enterprises to maintain records on the number of hours worked.

2.3 *Inventories*

This section is designed to measure changes in stocks during the census year, as well as the level of stocks. The information is being requested only on the manufactures long form and the form for the electricity and gas industries. Inventories are not a significant item in the minerals area. In the manufacturing sector, the smaller establishments find it difficult to report stocks data; however, as a group, they have little impact upon the total level of manufacturing inventories.

In the electricity and gas industries, the amount of finished product and work-in-process inventory is minimal; accordingly, no breakdown is called for by stages of fabrication. For manufacturing, the type of inventory detail affords an understanding of the economic forces at work during the census year and provides the necessary adjustment to the value of shipments in the calculation of value added (discussed later in this chapter).

The UN recommendations specify materials and finished product inventory categories as priority 1 items but work-in-process as a priority 2 item. Providencia felt that to call for only two of the three components impaired the value added adjustment and introduced a potential source of misreporting by the respondents; therefore, full detail was listed on the manufactures long form.

2.4 *Fixed capital formation*

New capital formation is a very important element in a country's industrial economy. For Providencia, the phenomenon is being measured by the acquisition of new and used fixed assets defined generally in accordance with UN recommendations. That inquiry, sub-divided between (a) structures and additions to structures and (b) machinery and equipment, appears on all the industrial census forms except for the manufactures short form.

The Providencia Census departs slightly from the UN guidelines in that it includes "transport equipment" with "machinery and equipment" rather than as a separate category. Past censuses and surveys, even in industrialized countries, have revealed a reporting problem when requesting separate figures on transport equipment.

Although the 1963 Providencia Census called for the sales of fixed assets, that item does not appear on the present census forms. Such sales are relatively minor and the item does not enter into the calculation of value added. Sales of fixed assets does affect the computation of "gross additions to fixed assets." The UN 1973 World Programme[13] called for the adoption of that concept only by developed countries and then only as a priority 2 item.

[12] *Ibid*, footnote 2.

[13] *Ibid*.

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2.5 Input costs

This section deals with the nature of the input into the production of goods and services. Input is itemized in terms of purchased materials and supplies, fuels, electricity, and the services of other industrial establishments (contract work on materials supplied to them, and repair and maintenance work). Payments to homeworkers are called for separately as a control figure to be matched (should be lower) with the estimated receipts from the sample canvass of cottage industries (household units engaged in manufacturing activity). Special provision is made in the input categories for the compilation of estimates of total energy consumed.

The full range of input detail is listed on the manufactures and minerals long forms and on the form pertaining to the electricity and gas industries. The input cost item (item 13) has 7 categories on the manufactures long form and 5 and 4 on the other long forms mentioned (resales and payments to homeworkers do not apply to those other areas). All input categories except contract work and payments to homeworkers are combined on the manufactures short form; all except contract work are combined on the mineral industries short form.

Electricity purchased, generated, and sold appears on all but the two short forms. The same is true for consumption of specific types of fuels (five categories of fuels).

The quantity and cost of principal materials consumed (or principal minerals received for treatment and supplies) are requested on the manufacturing and mineral industries long forms. A Materials Reference List is provided as a guide to respondents in completing the item.

A category entitled "Purchased machinery installed for your own use" appears on both the minerals long and short forms. This information is needed for the special method of calculating value added in the minerals sector (see 2.7 below).

2.6 Gross output

The questionnaires measure the result of all industrial activity; that is, the end result of input of labor, materials, and capital. Gross output consists of products, industrial services, and miscellaneous receipts of the industrial establishments. In accordance with UN recommendations, Providencia values gross output in producers' values; that is, the market sales value of goods and services at the establishment of the producer. A UN recommendation applying only to the statistics of developed countries is the alternative "basic value" measurement of gross output. For a valuation in approximate "basic values," indirect taxes should be excluded and subsidies received should be included; but these items are normally difficult to obtain at the establishment level.

Gross output consists of six categories as follows: (a) value of all products made, (b) receipts for contract work; (c) receipts for repair and installation work, (d) sales of scrap and refuse, (e) other miscellaneous receipts, and (f) sales of products bought and resold in the same condition. All six items are specified on the manufactures long form, but only the value of products and receipts for contract work appear on the minerals industries long and short forms. The manufactures short form lists value of products made, contract work, and resales, but groups the other categories under "miscellaneous receipts." The electricity and gas industries form obtains the sales of electricity and gas separately and combines all other products and services.

In the manufacturing industries, the value of products manufactured is requested

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in terms of shipments, whereas production is the concept followed for mineral industries. This variation reflects differences in the nature of the records kept by establishments in these two industrial sectors. In Providencia, as in many other countries, the majority of manufacturing establishments record and value the output when it is shipped, whereas mineral establishments base their output data on the point of production. Use of the shipments concept for output requires an inventory adjustment in the calculation of value added for the manufacturing sector (see 2.7 below).

The product shipments portion of the manufactures long form asks for separate values and, where there is a homogeneous physical unit, quantities for groups of related products comprising the establishment's output. As a guide to reporting, the respondent is provided a Product Reference List which specifies classes of products; they are coded according to the International Standard Industrial Classification (ISIC) and arranged by those ISIC codes. The same procedure is followed in obtaining individual product data in the minerals sector.

The short forms in manufacturing and mining provide for the reporting of individual products. However, the objective is primarily the derivation of an industry code for the establishment. There is no provision of reference lists for these small establishments. Without the uniformity that is afforded by such lists and the subsequent investment of time and effort by the NSO to monitor the reported data, it is unrealistic to expect to generate product data for publication.

2.7 Value added

As the term implies, value added is the increment to the value of the goods and the services that is contributed by the reporting establishment. As an aggregate of all establishments classified in a given industry, it is the incremental value attributable to that industry.

Value added avoids the duplication in the value of shipments (or production) which results from the inclusion of the shipments of establishments producing materials and components together with the shipments of establishments producing finished products. It is considered by economists to be the best value measure for comparing the relative economic importance of manufacturing or mining among industries and geographic areas.

Respondents do not report value added but rather the component elements of value added. Value added, in the census concept, is defined as the value of gross output less the value of goods consumed and industrial services rendered. The calculation of value added is made by the National Statistical Office in the processing of the establishment data.

This census value added is not net value relative to the economy as a whole, but is only net value relative to the agricultural and industrial sectors of the economy. To derive a wholly net value added in the census it would be necessary to exclude, in addition to the cost of materials and purchased industrial services, other costs such as purchases of services from non-manufacturing enterprises. However, the collection of data on the cost of business services at the establishment level presents many problems. Advertising by multi-unit companies, for example, is frequently charged at the company level and the cost is not allocated by the company to the establishment level.

It should be noted that census value added is not the same as value added according to the definition in the national accounts.

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In those accounts, the "net" concept of value added is followed by calculating the item as the total factor costs that are incurred during the manufacturing or mining process.

The concept of value added is modified for the minerals sector in the Providencia Industrial Census. For mineral industries, value added is equal to gross output plus the value of fixed assets acquired (including the development and exploration of mineral property) less the cost of supplies, purchased industrial services, and purchased machinery installed. This definition provides a measure of value added not only in mineral production but also in the development of mineral properties.

2.8 Capacity of installed power equipment

The inquiry in the 1963 Providencia Census on the capacity of installed power equipment does not appear on any of its 1975 Industrial Census forms. The measure presented reporting problems and it proved expensive to collect and validate the data. Moreover, the main purpose of the inquiry was to indicate the extent to which the country's economy was capital-intensive. This objective is met satisfactorily by the measures on the questionnaires for consumption of electricity and acquisition of fixed assets. The UN recommendations do not suggest the collection of capacity of power equipment by developing countries, and UN assigns the item only a priority 2 classification in the case of nations with developed statistical programs.

The form for electricity contains an inquiry on the location of power plants and the capacity of the electric generators. It also asks for the capacity of transformers in transmission and distribution systems.

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Chapter III-3. DEFINITIONS OF DATA ITEMS

1. INTRODUCTION

Chapter III-2 specified the items of data to be obtained in Providencia's Industrial Census. Chapter III-3 gives the definitions for those same items of data. Usually, the definition given appears either on the census questionnaire or on an instruction sheet (or partly on each). Examples are shown as exhibits to chapter III-4, Questionnaires and Respondent Instructions. For the most part, the definitions of the items of data which Providencia adopted for its industrial census follow the UN recommendations.[14]

2. DEFINITIONS

2.1 *Identification and classification information*

Most of these items are self-explanatory; relatively brief instructions for respondents are printed on the report form. However, a few observations may be made.

Accurate and precise information on the physical location of each establishment is essential to prepare the tabulations of manufacturing, minerals, etc., activity in each province, county, and ward of Providencia. It is also important to obtain the address and telephone number of the person to contact regarding the report. Such information is provided for in the certification at the end of the questionnaire.

The legal form of organization should be reported on the basis of the form of the legal entity which owns the unit directly. Cooperatives can be either incorporated or unincorporated. Partnerships refer to both limited and unlimited liability types.

The definition of an establishment is different for the mineral industries and electricity and gas industries from manufacturing. The modifications are shown on the respective questionnaires.

2.2 *Employment and earnings*

Complete definitions of the items in this section are contained on the instruction sheets or questionnaires.

2.3 *Inventories*

For the most part, experience in gathering inventory figures teaches the lesson that the statistical agency must live with the way respondents keep their records on stocks. Overly detailed instructions can lead the agency into believing that it is obtaining something more precise and uniform than is the case.

For data on stocks, Providencia limited itself to emphasizing the importance of comparability in the method of valuation between the beginning and end of the year, regardless of what that method may be for the individual respondent. In so doing, Providencia is attempting to assure the validity of the measure of change in inventories even if the measure of level is an approximate one. Economists agree that the change in inventories is a more important piece of information than the level of inventories.

Valuation is requested in current cost, as recommended by UN, but the option of using

[14] See footnotes 1 and 2.

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book values is offered to the respondent (this is an alternative suggested by UN).

2.4 *Fixed capital formation*

The definitions of the categories comprising the Acquisition of New and Used Fixed Assets are embodied in the instruction sheet for respondents in the manufactures and minerals sector and are on the questionnaire for the electricity and gas industries. The specifications for inclusions and exclusions are basically those recommended by the UN. According to the UN definition, new fixed assets are those that have not been previously used in the country conducting the census. The UN statistical paper for the 1973 World Program (Series M, No. 54, part 1) goes on to state that "newly imported fixed assets are considered as new whether or not used before they were imported." The UN defines a fixed asset as a physical asset expected to have a productive life of more than one year.

If a country is characterized by extensive oil or gas field operations, the instructions for the minerals area should be expanded to include examples of the types of structures, machinery, and equipment that are unique to such activities. Similar adaptations should be made if the dominant mineral activity of the country happens to be metal mining, coal, mineral contract services, etc.

2.5 *Input costs*

The questionnaires and instruction sheets contain detailed instructions for the inquiries in this section of the census forms. The only amplification necessary here is to discuss the estimation of total energy consumption which appears in the published tables dealing with fuels and electricity data (see exhibits to chapter III-5).

In order to make possible the estimation of energy consumption, figures are obtained in the Providencia Census on both the total value of all purchased fuels consumed and the value and quantity of individually important fuels.

Total energy consumed is defined as the sum of (a) electricity consumed and (b) the energy equivalent of fuels consumed. Electricity consumed is the sum of the quantities of electricity purchased and generated less the quantity of electricity sold to others. That sum is expressed in terms of kilowatt-hours. The total energy equivalent of fuels consumed is also measured in kilowatt-hours. That equivalent is calculated by the statistical organization conducting the census by converting physical unit data for individual fuels consumed into the kilowatt-hours equivalent.

2.6 *Gross output*

Once again, care has been taken to place all the principal instructions on the report form; for example, the basis of valuation of the establishment's output and the method of reporting inter-plant transfers and contract work. In addition, it should be noted that production of fixed assets for use in the same establishment is to be included with shipments to others in the appropriate product category. The value of such assets should also be shown in item 12 of the long form, Acquisition of New and Used Fixed Assets.

2.7 *Value added*

This item is computed by the NSO for the manufacturing industries by subtracting the total cost of materials, fuels, electricity, and contract work (item 13h) from the total value of shipments and receipts (item 18e). The resulting amount is adjusted by the net change in finished products and work-in-process inventories between the beginning and end of the year. This adjustment is necessary because the output measure for the manufacturing

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industries in Providencia's Census is shipments, not production. No such inventory adjustment is made for the mineral industries where the output data are in terms of production. However, in the calculation of value added for minerals, the value of fixed assets that are acquired (item 12e) is added to the value of production (item 18c); the cost of purchased machinery that is installed (item 13g) is added to the total cost of purchased supplies, fuels, electricity, and contract work (item 13f).

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Chapter III-4. QUESTIONNAIRES AND RESPONDENT INSTRUCTIONS

1. INTRODUCTION

A critical step in any data-collection program is the design and preparation of the questionnaires and respondent instructions. It should be remembered, however, that questionnaires cannot be designed until the content of the census has been decided. Once that has been determined, the layout and design of the questionnaires (as well as the number of different forms) should be the product of a close working relationship between the subject matter specialist, the data processing specialist, and the forms design specialist.

Each of these persons has his respective role to play in the census. The subject matter specialist is responsible for the collection of meaningful and accurate information. Generally, his decisions on the wording and the sequence of items should take priority over other considerations in designing the report form. The efficient and economical processing of the data is the responsibility of the processing specialist. His views should be respected on the placement of identification items, the need for precoding for machine processing, and the optimum arrangement of items on the form so far as facilitating clerical and professional review of the data is concerned. It should be kept in mind, however, that a questionnaire design which would best facilitate clerical and analytic processing may not be the most effective vehicle for the collection of the data. The forms design specialist is concerned with good response from the respondent and with a form that lends itself to easy processing. He tackles the problem from the standpoint of eye appeal and legibility, so that the form does not appear burdensome. He strives to see that the wording of the items and their sequence carry out the intent of the subject matter specialist. If all these individuals perform their tasks well and work together smoothly, the chances are greatly enhanced that the census will achieve its objectives. A well-designed questionnaire that is based on clearly defined concepts is a key element in a successful census.

2. CENSUS QUESTIONNAIRES AND INSTRUCTION SHEETS

Providencia utilized the following questionnaires in the conduct of its 1975 Industrial Census. Wherever there is a separate instruction sheet accompanying the report form, that fact is noted. Otherwise, all the instructions to respondents are contained on the forms.

(1) Census of Manufactures Long Form (ECP-1) with separate sheet of instructions for respondents--to be completed by manufacturing establishments with 10 or more persons engaged (see exhibit III-4-1).

(2) Census of Manufactures Short Form (ECP-101) --to be completed by manufacturing establishments with less than 10 persons engaged (see exhibit III-4-2).

(3) Census of Mineral Industries Long Form (ECP-2) with separate instruction sheet--to be completed by mineral establishments with 10 or more persons engaged (see exhibit III-4-3).

(4) Census of Mineral Industries Short Form (ECP-201)--to be completed by mineral establishments with less than 10 persons engaged (see exhibit III-4-4).

(5) Census of Production and Distribution of Electricity and Gas--Long Form only (ECP-3) (see exhibit III-4-5).

(6) Census of Household Industries--Special Short Form (ECP-102) (see exhibit III-4-6).

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The manufacturing and mineral establishments with 10 or more persons engaged will receive, together with the long form, a Product Reference List Booklet and a Materials Reference List Booklet. These booklets will be used by these establishments to enter the appropriate description and code number for their principal products made and materials consumed.

All establishments of multi-unit enterprises (regardless of size) will receive long forms. This procedure is being followed for operational reasons and in order to set the stage for possible company-type tabulations at a later date. Units chosen in the small sample of the cottage industries (household units) will be canvassed with a special short form.

The remainder of this chapter deals with the basic principles of questionnaire design. In the discussion, the ways in which Providencia's forms have been constructed to meet good design principles are described.

3. PRINCIPLES OF QUESTIONNAIRE DESIGN

The layout and design of the questionnaires and related forms must be carefully considered in planning the entire census program. Forms are designed to satisfy different requirements, such as the amount and complexity of the data being collected, and the number of times a form is used.

3.1 *Form identification*

Each report form should carry a unique form number and letter(s) prefix. For Providencia's Industrial Census, the prefix "ECP" was used on all forms, the "EC" standing for economic census and the "P" for Providencia. A demographic census for Providencia would have different first two letters in its prefix. Each form should carry a date; the Industrial Census forms show the date under the form number, which is the date when the forms were completed by Forms Design Staff and were ready for printing.

Forms should be numbered in series or blocks of numbers to facilitate identifying them with specific subjects or functions. Providencia's ECP forms are numbered 1 to 3 with the companion long and short forms for manufactures and minerals, 1 and 101 and 2 and 201, respectively.

3.2 *Size of form*

The size of a form is determined by the number of questions, the extent of instructions to respondents on the form, the size of type, and the amount of space required to record the answers.

A form should be large enough to accommodate a print size that can be read easily and provide sufficient open space. At the same time, the form should not be so large that it is clumsy to handle.

If several forms are involved in a census, it is desirable to have a uniform size for ease in handling. All of the questionnaires for Providencia's Industrial Census (except the Household Industries form) are 10 1/2 by 17 inches (or approximately 27 by 43 centimeters).

3.3 *Color and quality of paper*

The paper on which the questionnaire is printed should be a color that is distinctive and easy on the eyes. Where several forms are involved, different colors facilitate the selection of the appropriate form by the enumerator or respondent. Providencia distinguishes its census forms by the use of different colors.

Consideration also needs to be given to the quality of paper. A good quality paper was selected by Providencia because the forms were subjected to frequent handling.

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3.4 *Arrangement of items on the form*

The form should be laid out in a manner that makes it convenient to use, both for the respondent (or enumerator) and for the statistical processing office. For example, the inquiries should appear in a logical order on the questionnaire. Related questions should be grouped together (see chapter III-2).

If the information is to be edited, coded, and punched directly from the form (as with the Providencia Census), the arrangement and spacing of items should take these operations into account. There should be the maximum amount of precoding of information for machine processing. Whatever arrangement is used in the layout of the questionnaire, there should be uniformity in style with respect to the placement of code boxes, the kind of type used, and the like.

The wording of the inquiries on the form should be clear, concise, and easily understood. As many of the instructions as possible should be placed on the questionnaire itself, close to the item to which they refer. However, rather than overburden a form and make it too long, a separate instruction sheet should be utilized. This latter technique has been adopted by Providencia for its Manufactures and Mineral Industries long forms. In such instances, the most critical instructions should be left on the form itself with expansion or supplementation of them appearing on the separate instruction sheet.

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Chapter III-5. DESIGN OF CENSUS REPORTS

1. INTRODUCTION

The publications resulting from a census are the ultimate goal of the entire undertaking. The success of a census is directly correlated with the degree of skill exercised by the statistical authority in presenting the facts gathered in the census. Good publication planning requires that the census statistician anticipate the needs of the data users and at the same time recognize the limitations of the data.

Table outlines should be prepared early in the planning of a census or survey. Otherwise, the questionnaires, respondent instructions, field operations, and survey processing operations may fail to provide the desired results. In addition, decisions on the publication program are necessary in order to develop tabulation specifications.

Early consideration of a plan for publishing the census results is also required to serve as the basis for estimating the cost of that phase of the census program. Such an action helps to insure that adequate funds will be allotted to publication work. It is critical that funds budgeted for publication not be used to pay for other census operations which may fall behind schedule and run over their budgets.

No matter how well a census is conducted, it will be judged on the adequacy and quality of its publications. After all, those publications are the only tools that the world outside the census office has to use. Knowledge of the results and the strong and weak points of the data by the census statistician is of no help to the data user unless that information is conveyed to him in print.

2. DESCRIPTION OF REPORTS

The preliminary (advance) reports will be quite functional in order to conserve time and money. Prompt release of the statistics is the overriding consideration at this stage of the census. The preliminary reports will consist almost entirely of tables of data. There will be a brief text that deals with scope and coverage of the data, definition of the industrial sector, and the caution that the figures are subject to revision in the final reports. The release will be identified by a report series masthead at the top of the first page and will not have a separate cover page.

The final reports will consist of the following items in the order indicated:

(1) Cover. Reverse side of the cover will show an outline map of Providencia with its 12 provinces marked on the map and the name of each province printed inside its boundaries.

(2) Title page.

(3) Back of title page containing list of officials, and acknowledgements.

(4) Table of contents.

(5) Text. The text should start on a right-hand page; therefore, the left-hand page facing the text should be left blank, unless needed for the table of contents; if desired, it can be used for a description of the Industrial Census Publication Program.

(6) Tabular pages, consisting of statistical tables.

(7) Appendices. These comprise a copy of census legislation, an explanation of concepts, copies of questionnaires, etc.

The text will include (a) a discussion of the concepts followed in the census, (b) a

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description of the survey methods, (c) an evaluation of the quality of the data, (d) a discussion of qualifications or limitations of the data, and (e) references to related statistics from other sources. To set the background for the statistical tables, the text might begin with a summary of findings (particularly appropriate for the preliminary reports).

The typing, page size, amount of reduction, etc. are discussed fully in chapter III-6. Although that chapter emphasizes the technical aspects of setting up and printing tables, the guidelines are similar. For readability, verbal materials in the text are usually arranged in two columns and the amount of reduction may be less than the reduction for statistical tables.

2.1 *Separate series by industrial sector*

There will be three preliminary reports, one for each of the three major areas covered by the census. These reports will contain selected statistics for industry and geographic areas.

For the final reports, each of these sectors will again be handled by a separate report series. There will be a pattern to the content in each of the series. For manufacturing establishments, final publication will present industry data for Providencia as a whole (13 tables); data for provinces, counties, or wards (8 tables); and manufacturing activity according to other characteristics such as size of establishment and type of ownership (4 tables). Publications that group tables by these three systems of classification will be issued for mineral industries and for electricity and gas industries.

Uniformity in the tabular content of the final reports benefits the data user. The user will frequently want to refer to all the industry data for in-depth studies of an industry or group of related industries or to all the geographic data for regional analysis. Furthermore, this feature of parallelism in tables aids in the preparation of the census publications. Exhibit III-5-9 demonstrates the close concordance of the manufactures and minerals census tables in the final report series.

As part of the final report phase of the publication program there will be a report covering the household industries. Additionally, there will be an overall summary release bringing together key totals from all three census areas.

2.2 *Time schedule*

The 1975 Providencia Industrial Census will have a series of preliminary advance reports followed by the final report series. The advance reports will be issued within 12 months of the end of the reference year (1975), that is, by 31 December 1976. The final reports will appear on a flow basis during 1977 with all of them in print by the end of that year. There will be a single bound volume comprising all of the final reports (with redundant text and pages eliminated) published early in 1978.

3. *DESCRIPTION OF TABLE OUTLINES*

Table outlines or formats are prepared by the subject matter specialist. The formats have three basic uses:

(1) Table formats provide the proposed specifications as to the contents of each table for purposes of discussion and review.

(2) As finally agreed upon, they are used by the Publications Division in the detailed planning of each tabular page, whether preprinted or not.

(3) Finally, they are used by the Data Processing Division in drawing up a tabulation plan.

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3.1 *Table content*

Table outlines (formats) consist of the title, headnote, boxhead, stub captions, and footnotes, if any, of each table to be included in the census publication. They do not have to be prepared in complete detail but should contain enough information to enable the table planner of the Publications Division to count spaces and lines accurately, and the systems analyst of the Data Processing Division to relate the table content to the questionnaire by means of a "key" technique.

Exhibits III-5-1, 2, and 3 contain the formats of the tables in the preliminary (advance) reports on manufacturing, mineral industries, electricity and gas industries. The preliminary reports are scheduled for release by the end of 1976. Exhibits III-5-4, 5, and 6 illustrate the table formats for the final reports on the three industry sectors. The tabular content of the final summary reports with key totals from all three industry sectors is presented in exhibit III-5-7. Finally exhibit III-5-8 shows the detail for the tables in the special report for household industries.

Exhibit III-5-10 illustrates the relationship between tables and inquiries on the forms, using the manufacturers final report series to show how all of the information collected from respondents is published and in a logical sequence.

3.2 *Table design*

For most censuses, statistical tables consume a substantial portion of the reports. The design of the tables is described in detail in chapter III-6.

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Chapter III-6. PREPARATION OF STATISTICAL TABLES

1. GUIDELINES FOR TABULAR PRESENTATION

The tabular presentation of Providencia's Industrial Census reports is based on a set of rules, the application of which depends greatly on good judgment. However, these rules involve principles and technical details which every statistician needs to know about in order to instruct clerks, typists, and printers in the formatting of tables.

It is of major importance to keep in mind who is going to see and use the table. One should always plan the table from the viewpoint of the user. In observing this rule, everything possible should be done to make tables easy to read, understand, and interpret. The table form does not add new meaning to the figures; it is intended only to make the meaning which is already there easier to find.

Good style in tabular presentation implies a clear and economical display. This means that consistent practices must be developed relating to the layout or design of a table; the way table titles are written; the way classifications are handled; the use of footnotes and headnotes; the use of vertical and horizontal rules; and consistency in capitalization, abbreviation, punctuation, and indentation.

2. CLASSES OF TABULAR PRESENTATION

Tabular presentation can be defined as an orderly arrangement of numerical information in columns and rows so as to present, in a concise and orderly fashion, statistical information which could not be presented so clearly in any other way. There are three general classes of tabular presentation--leader work, text tabulations, and formal statistical tables.

2.1 *Leader work*

This form of tabular presentation is usually a part of the text. It is a simple listing without title, boxheads, or rules. Ordinarily, it presents only one or two columns of figures or indicates the relationship between two sets of facts or categories. Since it does not carry a table number or title, it cannot stand alone; hence it is introduced directly by a statement ending in a colon.

EXAMPLE 1.

Unemployment rates among young people are as follows:

Age	Rate
12 to 14 years.....	14.1%
15 to 19 years.....	12.0%
20 to 24 years.....	10.8%

2.2 *Text tabulations*

As the term implies, a text tabulation usually appears as part of the text of the report. Text tabulations are simple ruled tables without a table number or title. In other respects, the form is the same as that of the formal statistical table. Since the text tabulation has no identification, it must be introduced by an explanatory statement.

Text tabulations are difficult to use because, in the arrangement of the page, they cannot be shifted away from their introductory statement (this is also true of leader work).

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In addition, it is difficult to cite or to refer to text tabulations.

EXAMPLE 2.

Unemployment rates among young people are as follows:

Age	Total labor force	Unemployed	
		Number	Percent
12 to 14 years..	186,119	26,317	14.1
15 to 19 years..	502,001	60,429	12.0
20 to 24 years..	417,237	45,001	10.8

2.3 *Formal statistical table*

The formal statistical table is the most finished form of tabular presentation. Designed to be self-sufficient, the formal table includes a number and a title, and often includes headnotes and footnotes. Its stub and boxheads are precisely worded and arranged to avoid the need for textual explanations. The structure and some types of formal statistical tables are illustrated in exhibit III-6-1 through exhibit III-6-5.

3. *FORMAL STATISTICAL TABLE: STRUCTURAL PARTS*

The statistical table is made up of a limited number of structural parts, most of which appear in all formal tables. From table to table, differences between similar parts are mainly the variations required by subject matter and meaning. The major structural parts of a formal statistical table include the following:

(1) Heading: Consists of the table number, title, and headnote when necessary.

(2) Boxhead: Contains column captions and spanner heads. A group of related column heads is called a panel.

(3) Stub: Contains the stubhead, center heads, and line captions. A group of line captions is called a block.

(4) Field: Portion of the table extending from the bottom rule of the boxhead to the bottom rule of the table and to the right of the stub. It is the depository of information appearing in the cells.

(5) Footnote: Statement qualifying or explaining the information presented in, or omitted from, a specific cell, column, line, or group of columns or lines.

The major structural parts of a formal statistical table are shown in exhibit III-6-1.

3.1 *Table number*

The table number is an identifying device; it positions a table within a series. In a single report, no two tables should bear the same number. The tables should be numbered in one series, using Arabic numerals for example, and starting with 1. When there are text tables as well as a separate series of formal tables, the text tables having titles should be identified by capital letters or possibly Roman numerals (usually there are not many text tables). Capital letters are preferred, as they are easier to read and understand than Roman numerals. The table number is followed by a period and two spaces (or a 1-em dash if letterpress). The table number may be set in boldface type for easy identification.

3.2 *Table title*

The table title is a brief statement of the nature, classification, geographic area (or place to which the statistics refer), and the time reference of the information presented in the table. It is the what, how classified, where, and when of the table. A title should never be footnoted.

3.21 Function.--The function of the table title is twofold; it catalogs the table content and serves as a reference guide. The

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wording and arrangement of the component parts of the title depend on the comparative significance of these two factors in the given presentation.

3.22 Component parts.--Each title should indicate, specifically or by implication, four basic characteristics of the tabular data. The parts are joined by appropriate connectives and punctuation to form the title as a whole. The parts can be described as "title segments."

(1) Universe segment: Specifies the nature and limits of the group covered by the table. For example: Employed persons; Manufacturing establishments; Production workers. The universe segment usually appears as the first or second component part of the title. Placement at the beginning of the title is suitable in a series of tables involving many different universes or in a table presenting general information on the universe without stressing a particular characteristic. If the universe segment is long, part of it can be put in the headnote; however, universe qualifications which distinguish one table from another should remain in the title. On the other hand, if the basic universe is identical for all tables in a series and the nature of the universe is made clear in the report title or running head, the universe segment may be omitted completely from the title and headnote.

(2) Classification segment: Specifies how the universe data are classified and cross-classified. For example: By age and sex; By number of hours worked; By occupation and industry. This segment may precede or follow the universe segment (or may be split). Placing the classification segment at the beginning of the title is most suitable in a series of tables with the same or similar universe and in which the emphasis is on differences in the classification of data. For example: Age of production workers; Weekly salary of production workers. The extent to which varying detail of classification should be shown in the title depends largely on whether the primary purpose of the table is such as to make detailed description essential. Where possible, the title should be kept short by indicating no more than the basic classifications, unless this results in an over-statement of the table contents. For summary tables containing a number of subjects, the terminology, "General characteristics of ..." may be used and the separate characteristics can be identified in the boxhead spanner or the stub center heads; only one such table title would be appropriate in any series.

(3) Area or space segment: Specifies the administrative divisions or subdivisions, geographic area, or place to which the data refer. For example: For rural areas; For Providencia; For Provinces; For urban places. Normally this segment is placed toward the end of the title immediately preceding the time reference. The area or space segment may be omitted if the report relates to one area and this fact is shown in the report title or the running head.

(4) Time reference segment: Specifies the point in time to which the data refer. For example: 1970; 1963 and 1975; 1920 to 1970; First quarter 1974. As indicated, the time reference may be a single date, a time period, or a series of dates or time periods. The time reference is customarily placed at the end of the title or interspersed where it applies. A terminal time reference is set off from the rest of the title by a colon; an interspersed time reference is set off by commas. If the entire report refers to one time period, the time reference may be omitted from the table titles. This type of omission may be confusing, however, and it is generally better to include the date in the title.

3.23 Wording of the title.--Table titles are written in telegraphic style, not in complete sentences. Verbs and unnecessary words are omitted. For example, words such as the following are unnecessary: Table showing...; Comparison of...; Relationship between.... A table title should be brief but adequate, and a headnote may be used to qualify an otherwise long title. Titles of simple tables can easily be made both brief and complete; for tables consisting of complex classifications, however, it is considerably more difficult.

As a rule, a less complete title which will be read is better than a complete title which will be ignored because of length or complexity. Furthermore, a title may understate the contents of a table but should never overstate.

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The most common method of title wording is the "conventional" method. (It is called "conventional" because it is commonly used in statistical reports.) This method expresses simply what, how classified, where, and when; for example, ECONOMICALLY ACTIVE POPULATION BY AGE, FOR PROVIDENCIA: MID-YEAR 1974. Advantages of this method are that it is flexible; it is easy to learn and to handle; and it conforms to the normal expectation of the user.

Another method is the subject-phrase or key-phrase indicator. The title starts with a phrase set off from the remainder of the title by a dash or colon. For example: EMPLOYED PERSONS: OCCUPATION BY AGE AND SEX. As another example: EMPLOYED PERSONS: HOURS WORKED BY OCCUPATION. This method permits increased emphasis on the purpose of the presentation and differences between tables. It is most useful when presenting an involved series of tables.

Table titles need to be edited and often rewritten. The wording of each segment should reflect the content of the table, and the order in which the segments appear should depend on the significance they are given in the table.

3.24 Mechanical presentation of the title.--In order to make a title prominent and distinctive, it should be written in capital letters except for the word "Table." If letterpress, the table number usually appears in boldface type; also, if the table is not very wide, full caps and small caps are used for the title and for the word "Table." If the computer prints the title, all letters are full caps.

A one-line title is to be centered on the full width of the table. The first line of a two-line title is run full width and the second line is centered. If the title is three lines or more, the first line is run full width and all succeeding lines indented four typewriter spaces (2 ems, if letterpress) from the left and run flush on the right edge of the table; the last line may run short at the right. Title placement does not change when produced on the computer.

3.3 *Headnote*

The headnote is a statement (or statements) placed below the table title, above the top rule of the table. It gives information which cannot be made clear elsewhere in the table and which is too general for inclusion in footnotes. It refers to the table as a whole or a major portion of the table, or to a constantly recurring specific term, abbreviation, or situation. Several statements may be included in a headnote. All should be as brief as possible; for example, "These statistics cover persons 14 years old and over" may be shortened to "Persons 14 years old and over" because the reference is clear. However, clarity should not be sacrificed for briefness.

Sometimes the headnote gives additional title information; that is, information essential to understanding the statistics in the table. It may define a term used in the title. In some reports where it is not practical to include adequate introductory textual information, the burden of general definitions and qualifications must fall largely upon the headnote. The ideal table, however, would have no headnote because the table would be easily understood with the aid of a clear title and clear boxhead and stub entries.

The headnote is enclosed in parentheses (or in brackets if letterpress). Normal punctuation rules apply except that no period is used at the end even though the last statement is a complete sentence. The centering

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and indentation follow the same rules as for the title. A headnote should not begin with the word "Note" or "General note," since its placement is sufficient to identify it as such. Also, a headnote should never be footnoted.

3.4 *Boxhead*

The boxhead is that portion of a table in which is located the individual column heads or captions describing the data in each column. The boxhead may also contain qualifying spanner heads.

Like the stub, the boxhead serves the purpose of describing data. Usually it is not important whether the items are listed in the boxhead or in the stub, provided space is not a problem. However, the same pattern should be used for each table in a series. Boxhead presentation is efficient for (a) classifications limited to comparatively few items, (b) classifications with brief captions, and (c) constant subclassifications which are repeated many times in the series (such as value, quantity, unit cost). The boxhead, as compared with the stub, has one great advantage; that is, its greater ability to emphasize relationships among data, particularly those in adjoining columns.

3.41 Column head.--The individual column head (caption) is a descriptive title placed directly above the individual column to which it refers. It is the basic unit of the boxhead. Often it is further qualified or supplemented by one or more spanner heads.

3.42 Spanner head.--The spanner head is a classifying, descriptive, or qualifying caption which spreads across two or more individual column heads or lower spanners. It is the counterpart of the stub center head or subhead and the colon or dash (read-in) line caption in the stub. Normally, the boxhead should not contain more than three levels, as indicated by the spanner heads and column heads.

Spanner heads should be used where a group of columns would start or close with the same words, or where columns have a common qualifying or descriptive classification.

EXAMPLE 3.

Correct:

Weekly payroll (thousand dollars)	
Production workers	Other

Incorrect:

Weekly payroll for production workers (thousand dollars)	Weekly payroll for other workers (thousand dollars)

A spanner head is not used over a single column; such arrangement would serve no useful purpose. The two ideas should be combined into one column head.

EXAMPLE 4.

Correct:

Increase in manufacturing establishments, 1963 to 1975

Incorrect:

Increase in manufacturing establishments
1963 to 1975

3.43 Banner head.--A spanner head which extends across the entire boxhead of the table is called a banner head. Normally, it is not

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necessary to use a banner head. Since it applies to the table as a whole, the classification or qualification can be taken care of in the title, in the headnote, or in a stub center head. A banner head may be used to avoid wordy column heads or to emphasize an essential important qualification.

3.44 Panel.--A panel is a distinctive segment of the boxhead consisting of a group of related columns with their spanners, frequently a self-contained unit. The term is largely a term of convenience that is used when referring to distinctive groups of columns. The panel is the boxhead counterpart of the stub block.

3.45 Wording and arrangement.--The wording in the boxhead should be brief but clear. Insofar as possible, avoid abbreviations; also, keep to a minimum the need to hyphenate words that run over several lines. Except for words normally capitalized, captions should be in lower case throughout. However, when tables are produced entirely on the computer, the wording will be in capital letters entirely and may not be centered (see example 5).

EXAMPLE 5.

Usual:

TOTAL	PRODUCTION WORKERS	SALARIES PAID TO OTHER WORKERS

Alternate:

TOTAL	PRODUCTION WORKERS	SALARIES PAID TO OTHER WORKERS

The boxhead is set off from the title and headnote by a heavy single rule; it is set off from the stub and field by a medium single rule. The captions may be centered vertically and horizontally. They are not necessarily lined up with each other at the top or bottom and there is no spacing between lines. Whenever possible, an inverted pyramid effect should be used; that is, the first (top) line of the caption should be the longest (see example 6).

EXAMPLE 6.

Correct:

Type lines solid	Run first line full width and center remainder

Incorrect:

This is wrong	Do not run lines across in center of column

The depth is normally controlled by the deepest box on the same level, as illustrated in example 7. An alternate style that saves considerable time is to type the caption flush left, beginning at the top (see example 8).

EXAMPLE 7.

Correct:

Wages and salaries paid		Man-days worked	
Total	Production workers	Total	Production workers

Incorrect:

Wages and salaries paid		Man-days worked	
Total	Production workers	Total	Production workers

EXAMPLE 8.

Total	Production workers	Salaries paid to other workers

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On computer output tables, all captions are usually done flush left. Captions can be centered horizontally but it is time-consuming and not really necessary. Vertical centering is not possible on a computer; consequently, all captions start on the first (top) line (see example 5 on previous page). Because of this, one must be careful when drafting the table, being sure to remember that the depth of the boxhead is controlled by the deepest box. The "Incorrect" portion of example 7 illustrates this point.

3.46 Unit of measure.--It is essential to the understanding of the data that the unit of measure be clearly indicated. This is particularly true when the descriptive captions, as well as the data, are expressed in figures.

EXAMPLE 9.

Correct:

	Percent		
Under 5 years	5 to 9 years	10 to 14 years	15 years and over

Incorrect:

	Percent (years)		
Under 5	5 to 9	10 to 14	15 and over

In the above example, the column heads in the incorrect portion could be interpreted as the percent intervals rather than years of age. In most instances, the wording in the boxhead combines with the wording in the stub to clarify the unit of measure.

3.5 *Stub*

The table stub is usually the first column on the left, in which are listed line descriptions with necessary center heads and subheads. For descriptive purposes, the caption over the stub is also part of the stub, although in terms of location and physical requirements, it is part of the boxhead.

Like the boxhead, the stub describes the specific data in the table and makes clear the relationship among the items. Whether a classification should be allocated to the stub or to the boxhead depends on space requirements, consistency from table to table, and the mechanical advantages and limitations on the ability of each to indicate intra-table relationships. The final allocation usually represents a compromise. Nevertheless, it is a decided convenience to the user if a constant pattern in the content of the boxhead and stub is maintained from table to table in a series.

Generally, stub presentation is recommended for (a) classifications involving numerous lists of items, (b) classifications requiring long and detailed captions, and (c) multiple sub-classifications. In its ability to show multiple levels of classification, the stub excels where the boxhead is weakest. Although brevity in presenting the classifications is essential in the stub captions, the same restrictions do not apply as for boxhead captions.

3.51 Stubhead.--The stubhead or caption of the stub describes the stub listing as a whole in terms of classifications presented. For example: Type of ownership by industry group; Industry group by size of establishment; Province and industry group. In general, only the major classifications should be indicated to permit the reader to note at a glance the principal content of the stub and the allocation of entries to the stub as compared with the boxhead.

The order of listing the classification terms depends largely on the purpose of the table. The levels may be listed in descending order, ascending order, or in order of importance. The space for the stubhead should never

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be left blank. Where the stub listings are comparatively unrelated and cannot be generalized in a few words, it may be necessary to confine the description to a term such as "Subject," "Characteristic," or "Group."

3.52 Center head.--A center head describes a group of line captions until another center head is reached. It is centered horizontally in the stub. The first level center head is usually typed in full capital letters and the second level in initial caps and underlined. In letterpress work, distinction in levels is sometimes achieved by combinations of the boldness of the type and capitalization. If the computer prepares the printed tables, both the first and second levels will be in full capital letters.

3.53 Colon line and dash line.--A colon line is a heading within the stub, similar to a center head. However, it differs from a center head in that it conforms to data-line indent rather than being centered in the stub. Each colon line is a complete line caption in itself.

The dash (read-in) line is a fragment of a line caption and also conforms to data-line indent. It is basically a device to avoid repetition of words and is an integral part of each of its sub-entries. As such, it "reads in" smoothly to each sub-entry.

The colon line and dash line are similar in that no cell entries appear opposite them in the field of the table. Also, both conform to data-line indent and are typed in lower case letters.

EXAMPLE 10.

Colon Line:

Persons engaged by type:
Owners and active partners.....
Family and other unpaid workers...
Production workers.....
Other.....

EXAMPLE 11.

Dash line:

Mining establishments having--
Less than 10 employees.....
10 to 14 employees.....
15 to 19 employees.....
20 or more employees.....

3.54 Line caption.--A line caption describes the data on a given line of cells. Line captions are typed in lower case letters, unless the word is normally capitalized. Except where space prevents, the line caption is followed by leaders in the stub (series of periods, if typed or printed by the computer; series of short closely spaced dashes, if letterpress). The leaders help the reader line up the figures with the descriptions in the captions.

To save space in a stub, center heads can be changed to line captions in the form of a total line, but this must be done consistently within a table.

EXAMPLE 12.

Acceptable:

MALE

Persons 12 years old and over.....
Labor force.....
Employed.....
Unemployed.....
Not in the labor force.....

Could be changed to:

Male 12 years old and over..
Labor force.....
Employed.....
Unemployed.....
Not in the labor force.....

"Total" lines are special cases of line captions. In tabular presentation, the term "total" is subject to a number of different

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interpretations. Where standing alone on a line, the word "Total" generally implies that the figure entries on that line represent the summation of the sub-entries. "Total" also may signify the whole and thus be a class in itself; for example, the "Total" of the urban and rural classes. As a rule, the use of the term "Total" in several places in the table (in the boxheads as well as the stub, for example) should be avoided. The term should be changed to a more specific description. For example, rather than having "Total; Male; Female," the designation could be "Both sexes; Male; Female."

3.55 Block.--A block is a distinctive segment of the stub consisting of a group of related line captions with their heads and subheads. Usually the block is a self-contained unit. A stub may consist of a single block, a series of repeated blocks which are identical except for changes in heads, or a series of independent nonrepetitive blocks different in content and coverage.

3.56 Space breaks and indentation.--Space breaks are inserted at regular intervals in a stub, to improve legibility. For this use, reader space breaks are usually inserted in solid blocks of more than 10 or 15 lines. For analytical purposes, space breaks separate lines or groups of lines in terms of analytical relationship. Where tables in a series have identical stubs, placement of space breaks should be the same for each table.

The effectiveness of the stub arrangement depends on proper vertical spacing of the center heads and line captions. The headings and total lines should always tend to "sit" close to the material to which they relate. If space is provided below a center head or total line, the same amount of space must be left clear above it; preferably, the space above should be greater than the space below (see example 13). Also, if horizontal rules are used, space must be allowed for drafting such lines.

EXAMPLE 13.

Correct:

ALL INDUSTRIES

Total number of establishments...
Less than 10 persons engaged.....
10 to 19 persons engaged.....
20 or more persons engaged.....

MANUFACTURING

Total number of establishments...
Less than 10 persons engaged.....
10 to 19 persons engaged.....
20 or more persons engaged.....

MINING

Total number of establishments...
Less than 10 persons engaged.....
10 to 19 persons engaged.....
20 or more persons engaged.....

Incorrect:

ALL INDUSTRIES

Total number of establishments...
Less than 10 persons engaged.....
10 to 19 persons engaged.....
20 or more persons engaged.....

MANUFACTURING

Total number of establishments...
Less than 10 persons engaged.....
10 to 19 persons engaged.....
20 or more persons engaged.....

MINING

Total number of establishments...
Less than 10 persons engaged.....
10 to 19 persons engaged.....
20 or more persons engaged.....

The indentation, as well as space breaks, can be used to improve the understanding of the stub information. An indent pattern emphasizes and clarifies relationships between a total and its immediate sub-entries. Normally, indentation of the grand total line is

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recommended. This places the more numerous sub-entries at the margin, and allows more space for long line captions. To avoid confusion, an indented total line must always carry a space break above it; very often there is a space break (of less depth) below it. In some instances, placing the total line flush with the margin is clearer. In example 14 below, indenting the total line makes it possible to bring the longer line captions out to the margin.

EXAMPLE 14.

Preferred:

Economically active population 14 years old and over.....

Agriculture, forestry, fishing.....
Mining and quarrying.....
Manufacturing.....
Electric light and power, gas services.....

Water and sanitary services.....
Construction.....
Transportation, storage, communication.....
Wholesale and retail trade.....
Services.....

Satisfactory:

Economically active population 14 years old and over.....

Agriculture, forestry, fishing....
Mining and quarrying.....
Manufacturing.....
Electric light and power, gas services.....

Water and sanitary services.....
Construction.....
Transportation, storage, communication.....
Wholesale and retail trade.....
Services.....

In example 15, however, indenting the total line for the Provinces is confusing; the rural entry appears to be a subtotal for the Provinces that follow.

EXAMPLE 15.

Clear:

Catedral.....
David.....
Estrella.....
Urban.....
Rural.....
Falcon.....
Girardot.....

Confusing:

Catedral.....
David.....
Estrella.....
Urban.....
Rural.....
Falcon.....
Girardot.....

3.57 Unit specification.--Specifying the unit of presentation is required when the unit differs from one part of the table to another, particularly from line to line. If the same presentation unit prevails throughout the table, it should be made clear in the title or in the headnote.

Where unit indicators are required in the stub, they are placed at the right of the given stub line. Leaders are run solidly between the line caption and the indicator. The indicators usually line up on the right and are followed by two leader dots.

EXAMPLE 16.

Age group.....(years)..
Number in age group.....(000)..

3.6 *Field*

The field is the depository of statistical or other information. It extends from the bottom rule of the boxhead to the bottom of the table, and from the column rule at the right of the stub to the right-hand edge of

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the table (or in fractional-measure tables, to the next repetition or continuation of the stub).

3.61 Cell.--The cell is the basic unit of presentation. The description of a cell entry consists of the combination of the line caption and the column caption, which in turn are supplemented or qualified by related center heads and colon lines in the stub and applicable spanner heads in the boxhead.

Normally each cell should contain an entry of some kind--either a figure, a reference symbol, or a word. For uniformity, it is generally preferable to aline cell entries at the right of the column (allowing space for drafting vertical lines and some "bear off" or white space) rather than to center them in a column. Cells left completely blank are subject to misinterpretation. Blanks are particularly objectionable where the user is unable to tell whether the cell was deliberately left blank or whether it is a mistaken omission. Where such confusion is likely, a dash (—) is entered in an otherwise blank column. A footnote symbol standing alone in a cell is enclosed in parentheses; normally this indicates that information for that cell is not available or the data are not provided for some other reason.

3.62 Unit indicator.--The unit indicator (or unit of quantity) is intended to make clear the exact unit of measurement to which the statistics refer; for example, number, percent, dollars, years. The unit indicator usually appears in the stub or boxhead, but occasionally appears in the field. If part of the field, the unit indicator is placed at the top of the column to which it applies, on the line above that allocated to the first line of data.

3.7 Footnote

As the term implies, a statement or note inserted at the foot (bottom) of a table is a footnote. A footnote may be (a) a specific reference to a designated portion of a table, (b) a source note, or (c) a general note referring to the table as a whole or a major portion of it.

Brief wording of footnotes is desirable; superfluous words should be omitted. It is not necessary to include such words as "These statistics" or "This item." Even though not a complete sentence, the footnote always ends with a period. Footnotes are often typed in smaller size type than the rest of the table. The first line is indented, while the second and subsequent lines are flush with the left margin of the table.

3.71 Specific footnote.--As compared with a headnote, which refers to the table as a whole, the specific footnote explains a certain cell entry, a line caption, a column heading, or a word. However, a footnote reference is never attached to a table title or a headnote.

Reference symbols are necessary to refer the reader from one part of the table to another. A reference symbol in the body of a table means that an explanation with that symbol will be found in the footnotes. Arabic numerals are the preferred type of reference symbol, and in typewritten copy they may be superior numerals (^{1}) or raised numerals in a modified caret ($\overset{1/}{=}$).

Each table in a series is assigned an independent series of reference numbers, beginning with "1" in each case. For multi-page tables, the numbering of the footnotes may start anew on each page and the footnotes

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placed at the bottom of the affected page; or the references may be numbered as a continuous sequence throughout the table and the footnotes gathered together at the end of the table. In this latter case, each page except the last should carry the note "See footnotes at end of table." (This note carries no cross-reference symbol.)

In column headings and line captions, the reference symbol is placed after the affected word, phrase, date, or figure. In cells, the symbol is placed in front of the affected number. In blank cells, the symbol is placed within parentheses and is alined at the right of the column. Whether in text or tables, footnote references are placed in sequence from left to right, including the stub and boxhead and proceeding line by line. When an identical situation in several places within one table calls for the same footnote, the same reference symbol is placed at each situation. The number to be repeated is the one used in the first instance.

EXAMPLE 17.

Employed persons[1].....	884	389	255	240
Wage and salary workers.....	629	352	[2]110	167
Self-employed workers.....	158	([3])	85	73
Unpaid family workers[4].....	97	37	[2]60	([3])

[1]Includes persons with a job but not at work during reference week.
[2]Seasonally adjusted.
[3]Not applicable.
[4]Worked 15 or more hours during reference week in a family enterprise.

The footnote reference symbol must be placed precisely. When it appears against a cell entry, it applies to that one entry only. When a reference symbol is placed against a column head, the footnote applies to all entries in the entire column. The same is true in the case of footnoted spanner heads where all entries in the spanned columns are affected. When a reference symbol appears against a stub center head, the footnote refers to all entries in the block. When an entire line of figures is to be qualified, the reference symbol is placed against the stub line entry.

Footnotes are placed in order of reference number. Whenever possible, each is placed on a separate line, with the reference symbols lined up at the left. When space is a problem, however, the footnotes may be arranged across the page, following each other. Recurrent footnotes must appear on each page affected, even though the number symbol may be out of order. Footnotes to text tables are placed below the text table, whereas the footnotes to the text itself are placed at the bottom of the page.

3.72 Source note.--The source note indicates the specific source of the statistics. (Such a note need not be used if the table presents survey results directly and the report is a primary source.) A source note might reasonably be considered a distinctive component of a statistical table rather than a type of footnote. It is placed at the bottom of a table, following specific footnotes; it is introduced by the word "Source" followed by a colon.

3.73 General note.--The general footnote is a statement which qualifies, describes, or explains the table as a whole, or an easily identified major portion of it. In concept, it is virtually identical with the headnote. The general footnote is appropriate where the desired explanation is too long to permit incorporating it in a headnote or the nature of the discussion makes headnoting inappropriate.

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It is introduced by the word "Note" or "General note" followed by a colon, and is placed at the bottom of the table following specific footnotes but preceding the source note, if any.

3.8 *Horizontal and vertical rules*

There are varying types of single rules according to weight (hairline, medium weight, and bold) for vertical and horizontal use. In the typing of a table, space should be allowed for subsequent drafting of the horizontal and vertical rules.

3.81 Horizontal rules.--A single bold rule is used as the top rule of the boxhead, and runs the full width of the table. A medium weight rule is used at the bottom of the boxhead to set it off from the remainder of the table. It is also used at the bottom of the table, running the full width of the table. This line designates the end of the table (not necessarily the end of the page). Note that when a table is continued from one page to another, the bottom rule of the table falls only on the last page. The single hairline rule is used to distinguish additive totals. The line may be continuous, or each additive total may be individually underlined; in either case, the rule does not run through the stub. (In letterpress, boldface type is generally used for additive total captions.)

3.82 Vertical rules.--The single hairline vertical rule is the standard tabular rule. It is normally used at the right of the stub and at the right of all columns which are not total columns or panel-ending columns. However, no vertical rule is placed after the last column on any table page (except that the last column on the left-hand page of a parallel table carries a hairline column rule). The single medium vertical rule (heavier than the hairline rule) is best used to set off independent segments or panels. It need not be used, however, when the independent segments are narrow and appear often on a page; in these cases, the hairline rule is used. The single bold rule may be used to set off additive totals--total columns or panels. Where the totals represent summations of the series of columns that follow, the total column or panel carries a bold rule at the right. The bold vertical rule may be used to set off parts of a fractional-measure table; in this case, the rules precede the new stub.

4. *STRUCTURAL TYPES OF FORMAL STATISTICAL TABLES*

Structural type refers to a classification of tables according to the physical combination of their major structural parts--particularly the boxhead, stub, and field. Available space is the determining factor, so much so that a table which would be one structural type on a large page might necessarily become another type on a small page. The most common structural types used in a statistical report are the narrow table and fractional-measure table.

4.1 *Narrow table*

The narrow table is used most frequently. It has a single stub which applies to the data across the entire page, and a single boxhead which applies down the full depth of the table (see exhibit III-6-2). It is the simplest in basic pattern and the most readily understood. It is called "narrow" because it is placed upright on the page, with the printing running across the narrow dimension of the paper.

One form of the narrow table is the multipage narrow table, which requires two or more pages. This type of table has a continuous boxhead but the same stub (the boxheads change from page to page). Another form of the multi-

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page narrow table has a continuous stub but the same boxhead from page to page.

4.2 *Fractional-measure table*

The term "measure" is a printing term referring to the width of the type page. The fractional-measure table, therefore, is one in which the stub and data columns require only a part of the width of the page. It may be half-measure or doubled; third-measure or tripled; fourth-measure or quadrupled; and so on. The half-measure (doubled) table is the typical case (see exhibit III-6-3). The fractional-measure form is used when the table is not wide enough to spread across the page, yet it is narrow enough so that both the stub and the columns can be doubled (tripled, quadrupled, etc.).

4.3 *Other types*

Although the narrow table and the fractional-measure table are the most frequently used table forms, the tabular content in relation to the page size occasionally requires that other types be used. Among them are the parallel table and the broad table. Others are modifications or composites of the table types already described.

The broad table is used when the table is too wide for the normal width of the page but not wide enough to make a parallel table necessary. Is should be avoided where possible, since the page must be rotated (turned) to read the table (see exhibit III-6-4).

The parallel table is used when the form is so wide that is spreads across two pages, with no room for repeating the stub on the second page. Its use should be avoided whenever it is possible; this type of table is generally hard to read, and the requirement that is appear on facing pages complicates the make-up of the report and the table sequence (see exhibit III-6-5).

5. *FOLIO LINE*

The folio line is the first line on the page and consists of the running head and the page number; it is never to be considered a part of the formal statistical table. The folio line appears on every page except the pages containing the title, the list of officials, the preface and acknowledgments, the contents, and the first page of each chapter.

Normally, the left-hand running head is the title of the publication and the right-hand running head is the title of the chapter or other division of the report. Another common practice is to have the left-hand running head provide the chapter title in brief and the right-hand running head give the section title in brief. If the report is fairly short, or contains no major divisions such as chapters or exhibits, the running head frequently is omitted.

In this document, the running head for the left-hand pages is the title of the publication, which is "PROVIDENCIA: A Case Study in Economic Censuses." On the right-hand pages, the folio line consists of the Chapter No. and title preceded by the Unit No., to facilitate ready identification of each page. In the portion containing the exhibits, the running head consists of the word "Appendix." In the Appendix, the Unit No. and Chapter No. are omitted from the folio line since they are part of the exhibit number itself.

6. *TYPE SPECIFICATIONS AND TABLE ARRANGEMENT*

The kind of type used for a report depends on whether the preparation involves computer print-out, letterpress methods, or offset methods employing a typewriter. The distinction among the levels of subjects and classifications in a table rests on various combinations of boldness (blackness) of type

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face, selected type size, and capitalization. A reader cannot be expected to note, or remember, subtle distinctions in boldness, type face, or type size. To be of value, level distinctions must be obvious; otherwise they will distract the reader from the subject matter of the table. To distinguish levels in offset work prepared with a typewriter, as is generally the case for a relatively small publication, reliance must be placed largely on capitalization, since type size, face, and boldness usually cannot be readily achieved by typing. However, there are typewriters now available which offer a greater flexibility in type style and size.

A clear understanding of the data in a table depends not only on the size and kind of type used but also on the spacing and the arrangement of the items and the figures. For easy reading, some white space should be allowed between columns and between subjects or groups of related items in the stub. At the same time, the space from the stub to the figures or between columns should not be so great as to make it difficult for the reader to follow the lines of data. Balance should be maintained between the width of the stub and the width of the field.

In the stub, a system of indentations and reader and analytical breaks contributes to legibility. If total figures are underlined, space must be allowed for drafting of such horizontal rules. Where center heads are used to separate groups of related items, the space above the center head should be greater than (or at least equal to) the space below it. In the boxheads, as in the stub, space must be allowed at each level and column for drafting the horizontal and vertical rules.

The width of a column is determined both by the number of digits in the largest figure (allowing for commas, decimal point, and space for drafting vertical rules) and the amount of word description required to identify the column. For example, a figure of 278,006.7 requires a minimum of 9 typewriter spaces (including the comma and decimal point) and the words "establishment's man-hour report" require 31 typewriter spaces, counting the hyphen, apostrophe, and spaces between words (but not the quotation marks which in this case only indicate the words being considered). The equivalent of one typewriter space could be allowed for drafting a vertical rule; as width permits, additional space may be allowed as the "bear off" or white space between columns. As a general rule, a mixture of very wide and very narrow columns should be avoided either by deepening the boxhead or allowing a little more space in some of the narrower columns or in the stub.

Frequently, the size of the tabular page imposes space limitations on the arrangement of the data. If the report contains many tables and it is necessary to conserve on the number of pages, the tables may be typed on larger sheets (appropriately proportioned in length and width, allowing for margins at top, bottom, and both sides), then reduced to the page size used for the report. Such reduction, however, generally should not exceed 45 or 50 percent.

In this document, the size of paper used is 8 1/2 inches by 11 inches (or approximately 21 1/2 centimeters by 28 centimeters). The maximum image size after reduction is about 7 inches by 9 1/2 inches (or approximately 17 1/2 centimeters by 24 centimeters), including the running head. For the most part, text material was typed for 15% reduction. For the exhibits, however, the amount of reduction varied depending on the nature of the material. Dimensions for the typed page are shown in exhibit III-6-6.

For example, the desired maximum width for a page which is to be reduced 15% is 98

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typing spaces on an elite typewriter (12 spaces per inch or 12 spaces for each 2.54 centimeters), and the depth (including the folio line) is 68 lines. The dimensions would vary proportionately if wider margins are desired or if the size of the paper is increased or decreased.

The mechanical aspect of tabular presentation should be thought of as a tool of presentation, not as an end in itself. In the last analysis, the purpose is to make clear to the reader the significance of the data being presented.

7. SPACING AND PAGINATION OF TABLES

The main objectives of the spacing and pagination operation by the publications planner are as follows:

(1) To determine which data lines appear on a particular page of a table so that the worksheets for posting final figures can be prepared to conform to a final printed page.

(2) To determine the number of pages for each table for (a) ordering preprints if necessary, and (b) drafting non-preprints, usually after the actual typing of figures.

(3) To bring each table to the exact specified width and depth (if a full-page table) required for the already determined amount of reduction for the census reports.

An important byproduct of paging a report is estimating the cost of reproducing it, and relating this cost to the money set aside for publication purposes.

The entire set of table outlines and table titles should be reviewed by the publication planner for consistency and accuracy--for example, the order of presentation of census years, industries, areas, and other characteristics.

The planner is also to review the set of outlines to see if the presentation could be improved. This can be achieved in several ways: the tables themselves could be rearranged; combinations or splits of tables could be made; the order of the data presented in either the box or the stub could be changed; perhaps even combinations of lines in the stub, or columns in the boxhead, would improve the appearance of the page. Suggestions of this type must be cleared with the subject matter specialist before any changes are actually made.

Concurrent with the planner's review of the table outlines, he is to determine the horizontal and vertical spacing of the stub and the columns. This may have some effect on combinations and splits of tables and columns. Once the planner's review has been initiated, work can proceed on the following:

(1) Typing of worksheets. This operation does not have to be delayed until all tables have been paged.

(2) Preparation of copy to the printer for preprints so that all copies will be completed at nearly the same time that the pagination is finished.

8. PREPARATION OF WORKSHEETS

The basic objective of the worksheet is to provide the formats to which the tabulated statistics will be posted, and from which the final tables are to be typed (unless printed by computer). Each worksheet is to contain the data that will be shown on a particular publication page in the census reports. Worksheets are set up as follows:

(1) The typist is to be given the table outlines and the pagination scheme as worked up by the publication planner.

(2) The title, headnote, boxhead, stub, and footnotes, if any, are to be typed in complete detail on worksheets. For ease in handling, these worksheets are to be uniform size. Each worksheet should contain the space for all data that will appear on a published page.

(3) Although the paper itself is of uniform size, the tables need not run the same width. In many instances, the number of columns vary from table to table and

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space need be provided for only the number of columns required.

(4) On some tables the stub detail, except for centerheads and/or total lines, is identical for several pages of a particular table. The number of typings of such a page is to be eliminated by making 1 or 2 additional copies of the detail and then inserting the appropriate centerheads and total lines on each sheet.

9. *PREPARATION OF PREPRINTS*

The purpose of a preprinted table form is to provide typeset copy of a table format if many pages are required. It eliminates the typing of either the boxhead or the stub, or both, and manual drafting of columnar rules.

Whenever more than six copies of a table form are needed, preprints should be ordered. These forms are to have the folio, title, headnote, vertical rules, and either the stub or boxhead or both. The copy for the printer should be typed with the columns the exact width as planned.

Exhibit III-6-5 can be considered a preprinted format. If a similar table is prepared for each county in Providencia, a format such as exhibit III-6-5 could be printed in advance and the figures could be typed onto the form for each county. If the tables are produced by computer, it is not necessary to have preprinted formats.

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Unit IV

DATA COLLECTION OPERATIONS

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Chapter IV-1. ENUMERATION REQUIREMENTS

1. INTRODUCTION

The kind of industrial census envisioned in this case study depends for its success on well-organized field operations, carefully planned in advance and carefully supervised while in progress. The quality of the results will be no better than the quality of the data as reported by the interviewer. Recognizing this importance, the NSO made the Field Operations Division responsible for the data collection operations. By centering the responsibility for this key function in one division, the Executive Committee found it easier to supervise the data collection and insure its success.

1.1 Timing

The starting date and the length of the enumeration period are extremely important in any census. The starting date should be as close to the end of the census reference year as possible; as time goes on, the number of firms whose records for the census year will be unavailable, will increase because of going out of business and other reasons. The length of the enumeration period should not be too long because of the mobility of the population; this may result in counting establishments more than once.

Fortunately, the industrial "population" is much less mobile than in the general population; consequently, the collection effort can be spread over a relatively long period of time if necessary. Taking the above into account, and considering that the number of enumerators, staff experienced in training and supervision, travel time, and the funding available were limited, the Executive Committee decided to start data collection in February 1976 and allow a 10-week enumeration period.

1.2 Enumeration plan

Two methods of enumeration were used in the census: (a) the mail-out and mail-back method and (b) canvassing. The first method was used for multi-unit establishments, establishments with 100 employees or more, electrical power plants and stations, gas manufacturing and distribution plants, and government owned-and-operated establishments. The canvass method was used for all other types of establishments.

1.21 Mail-out mail-back method.--A mailing list was put together of all known establishments that fit the above criteria. It was assumed that these types of establishments would have personnel available who were capable of completing the census questionnaire. In addition, in any industrial census where multi-unit enterprises are frequently encountered, the training of the enumerators is much more difficult since elaborate and complex procedures are necessary if the canvassing method is used. In Providencia, as in a great many countries, these types of establishments are so few that the operation was conducted from the central office by a small group of staff experts, who needed minimal training.

A list of these establishments (referred to as the skip-list) was given to the enumerator so that he would know, when canvassing his area, that he was not to enumerate them; he was to list them on his Form 123, however.

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If the enumerator discovered an establishment that was part of a multi-unit company, a gas or electric establishment, or a government owned-and-operated establishment that was not on the list, he was not to enumerate it but to notify the central office as soon as possible of its existence. However, if he discovered a manufacturing or mining establishment with 100 or more employees that was not on the list, he was to enumerate it.

1.22 Canvass method.--A number of considerations led the NSO to choose this type of method for the majority of the establishments. The chief reasons were the rather low level of literacy in the general population and the lack of an adequate mailing list, rather than the quality of mail service.

Each of the counties was divided into enumeration districts (ED's) with one enumerator assigned to an ED. In some cases an ED was a whole county or ward. The enumerators were expected to canvass their ED's in a systematic manner, listing all regular establishments and enumerating all the establishments which were not on the skip-list (except a manufacturing or mining establishment with 100 or more employees, noted above). This meant that the enumerators had to be trained in the use of both the long and short forms.

One of the alternative plans considered was to have two sets of enumerators. One group would enumerate only establishments with less than 10 people engaged and the other would enumerate all establishments with 10 or more persons engaged. The NSO decided the workload was not sufficiently large nor was it sufficiently concentrated (except in Estrella Province) to justify the complex procedures and additional enumerators that would have been necessary with two types of enumeration procedures.

2. PERSONNEL REQUIREMENTS

Using the methods described in Unit II (chapter II-5), it was estimated that the services of 100 persons would be required in the field enumeration, in addition to a maximum of two-thirds of the time of the 216 county agents (actually only 215, considering that the agent for Estrella County did not take part). Prior to the field work, a county-by-county analysis of the workload was undertaken. For each county, the NSO prepared estimates of mining and manufacturing forms (long and short forms), rural and urban establishments, and household screening interviews in sample areas. Conditions requiring an abnormal amount of travel per completed interview were taken into account. Some aspects of this analysis are summarized in exhibit IV-1-1, which presents overall workload estimates for the average county and the average ward in each province, with separate figures for Estrella County.

This detailed analysis made it possible to identify the counties where the estimated workload was so low that the county agent himself could easily handle all of the data collection, and those which would require additional personnel. In some provinces (for example, Trocadero Province) there were a few counties where previous information indicated that there were no industrial establishments. It was still necessary to canvass these counties, however, because the preliminary estimates did not necessarily include all existing establishments. Estrella County, at the other extreme, was estimated to have 6,000 establishments--an average of over 350 per ward. It was this situation which led the central office to decide to supervise the enumeration of Estrella County directly from the provincial field office.

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The estimates of personnel requirements were transmitted to the provincial field offices, which were then better prepared to anticipate recruitment and training needs. In the fall of 1975, the estimates were given to the county agents by the provincial offices, in ample time for corrections and amendments based on the county agent's knowledge of his own territory.

As mentioned in Unit II, the NSO had a cadre of professionals in the province offices who could be used as provincial supervisors. In addition, the Ministry of Agriculture provided the part-time services of 216 county agents who could be used as enumerators or field supervisors in most of the counties. The exception was Estrella County, in which there was a higher concentration of industry and had to be handled separately. With the use of the county agents, the number of enumerators and supervisors that had to be hired from the outside was minimal. Chapter IV-2 discusses the recruitment and training of the personnel.

The total number of persons to be recruited, as distinguished from NSO regular employees or county agents, was estimated to be at least 80. Actually, the number hired was approximately 125, both because of the under-estimation of the workload and because some enumerators did not stay on the job for the full collection period. Budget-wise, the NSO central office was prepared to cope with this additional expense, which had been included in the contingency fund discussed in chapter II-4 (amount labeled "not specified").

3. *ROLE OF AGRICULTURE COUNTY AGENTS IN INDUSTRIAL CENSUS*

3.1 Agricultural statistical program

Under the law in Providencia, the Ministry of Agriculture, through its Farm Statistics Office (FSO), is responsible for taking a census of agriculture every 10 years. In that census, statistics related to farms are collected and compiled--such as number and size of farms, acreage devoted to each crop, income, assets, liabilities, expenditures, farm equipment, livestock, sociological characteristics of farm operators, and the number of full- and part-time farm workers. The Farm Statistics Office is also responsible for issuing periodic reports (monthly, seasonal, and annual) on farm-related subjects such as the current production and inventories of processed farm products like butter, cheese, grain products, canned fruits and vegetables, and frozen products. Statistics are collected both from factories and from farmers producing for their own use and for sale.

Current statistics on the production and distribution of fluid milk are compiled at three stages: farm production, wholesale distribution, and retail distribution. Another important series of reports, issued at irregular intervals during each crop season, are the estimates of the probable amount of each of certain key crops to be harvested.

Since much of the nation's gross national product is derived from agricultural products, estimates of the future production have an important bearing on prices and inventories in general. The Farm Statistics Office thus provides extensive statistical services on subjects related to agriculture, at intervals varying from one month for some of the current surveys to 10 years for the censuses of agriculture.

To tabulate the results of these surveys and censuses, the Ministry of Agriculture uses the data processing facilities of the National Statistical Office. This arrangement contributes to efficiency, because the

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training, skills, and special equipment needed for data processing are centralized and more fully utilized. The agriculture questionnaires are edited and prepared for card-punch by Farm Statistics Office personnel, then turned over to NSO for punching, tabulation, and tabulation review (another and final review of tabulations is then performed by FSO statisticians prior to publication).

3.2 *Conditions of employment*

The confidentiality of information provided to the Ministry of Agriculture is protected by provisions of law similar to those governing the National Statistical Office. Respondents are assured that no one other than sworn employees will have access to the completed questionnaires, and that they will not be available for taxation, investigation, or regulation. For Providencia, the complete provisions of the law applicable to industrial censuses and surveys are given in exhibit II-1-1. These provisions are similar to those governing the operations of the Farm Statistics Office. Before entering on duty, all employees of both NSO and FSO are required to take an oath of office; that is, to swear to uphold all of the provisions of the law applicable to various statistical activities.

3.21 Dual employment.--In the tabulation arrangements referred to above, it is obvious that data processing personnel of NSO would have to examine agriculture questionnaires. This access would violate the agriculture legal provisions, so that all persons who have such access are sworn employees of FSO also. Their employment is thus dual; they are employees of both agencies. Since the Agriculture County Agents are also active in projects of both agencies, they are sworn employees of NSO in addition to the FSO.

3.22 Time spent on census.--During the data collection period, the county agents were instructed by the Ministry of Agriculture to devote no more than two-thirds of their time to the industrial census. They were able to contribute this proportion of time to the census by curtailing or postponing regular Ministry of Agriculture projects where possible. The agriculture agent was empowered to hire additional employees if the advance estimate of the industrial census workload, or the workload as it became evident from day-to-day operations, made it clear that two-thirds of the county agent's time would not be sufficient, or if because of the pressure of necessary Ministry of Agriculture work he could not contribute two-thirds.

3.3 *Responsibilities of county agents*

Data collection in the field is only one of the responsibilities of the Agriculture County Agents. They are also expected to be in close touch with the farmers in their county, to inform them as to the latest research developments, legal requirements, and other central Ministry of Agriculture activities, and to advise them regarding problems of pest control, fertilization, cultivation, animal husbandry, and equipment availability and upkeep. As experts on agricultural problems, the county agents are citizens of stature and are respected in their counties. The county agents' training in statistical collection methods and in the supervision of enumeration of both farm operations and farm-related industrial operations made them natural candidates for a key function in the 1975 Industrial Census, that of collecting data or supervising the collection of data in the field. There was a single exception made: in the county of Estrella, where there is a high concentration

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of non-agricultural industrial establishments, responsibility for field operations was centered directly in the NSO provincial field office.

For all areas, the NSO central office handled the collection of data from establishments of multi-unit companies (those operating more than one establishment), government owned-and-operated establishments, any establishment with more than 100 employees, and electricity and gas plants. Except as noted for Estrella County, the agents were in charge of collecting data from all other types of establishments.

4. *SUPERVISION*

To expedite the transmittal of questionnaires to the NSO central office, the county agents sent the Forms 123 and their accompanying questionnaires directly to NSO. The provincial field offices received a copy of each Form 123, however, and were thus kept informed in detail of the progress of enumeration in each county. Subsequent contacts between the central office and the county agents, such as questions about questionnaires or other reports, were routed through the provincial field offices. Therefore, except for the flow of completed questionnaires to the central office, all contacts between the county agents and NSO were handled by the provincial field offices. The central office regarded the provincial offices as responsible for the orderly completion of enumeration, and expected regular reports from them on the progress of field work. Thus, the county agents regarded the provincial field offices as their supervisors for the industrial census. They looked to the provincial field offices for general guidance, supplies of materials, payment to enumerators, and reimbursements for out-of-pocket expenses.

The enumerators who supplemented the county agents were under the supervision of the agriculture agents. The one exception was Estrella County, where enumerators were supervised directly by field supervisors who were in turn responsible to the Estrella Provincial Office.

5. *COMPENSATION*

The county agents continued, as usual, to be paid by the Ministry of Agriculture. Time spent on the industrial census accounted for a proportion of the county agents' salaries during the 4 1/2 months when they were engaged in the census, either in the canvass of regular establishments or in the special survey of industrial activity in households. The Ministry of Agriculture was later reimbursed for the services of the county agents through a transfer of funds budgeted for the industrial census.

In addition to their salaries, the county agents were reimbursed directly by NSO (through the provincial field offices) for out-of-pocket expenses incurred by them. Claims for payment were made on Form 124 (see exhibit IV-1-2). In filling out Form 124, the county agent followed the instructions in the Pocket Manual except that for items (1) and (2), establishments enumerated and hours worked, the "Rate" and "Amount" columns were left blank. An extra copy of Form 124 was made for the Ministry of Agriculture to constitute a record of work done on the industrial census by county agents.

There are two principal methods for paying enumerators: (a) by the hour or day or (b) by the work unit (work units could be establishments, questionnaires, housing units, or the like). Payment by the work unit is usually preferable from the point of view

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of administration because the cost of enumeration can be calculated more precisely in advance and enumerators are motivated to work harder and longer. Also, the time needed to certify payment is reduced because the work unit consists of one item for payment; if it is of acceptable quality, there is no question that payment should be made; on the other hand, the quality of completed questionnaires suffers because the enumerator is anxious to complete a larger number even though accuracy is somewhat reduced. Payment by the hour or day usually means that the quality of the data is improved, but the cost of enumeration is harder to estimate, enumerators are not motivated to work more than the set number of hours, and most such systems call for elaborate control of expenditures by checking production records, distances travelled, and other cost factors against claims for compensation.

A further difficulty is inherent in industrial censuses: establishments, which are the most useful work units, differ greatly in size. It would be unreasonable to pay an enumerator the same amount for a short form interview which takes half an hour as for a long form interview which may take several hours with two or three call-backs. Basing the rate of payment on the size of establishment is not satisfactory either, since among establishments of the same size, some may present no problems because respondents fill the questionnaire themselves, while others require a large amount of time on the part of the enumerator. Consideration of these problems led the NSO to pay enumerators on an hourly basis except in the city of Estrella; here the workload was sufficiently large and concentrated enough geographically that the enumerators were paid on a piece-rate basis.

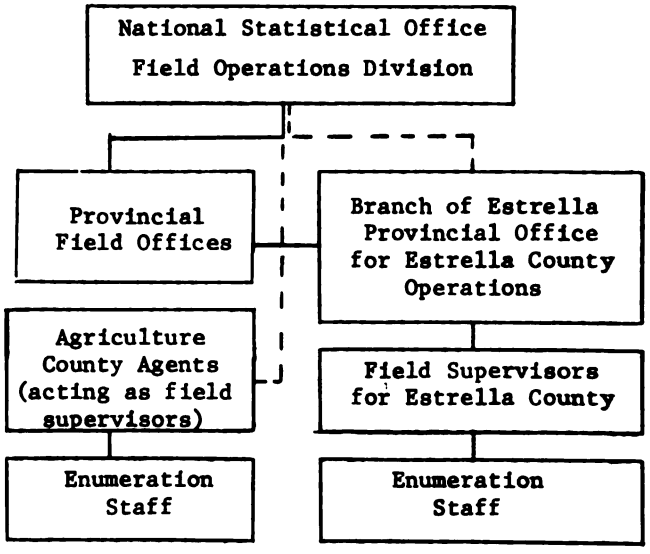
As with the county agents, the enumerators were reimbursed for actual amounts paid out for travel on official business and other authorized expenses such as telephone calls. They filed weekly claims with their supervisors on Form 124. The supervisor forwarded the claims to the provincial office, which in turn authorized payments. The payments were forwarded to the enumerators within 3 days after the province office received the claims.

In Providencia's 1975 Industrial Census, there was no extra compensation for exceptionally meritorious work or good work suggestions. There is no doubt that extra compensation does stimulate extra interest and diligence, however; in any census undertaking some way of compensation of the field staff for unusual effort should be considered. In the case of the county agents, for example, it could have been decided to pay each of them a bonus at the conclusion of census field work. The size of the bonus could have been based on workload.

6. *FIELD ORGANIZATION*

Providencia did not need an elaborate field organization since the mail and telephone service were quite adequate and a minimum of field supervision was needed. The chart below illustrates the field organization.

Figure 1



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The solid lines denote a direct supervisory connection. The dashed lines indicate that (a) the branch of Estrella provincial office set up for Estrella County field operations reports administratively to the provincial office, and also deals directly with the central office in some matters such as the flow of questionnaires, and (b) the county agents transmit completed questionnaires and Forms 123 to the NSO, but report to the provincial offices in all other matters.

In some countries, considerations such as inadequate mail and telephone service or inexperienced enumerators needing close supervision may require a much more complex field organization and system of reporting. In large censuses, additional levels of supervision could be profitably employed. For example, the next step might be to introduce "crews" of enumerators and "crew leaders" who would report to the county agents. County field offices to receive and distribute supplies and provide field supervision and review may also be needed in some instances.

7. *ALTERNATIVE ARRANGEMENTS*

In the Providencia Case Study, the NSO took advantage of the availability of the county agents for data collection, and thus greatly facilitated the training of enumerators. There are conditions found in some countries where such inter-agency cooperation would not be possible or desirable. It may be believed that dual employment constitutes an undesirable weakening of the confidentiality provisions of law--many of the county residents may be familiar with the agents as Ministry of Agriculture employees, and thus would be very suspicious of any association with the National Statistical Office. Still another possibility is that NSO may have concluded that the time of the county agents was already so fully occupied that they would have been forced to limit their responsibilities in connection with the industrial census. In such a situation, it is almost certain that the NSO work would have suffered, rather than that of the Ministry of Agriculture where the first loyalty of the county agents would lie.

If the county agents had not been used, it would have been necessary for the NSO to hire and train several hundred enumerators, many of whom would not have had prior field experience. The elaborate training that would have been needed is not described in detail in this case study. Preparation of training materials alone consumes several man-years of work.

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Chapter IV-2. RECRUITMENT AND TRAINING

1. RECRUITMENT

The county agents had the responsibility for recruiting and selecting their own enumerators. In the few instances where the agent was unable to find qualified individuals, the provincial field offices, and in rare cases even the central office, assisted him. Before training began, the agent was expected to have a suitable number of candidates ready to go to the provincial field office for training.

The county agents had acted as district supervisors in the Providencia Census of Population for 1970. In this project, approximately 12,000 enumerators had been employed for a short period. Even though several years had elapsed, some of these persons were available for the industrial census. These employees were known to the county agents, their 1970 work records were available, they had experience in dealing with the public, and they were the most favored candidates for the new positions. Similar experience in collecting data for the surveys of the Ministry of Agriculture was also considered highly qualifying, and the employment of persons with such experience was encouraged.

In counties where the number of persons with prior experience was not sufficient, candidates were sought from other sources. In general, to qualify as an enumerator, the candidate had to be able to understand and remember written instructions, explain himself clearly, write legibly, and have some ability at arithmetic computations. Familiarity with map reading was regarded as helpful. Perhaps most important of all, some familiarity with the fairly complex concepts in the census was considered essential before the enumerator began work; for example, it was desirable for him to know the difference between employees and other persons engaged, the concept of plant man-days, inventories, acquisition of fixed assets, the difference between products made in the establishment and resales, etc. Although these concepts were explained in the Enumerator's Pocket Manual, it was preferred that enumerators should not have to consult the manual while they were engaged in an interview, but they should be able to explain the definitions clearly and concisely, without hesitation. This ability was considered particularly important when the potential respondent tended to be uncooperative.

Occupational groups that were contacted because they offered promise as potential enumerators were school teachers, postmen, other government employees, salesmen, and small-business men. Individuals in these and other occupations were often glad to supplement their income by a short period of work for the NSO and, if employed, were able to arrange for a leave of absence from their regular activity.

Candidates for positions as enumerators were chosen by the county agents. However, they were not given final approval by the provincial field offices until after they had successfully completed the training.

2. TRAINING OF ENUMERATORS

Formal classroom sessions are only one aspect of a complete training program. Before classroom training begins, the candidate

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should address himself to a program of self-study. After classroom training, or even as part of it, the enumerator may receive on-the-job instruction in actual interview situations. The most common training of this type is where an experienced enumerator (for example, a county agent) accompanies an inexperienced person on one or more of his first interviews. Finally, consideration should be given to supplementary classroom instruction for enumerators whose performance on the job has been less than satisfactory.

2.1 *Self-study*

Classroom training is relatively costly. The organization sponsoring the training often must pay not only for training time but in most instances for travel expense, board, and lodging as well. The idea behind self-study is to get the potential enumerator to learn as much as possible before classroom training begins. Under some plans, he may be reimbursed for the time spent on self-study, but as a rule he studies on his own time in anticipation of qualifying himself for a job as enumerator.

Specially written self-study lessons have been found to be effective in introducing the potential enumerator to the basic concepts and procedures before the classroom training begins. Such lessons usually consist of a series of short paragraphs, each presenting a simple concept or setting forth the details of a procedure to be followed. These informational paragraphs can be followed by a statement with blanks to be filled in by the trainee, or by a number of answers of which the trainee selects the correct one. The trainee is supposed to fill the blanks or to check the boxes before he looks at the answers, which are in a separate section. If his answer is incorrect, he should try to determine why it is incorrect.

During the self-study training, the candidate may also be requested to fill test papers which are sent in to the office that is sponsoring the training. The corrected papers will then be returned to him so that he can see which topics require further study. Such tests provide some assurance that the trainee is completing his self-study course to the satisfaction of the training officers. If the trainee lives some distance away from the office where the training is to be conducted, transmittal of the test papers may be impractical because of the inadequacy of the mail service.

If in the judgment of the planners the general level of background experience is already high (previous employment as an enumerator, high educational level, etc.) it may not be necessary to go to the work of preparing special self-study lessons or test materials. In the 1975 industrial census, this was considered to be the case and the whole self-study program consisted of supplying the participants, in advance of classroom sessions, with material to read, such as the Field Enumerator's Pocket Manual, the census questionnaires and instructions, and the advance publicity booklet describing the census to the general public. This material had been prepared in advance for inclusion in the Enumerator's Field Kit, so that only a small extra cost was involved in treating it as material for the self-study program. The trainees were expected to be familiar with the contents of these documents before coming to class. Those who neglected reading the material in advance found that they were seriously handicapped when the classroom training was conducted.

2.2 *Classroom training*

At some point in the training program, the enumerators must be brought together for

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group training. If a self-study program has been used, the material of that program may be reviewed; otherwise, the material may be presented at this time. In the class sessions, some time should be devoted to some practice interviewing. The practice interviews should be designed to illustrate both the usual situations and some of the less frequent types of situations. Usually the trainer will act as the respondent while the trainees take turns acting as enumerators. If the areas to be enumerated are close to the training site, some practice in actual field interviewing may be included in the classroom training.

Generally, there will be some procedures and concepts which will be too complex to be learned by self-study and which should be taught in group sessions. Even if this were not the case, group training is still highly desirable. The interaction of trainees with each other and with the trainer will improve the understanding of the program by all persons involved. Furthermore, it often happens that group sessions uncover problems that were overlooked by those who planned the program. It is much better to uncover such problems at this point than to have them make their appearance after the field work has started.

The details for the practice interviews, if this technique is employed, should be prepared in advance, at least in the form of an outline for use by the trainer. If the trainer attempts to make up answers as the interview progresses, he will almost certainly get into trouble by giving inconsistent or unreasonable replies. The practice interview should not be too difficult or unusual, but two or three problem situations should be included or the training would be of little value. The trainer, acting as the respondent, should not reply too readily; he should sometimes hesitate to give information to simulate an actual interview. The trainee should be prepared to try to persuade the respondent to report, using the methods outlined in the Pocket Manual.

In the practice interview, an actual census questionnaire should be filled by the trainee, based on the information given him by the trainer. The completed questionnaire should be handed over to the trainer, who should review it for accuracy, legibility, and understanding of the concepts of the industrial census; later, the trainer should discuss any shortcomings with the trainee.

Training of enumerators for the census was divided into two parts: (a) instruction on enumeration methods and techniques, for those trainees who have had very little or no experience in census enumeration, and (b) instruction in census concepts and problems, illustrated mainly by practice interviews, with replies given by the trainer to inquiries on the census questionnaires. New enumerators attended the entire series of sessions, which lasted one week, while those with considerable prior experience attended for varying lengths of time, but in no case less than two days. The sessions were planned to deal with simple cases at first; gradually they became more difficult until the last two days were devoted largely to problems. The county agents decided how long each candidate should spend in classroom training. They themselves usually attended classes only for the last two days.

Trainers from the provincial field offices usually conducted that portion of the group session dealing with enumeration methods and techniques which did not require an intimate knowledge of the census questionnaires. The practice interviews during this part of the classroom training dealt only with simple

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situations involving short form questionnaires. Some time was spent on how to persuade reluctant respondents. For the last two days, training was conducted by a representative from the NSO central office, who discussed the more difficult industrial census concepts such as fixed assets accounting, inventories, use of materials, shipments, miscellaneous receipts, etc. Problems which the enumerator could expect to encounter in the field were also discussed, with the examples for the most part taken from the Enumerator's Pocket Manual.

2.3 *On-the-job training*

Regardless of how well-planned and how well-executed the training program may have been, much of it will not have meaning for the enumerator until he begins working. Consequently, some on-the-job training is necessary to solidify what has been taught in the classroom. If feasible, on-the-job training in nearby areas should start even before the classroom training is over.

In the Providencia Industrial Census, the county agents followed the practice of accompanying inexperienced enumerators on their first few interviews. Usually this observation took only a few hours, after which the new enumerator was on his own. Actual observation of an experienced interviewer in the field gave the new person an enormous advantage in practical information, and also helped to assure him as to his own ability to carry out the assignment by himself. In Estrella, where the classroom training was close by the areas to be enumerated, the third day of classroom training was devoted to on-the-job training, with field interviews being conducted by teams. In these interviews, the experienced member of the team was a person from the provincial field office or, in several instances, he was a statistician from the national office.

For the supplementary survey of households, which was part of the 1975 census, classroom training was conducted in many instances in the same areas where the sample fell. Under these circumstances, it was also possible to conduct on-the-job training as part of the classroom training.

2.4 *Final test*

A brief test was required of the trainees; the test was given during the afternoon of the next to the last day of class. The trainer reviewed the test results that evening and discussed them with all the trainees on the following day. The test was designed to cover several of the key features of enumeration techniques and as much of the content of the census questionnaires as had already been discussed.

2.5 *Supplementary classroom training*

In spite of careful training, the performance of some enumerators in the field was somewhat less than satisfactory. Their performance was judged by their supervisors on the basis of the questionnaires and the Forms 123 they submitted. In such cases, the supervisor then called the enumerator to the office, pointed out his mistakes to him, and suggested ways in which he might correct them. The parts of the training materials which the enumerator did not seem to have learned were reviewed. If more than one enumerator was involved, a small class was formed and, if convenient, the services of the trainer were again made available to conduct the class. This supplementary training in nearly every case served the purpose for which it was intended--to correct faults which the enumerator had exhibited in his early field work.

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3. *TRAINING OF COUNTY AGENTS*

As a group, the county agents were experienced in the collection of statistical data. Consequently, they spent an average of only two days in the training classes. Prior to the training class period, they were asked to study certain material such as the Pocket Manual, the census questionnaires, the control records, and the advance publicity booklet included in the Enumerator's Field Kit. Depending on the circumstances, other countries may find it necessary to devote a longer period than two days for training employees of other government agencies.

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Chapter IV-3. ENUMERATION MAPS

1. KINDS OF MAPS NEEDED

The accuracy of a field-enumerated census depends not only on good planning and an efficient program, but on the availability of reliable maps of the areas to be canvassed. Maps are important and essential tools. They are useful in preventing overlapping of jurisdictions and in avoiding omission and duplication of coverage. They help to locate establishments in scope for the census and assist in defining boundaries, not only for enumerators but for supervisors of data collection up to and including the central office. They are useful in preparing budget estimates of travel costs, in planning the location of field offices, and estimating the number of employees required in the field. The county estimates described in chapter IV-1, under the heading, Personnel Requirements, were prepared quickly and accurately with the help of large-scale maps of local areas.

Most of the maps used in the 1975 industrial census were adapted from those prepared by the Geography Division for use in the 1970 Census of Population and Housing. They contained some detail which was not needed for the industrial census enumeration. To a considerable extent, this disadvantage was compensated for by the fact that the county agents and many of the enumerators had been engaged in field work in the 1970 population census and were familiar with these particular maps. On balance, it was less costly to retain the unused features of the population maps than to remove them. As an example, many of the maps included Crew Leader Area boundaries; the crew leaders were first-level supervisors employed in the population census but not in the industrial census. The various maps that are described in the remaining sections of this chapter are appended as exhibits in Unit II.

1.1 Maps of the entire country

Based on the 1963 industrial census, a map of the entire country had already been prepared for use in the 1975 census showing, by province and county, the number of mining and manufacturing establishments and value added for mining and for manufacturing separately. Since these establishments varied in size from very small to very large, the figures on value added were needed to pinpoint the areas that required special attention because of their statistical importance. Electricity and gas establishments were not included because they were canvassed entirely from the central office of NSO and there was no need for most of the administrative and supervisory staff to be concerned about them. The map also showed natural features such as rivers, lakes, and mountains and man-made features such as railroads, major highways, cities, and towns. The map showed more detail than exhibit II-3-7.

The map was about 85 by 170 centimeters in size and was intended for wall-mounting. All the divisions of NSO concerned with the industrial census required one or more copies of this map. Copies were also sent to the provincial field offices.

As on other wall maps, flag pins could be used to indicate progress in the field enumeration. The copy mounted in the meeting

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room of the NSO Executive Committee, for example, was used to show the completion of enumeration in each county by inserting a red pin for manufacturing and a blue pin for mining. When the entire map was covered by flag pins, the field collection phase of the census had been completed.

Another way of preparing a map of the entire country would be to assemble the small-scale province maps shown as exhibit II-3-6, trim their margins, and fit them together. This method is often less satisfactory, however, because there may be slight differences in scale in the various province maps, due to unavoidable differences arising from the printing process. Changes in humidity, for example, will often increase or decrease the size of paper slightly and this can cause changes in the size of the resulting impression.

1.2 Small-scale province map

This is the map referred to above as exhibit II-3-6. It would be used principally in the provincial field offices to locate the counties and to record the progress of the enumeration by the use of flag pins. If the map is intended as a visual aid to plan and control assignments, it should be much larger and should include various features. For wall mounting, the map should be approximately 85 by 170 centimeters, and it should show wards in addition to natural features such as rivers, lakes, mountains, and man-made features such as highways, roads, and trails. Urban areas could also be shown in outline. Another useful addition would be the names and addresses of the county agents.

Another way of preparing a map of each province would be to fit together the small-scale county maps (see below). The several difficulties mentioned in the preceding section would also apply to such a project.

1.3 Small-scale county map

A map of this type is shown in exhibit II-3-5. They could be used in the county agent's office, but the maps would probably be more useful in the provincial field offices, in connection with many data-gathering projects.

1.4 Intermediate-scale map for general use

Maps of this type are illustrated in exhibit II-3-4. They are used principally by county agents to locate ward boundaries, delineate enumeration areas and, in some instances, to record the progress of the enumeration within the county. Note that the example map shows a complete ward, but the scale is not large enough to permit the inclusion of all the symbols for industrial establishments, stores, and similar type structures. Villages and hamlets are indicated, as well as roads, trails, and a creek. Crew leader area boundaries are shown in this example even though they were not used in the industrial census. Enumeration district (ED) boundaries are shown and can be used for enumeration purposes if the workload (that is, the number of factories and mines) is large enough to warrant breaking up the ward among several ED's.

1.5 Large-scale maps

Portions of such maps as used by enumerators in the 1970 population census, and again in the 1975 industrial census, are shown in exhibits II-3-1, II-3-2, and II-3-3. The scale on these maps was about 80 to 100 meters per centimeter, large enough so that all features of interest to enumerators, such as stores, factories, sawmills, mines, oil wells, and gravel pits could be shown on the maps for rural areas. On the urban maps, only the more prominent of these features could be shown separately; groups of

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industrial establishments were indicated as clusters on the maps but they were listed separately on Form 123.

The large-scale maps were intended to be carried by enumerators while working in the field. The standard size of the map, in most cases, was 60 by 72 centimeters. Maps of this size could conveniently be folded to 10 by 24 centimeters, a size which fits readily into a pocket or purse.

1.51 Large-scale rural map.--The large-scale rural map illustration, exhibit II-3-1, shows only a portion of a ward. In practice, most of the rural maps of this size covered complete wards. There are several features of the map which are useful only as landmarks for the enumerator, such as churches, schools, and cemeteries. The ED boundary line was important for the population census, but may not be needed for the industrial census. Note that the map shows scattered homes as well as those in Chateau hamlet. These features also were useful in the population census but were of no particular value in industrial census work.

Before this map was sent to the field by the central office, the known industrial establishments were indicated on it by means of the symbols that are shown in the legend. These entries were by no means complete, however, and it was up to the enumerator to locate other in-scope establishments if there were any.

1.52 Large-scale urban map for household sample areas.--A large-scale urban map for household sample areas is illustrated by exhibit II-3-2. Both the block numbers and the estimates of number of housing units were of value in interviewing households in the sample areas for this 1975 industrial census even though they were somewhat outdated. The estimates had been made prior to the 1970 population census, but enabled county agents to forecast the workload with fair accuracy.

1.53 Large-scale urban map for general use.--The large-scale urban map for general use, exhibit II-3-3, was used for enumeration in all places designated as urban in the 1970 census. In its use, the enumerators were instructed to inspect each block in their assigned area, and to ignore the blocks which were clearly residential. Those blocks which had one or more commercial or industrial establishments, whether or not they were indicated on the map, were to be canvassed thoroughly.

2. *CORRECTIONS AND ADDITIONS TO MAPS*

After completing the canvassing of an assigned area, such as a ward or ED, the enumerator was instructed to inform the supervisor of any errors discovered in the maps, such as omissions (establishments shown on the maps which no longer existed), new roads, and other new landmarks. The supervisors were instructed to inform the provincial field offices of such corrections and additions, and the field offices in turn informed the Geography Division of the NSO. The information was passed on in the form of a corrected copy of the map, together with a memorandum describing the changes and the circumstances under which they were found.

For each map, the county agents were asked to verify that the county, city, or ward boundaries were shown correctly. They were instructed to cross out the incorrect boundaries, if any, and draw in the correct boundaries in red pencil. In the transmittal to the NSO, they were also asked to supply the names and addresses of local officials with whom the boundary changes could be discussed.

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No attempt was made to supply the Geography Division with the names or locations of all the industrial establishments found in the canvass. However, the Geography Division was informed of new establishments of large size and any large structures shown on the original maps which were permanently out of operation because of fire, earthquake, tidal wave, etc.

This procedure was considered necessary because the NSO had no reliable central source for information on local changes, although they did assemble information from many sources. If a reliable central source exists in the country, census officials may consider it unnecessary to provide for a flow of corrections from the field enumeration staff.

3. *WRITTEN DESCRIPTIONS OF AREAS*

In the absence of large-scale maps for use by enumerators, written descriptions such as that given as an example in chapter IV-5, Enumerator's Field Kit, are very useful. The example is based on detailed knowledge of an enumeration district, however, and as such could hardly have been written unless a large-scale map had been available. Even if a map of the proper scale is not at hand, a smaller-scale map should show at least the outside boundaries of the enumeration district in terms of roads, rivers, and other landmarks. The written description given to the enumerator should never provide less than this, and preferably it should provide more detail. Sometimes written descriptions may be based on aerial photographs, which are either not available to enumerators or not understood by them.

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Chapter IV-4. ENUMERATOR'S FIELD KIT

1. INTRODUCTION

The contents of the Enumerator's Field Kit are described in this chapter. These are the materials which the enumerator will have available at all times in the field. The field kit should include all of the material which the enumerator will need in most interviews, but will not necessarily provide all the answers which may be needed in the field. To try to anticipate all possible situations, no matter how complex, would put a heavy strain on the resources of the central and provincial offices. Moreover, too much detail can confuse the interviewers.

If any situations arise which are not covered in the materials available in the field kit, the enumerator should be instructed to say, "I do not know the answer, but I will consult my supervisor and will have an answer for you as soon as possible," then proceed with the interview.

2. FIELD ENUMERATOR'S POCKET MANUAL

This manual is undoubtedly the most important single piece of material which the enumerator will carry. It covers rules of conduct, field procedures, legal provisions, scope of the industrial census, and the census questionnaires. The contents of the Pocket Manual used in Providencia's 1975 Industrial Census are shown in exhibit IV-4-1. The portion of the manual (exhibit IV-4-2) is essentially complete except that the industry descriptions and the discussion of borderline activities, extend only through the International Standard Industrial Classification industry number 3319. A pocket manual that is tailored to the needs of a particular country and a particular census should follow through and complete these industry descriptions and highlight the borderline activities for the entire industrial census for that country.

The Pocket Manual (a portion of which is shown in exhibit IV-4-2) is intended not only for use in the field, but it is an important training document as well. In it is contained all, or nearly all, of the information the enumerator will need; his training should include a thorough study of the Manual.

3. ADVANCE PUBLICITY MATERIAL

The field kit should include a booklet, leaflet, or other publicity announcement to cover most of the points likely to be raised in the field by respondents about the census. The fact that figures given to the census enumerator are not available for investigation, taxation, or regulation purposes should be carefully explained, and that the census is designed solely to serve its statistical objectives--that nothing will be published which will reveal, directly or indirectly, the operations of a single company. In a census taken only once every 10 years, it may be anticipated that many of those interviewed will be unfamiliar with these facts and will need persuasion in order to cooperate in supplying answers to the various inquiries.

Uses of the published census results also should be emphasized--both as to ways in which industrial statistics fulfill government needs and the value of the data to individual

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companies, either directly or through their manufacturers' associations. It is important that the material should present a convincing case for the need of taking an industrial census, because this furnishes the background for the enumerator's appeal for cooperation from reluctant respondents.

4. IDENTIFICATION CARD

This card should be presented to every potential respondent who is interviewed by the enumerator, to identify himself or herself and to introduce the industrial census. The card should include the full identification of the agency conducting the census (in this case the National Statistical Office of the Ministry of Economic Planning and Development), the name and signature of the employee, a recognizable photograph of him or her, and the words "Census Employee" and "Official Credential" located in a prominent place, where it can be seen readily.

Temporary employees, such as enumerators who are hired only for the duration of the industrial census field work, should be asked to return the identification card on the termination of their employment. If any difficulty is anticipated, this return of the card could be made a condition before the final payment for work is made to the enumerator.

5. SUPPLY OF CENSUS QUESTIONNAIRES AND INSTRUCTIONS

A sufficient number of census questionnaires and accompanying instruction sheets should be supplied to each enumerator so that there will be no shortage of these forms as enumeration proceeds. The number of forms should include at least two copies per respondent so that the respondent may keep a copy of the figures supplied to the enumerator (or mailed in to the central office). The supply should be generous, because nothing could hamper collection effort more than having to wait a week or even a few days for additional copies of the questionnaires. Even if it is found to be expedient to limit the number of forms given to each enumerator before the start of field enumeration, supervisors should have an ample number of these forms readily available.

5.1 *Supply of Form 123*

An integral part of the collection process is Form 123, the Establishment Control Record (exhibit II-6-1). An ample supply of these forms should be made available to each enumerator.

5.2 *Supply of Form 124*

Form 124, Request for Payment (exhibit IV-1-2), is important to the enumerator because it is the only vehicle for requesting payment for his wages and expenses, or (in the case of employees on a regular payroll, like the county agents) asking for reimbursement for out-of-pocket expenditures. Enough copies should be included so that the person asking for reimbursement or hourly wage payment can retain a copy for his own records.

5.3 *Supply of "Official Business" envelopes and stationery*

The enumerator will need envelopes and stationery marked "Official Business" to communicate with the supervisor and sometimes with respondents. An ample supply should be included in the field kit.

6. DESCRIPTION AND MAP OF ENUMERATION AREAS

Maps used by enumerators are discussed above in chapter IV-3. Wherever it is felt necessary, the field kit should also include

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written description of the area. This escription need not necessarily refer to a ap; it should define the area completely ven when there is no large-scale map. The lescription below of the boundaries of ED 002 s shown in exhibit II-3-3 is given as an xample:

"Starting eastward at the intersection of Manqua Drive and Missa Creek, the boundary is the south and southwest bank of the creek until you reach Marly Drive. Turning west, the boundary is the north side of Marly Drive until you reach Himo Street for the one block from Marly Drive to Luso Drive; the south side of Luso Drive for the one block from Himo Street to Manqua Drive; and the east side of Manqua Drive for the one block from Luso Drive to Missa Creek."

Descriptions of this type are of particular value for enumerators who have only a limited acquaintance with the area to be canvassed. They are more difficult to write, and perhaps would have to be omitted if the streets, roads, or trails are not identified by signposts with any degree of frequency. In the Providencia Industrial Census, the county agents wrote descriptions for their enumerators if they believed they were needed. In most counties where the agent was the only enumerator, he could dispense with a written description because of his familiarity with ward boundaries.

7. *SKIP-LISTS*

These lists of establishments to be canvassed directly from the central office were sent to the county agents, who further broke them down by ward or other enumeration area. If for no other reason, preparation of lists of establishments by enumeration area was necessary so that the establishments could be listed in the proper sequence on Form 123. The skip-list included the name and location of the establishment, the name of the company if it is different, the activity (mining, manufacturing, electricity, or gas as a minimum description). The kind of product, if known, was also given, and whether the establishment was privately operated or owned and operated by the government. Any other information useful in identifying the establishment could, of course, be included.

The types of establishments included on the skip-lists were multi-unit companies, electric plants and stations, gas plants or distribution centers, establishments owned and operated by the government, and establishments with 100 or more employees. When the enumerator encountered establishments of these types which were <u>not</u> on the skip-lists, they were to end the interview except for privately-owned mining or manufacturing establishments, not operated by multi-unit companies, with 100 or more employees, which they were to enumerate in the usual way. In all other cases, they were instructed to notify the county agent or provincial office at once about the existence of the establishment, so the central office could be quickly informed.

8. *COMPASSES*

It is not easy to find one's bearing in the field, particularly on a cloudy day when the compass points are difficult to locate. Compasses are usually not expensive and the central office may wish to supply one to each enumerator for assistance in locating area boundaries, roads shown on maps, etc.

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Chapter IV-5. FIELD OFFICE PROCEDURES

1. COVERAGE CONTROL

Early in the data collection phase of the census, the work of every enumerator should be checked for thoroughness of coverage, with the central question, "Has the enumerator located and enumerated all of the in-scope establishments in his assigned area?" The basic procedure for Providencia's industrial census was for the supervisor to select at least one of each enumerator's Forms 123, and to re-canvass the area covered by the form. If it was found in this re-check that any establishments had been overlooked in the original enumeration, the missed establishments were enumerated by the supervisor and the original enumerator was notified of this action. When omissions were found, the areas covered by other Forms 123 prepared by the same enumerator also were usually checked for completeness until a pattern of acceptable thoroughness had been established for the individual enumerator. If there were frequent omissions, on the other hand, the enumerator may need to be discharged and his work taken over by another person from the county agent's office or the provincial field office.

2. CHECK-INTERVIEWS

The supervisors were also instructed to re-interview at least one of the establishments from which completed questionnaires had been obtained, with the objective of determining the accuracy of the figures that were reported. Check interviews were often undertaken at the same time as the coverage control checks referred to in the preceding section. Although the enumerator was made aware that check interviewing was to be performed, he was never told which cases were to be check interviewed. (In fact, at the time of enumeration no one knew.) Thus, the enumerator was faced with the possibility that any of his cases might be check interviewed, thereby increasing his desire to obtain correct answers.

The check interviews are ordinarily conducted for only a small sample of respondents. Since a second interview involves an additional demand on the time of these respondents, the interviewer should be skilled at explaining the purpose of the check interview, which is basically to increase the accuracy and consequent usefulness of the census. He should then proceed to obtain new answers to the inquiries.

The check interview need not cover all of the inquiries on the questionnaire, but can be limited to these regarded as the most important. One of the most useful features of check interviews is the disclosure of unacceptable practices on the part of the enumerators, such as the fabrication of data. In some extreme instances, check interviews have revealed that there was no previous interview and the questionnaire turned in was entirely fabricated.

3. SCREENING OF QUESTIONNAIRES

For practical reasons, it is desirable to detect and correct errors in the reported information as quickly as possible after the questionnaires have been filled out. This generalization is applicable regardless of whether the questionnaire was completed by an

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enumerator or by the respondent himself. If there is a delay in the questioning of the respondent regarding the discrepancies or omissions, the person who had originally supplied the figures may no longer be employed by the company, the company itself may have gone out of business, the records may be inaccessible, or for other reasons it may be difficult to get at the facts. Naturally, the longer the delay the more often this sort of difficulty arises.

On the other hand, it is ordinarily not desirable or feasible for the field offices to conduct complete editing and coding operations, such as those discussed in this case study. For one thing, the services of competent subject matter specialists are available in the central office but hardly ever in the field offices. While enumerators could be trained in the skills involved in editing and coding, it would hardly be practical to conduct such training for them while the enumeration phase was still in progress. Editing and coding should be started as soon as practicable after the first questionnaires flow in to the central office.

For the 1975 industrial census, the field supervisory staff (meaning the county agents and the supervisors in Estrella County) performed only a limited amount of screening. Questionnaires which fulfilled the following requirements were considered acceptable and were forwarded to the central office for further processing:

(1) Entries should appear in items 1, 2, 4, and 5. These items identified the establishment and also indicated its status during the census year (full year operation, partial year operation, sold or purchased, etc.)

(2) There should always be entries in items 6 and 7, Persons Engaged and Payrolls. For establishments employing homeworkers or having work done for them by other companies, the entries might indicate that only a working proprietor was involved. In such cases, there should be entries in item 13, reflecting the cost of work done by others, or payments to homeworkers.

(3) There should be entries in items 13 and 18. If the total of the specified costs in item 13 was greater than the total value of shipments or production in item 18, a suitable explanation should appear in the "Remarks" section.

4. RECEIPT REGISTER

In addition to maintaining a file of the Forms 123 (3rd copy), the county agents maintained a receipt register, in the form of a bound book. The completed questionnaires were listed in this register when they were received from the enumerators, and appropriate entries were made when the questionnaires had passed the screening operation and had been sent on to the central office. The entries in the receipt register included items from Form 123: control record number, serial number of the establishment, the date the filled questionnaire was received, and the date the questionnaire was transmitted to the central office (see section 3 of chapter II-6).

In the 1975 industrial census, there was no special form printed for the receipt register, but the supervisors were instructed to make the appropriate entries in blank books. In a larger census, it would have been proper to have special forms printed to constitute the receipt register.

The purpose of the receipt register was to provide a running record of receipts of completed questionnaires for use if any questions were to arise regarding their location, whether one had been filled, etc. As noted earlier, the file of Forms 123 would provide the same information, if everything were done properly. The receipt register

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would be of immense value, however, if a Form 123 were lost or misfiled, and questions were raised by anyone regarding the receipt or non-receipt of a particular questionnaire. Since it consisted of entries in a bound book, it was difficult or impossible for the records of individual questionnaires to be lost or mislaid.

5. *PROGRESS REPORTS*

The county agents (and, in Estrella County, the supervisors of data collection operations) were instructed to prepare and file weekly progress reports during the collection phase. Although these reports reflected the Forms 123 and their accompanying questionnaires, they were forwarded independently. The supervisors were instructed to include the following items in their weekly progress reports:

(a) Number of Forms 123 forwarded to the central office, to date and during the current week.

(b) Corresponding number of completed questionnaires.

(c) Number of queries received to date from central office editing section regarding completed questionnaires.

(d) Number of queries answered (usually by contacting respondents).

(e) Number of unanswered queries. (Note: The counts in (c) to (e) above were in terms of the number of questionnaires, regardless of the number of queries on each questionnaire.)

(f) Narrative report on progress, which would cover such points as how the enumeration was progressing compared with original expectations, any failures on part of enumerators, unexpected attitudes of resistance on part of respondents, etc.

These reports were forwarded to the provincial field offices by the county agents, and the provincial offices in turn sent them to the Control Staff in the central office. The ADMS Control Staff consolidated them into progress reports for the Executive Committee and other supervisors concerned with progress of the census. The individual reports, with their narrative comments, were maintained by the Control Staff for the use of individuals who wished to consult them.

6. *FLOW OF QUESTIONNAIRES TO CENTRAL OFFICE*

In the Providencia Case Study, it is supposed that the filled-in questionnaires were forwarded to the central office along with their accompanying Form 123. There are many advantages to this system; for each enumeration district, for example, it was possible to use these documents as reference material to provide answers to such crucial questions as: Was the area properly and completely enumerated? Were the skip-list cases actually skipped or were they enumerated two times, once by mail and once by an enumerator? Were the borderline cases properly handled in the field? After the completed questionnaires had been separated from the control record, they (the control records, Forms 123) provided a permanent reference source in case future questions should arise. After approval in the central office, the enumeration area could be regarded as properly handled and as one more step toward completion of the census.

There are, however, some disadvantages to this system. The flow of questionnaires to the central office was to some extent slowed down, even though the field staff was instructed not to delay the shipment of reports and accompanying control record if all the questionnaires but two or three had been completed. Such cases were noted on the control record and the questionnaires were later forwarded to the central office

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along with a supplementary Form 123 for the particular enumeration area. Eventually this supplementary control record became part of the permanent record for the area. However, there was a tendency on the part of the field staff to want to wait until the enumeration area had been completed before forwarding the entire group of questionnaires to the central office. One advantage of waiting was that less record keeping in the field office was required and the need for remembering that a particular enumeration area had not been completed was eliminated.

An alternate system which could be considered is to separate the filled-in questionnaires from the control records (after screening or other review operations in the field office) and to ship the reviewed questionnaires to the Field Operations Division without delay. The control records would follow when all questionnaires covered by them had been forwarded to processing. When sending a shipment of questionnaires, a transmittal slip would be prepared, which would show the date, the number of completed questionnaires, identification of the field office, and other pertinent data. The receipt register (see description above) would then become doubly important because it would constitute the only readily available field office record of individual questionnaires received from enumerators and forwarded. The data processing operation would be expedited, however, since individual questionnaires would reach the processing division more quickly.

6.1 *Use of control records*

The basic control record (Form 123) was the document which told the central office whether or not a particular enumeration area was complete. On the form were recorded the refusals and delinquents remaining when the collection period was nearing a close. The decisions were made in the central office, usually by personnel of the Manufacturing and Mining Division, as to whether a further effort to obtain reports from the remaining delinquents was justified. At the time these decisions were made, the county agents had presumably exhausted all their avenues of approach, and only a visit from personnel of either the central office or the provincial office would be considered.

In the last analysis, decisions as to whether further effort was justified were based on the probable importance of the figures to be reported by the delinquent respondent to the published cell totals. A knowledge of the publication tables was thus essential at this stage to know whether further visits or other efforts should be made.

6.2 *Notice of completion*

When the control records for all the enumeration areas in the county had been forwarded to the central office, a memorandum to this effect was sent to the central office, with a copy to the provincial office. From then on, the only actions taken by the county agent (such as a re-interview of a refusal case) would be at the direction of the central or provincial office. The notice of completion of enumeration in the county would, of course, be a duplication of knowledge that the central office would already have by the receipt of all the control records for the county. In the event that one or more records had been lost or misfiled, however, the memorandum of completion was useful in that it called attention to this fact.

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Chapter IV-6. HOUSEHOLD INDUSTRIES SURVEY

1. INTRODUCTION

In planning for the 1975 industrial census, the MMD staff estimated that the "regular" establishments accounted for $1,400 million in value added, while households with income of $500 or more from household industry in 1975 accounted for $121 million, or about eight percent of the total of $1,521 million. The estimate of $121 million did not include the value attributed to homeworkers employed by "regular" establishments; that value would be approximated by the inquiry on "payments to homeworkers" in the standard manufacturing questionnaires (both long and short forms).

The planners decided that eight percent was far too great an amount to ignore. At the same time, they recognized that the cost of obtaining reports from all households doing some manufacturing would be too high. Such a survey would in effect mean repeating the population census, because every household would have to be contacted to determine whether some manufacturing did in fact take place. They decided, therefore, to limit the coverage of household industries to a relatively small sample. Furthermore, the information to be obtained was limited to a very few inquiries (principally the number of persons engaged in manufacturing activity, and the income or receipts from such activity) so that the survey would be consistent with the limited records maintained by households.

A random sample of the total 3,000,000 households was considered, but it was rejected because of its considerable cost. (A random sample, for example, might have specified that every 100th household was to be interviewed to determine whether or not there had been any industrial activity.) The 1970 information was too out of date to consider using it for a sampling frame, so that a "quick count" establishing at least the number of households in each enumeration district would have been necessary before a random sample could have been selected.

In these circumstances, an area sample offers the best solution. In an area sample, certain specific areas are selected and these areas are completely enumerated. The savings in travel costs alone compared with the random sample plan are very great; no travel to the non-sample areas is necessary, for example. The objective of the Providencia area sample of households was to produce statistical totals for those provinces and for those industries for which cottage (home) industry was significant. Standard errors of estimate (sampling errors) were scheduled to be published along with the statistics.

In the 1970 Census of Population and Housing, an inquiry on manufacturing activity was included. The 1970 census information was naturally somewhat out of date, because five years had elapsed and many families had moved, they had discontinued their industrial activity, or they had started to manufacture products in the intervening years. This kind of change, or turnover, was estimated at from 10 to 20 per cent. The 1970 canvass was also deficient, from the point of view of the 1975 planning staff, because the inquiry on industrial activity did not differentiate

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between manufacturers and homeworkers. It will be recalled that "manufacturers" are households which buy raw materials, or obtain them by mining, fishing or hunting, then perform some fabrication and sell the resulting products. The term "homeworkers" is used here to designate households whose fabricating activities are directed by a "regular" establishment which supplies the raw materials, or most of the raw materials, and then sells the resulting products. The manufacturing activity of homeworkers was measured in the census by inquiries about shipments to the homeworkers on the questionnaires for "regular" establishments, but the households operating as manufacturers were not covered in the census at all. As a matter of fact, the enumerators were instructed to ignore them and to consider for enumeration only the commercial establishments which were readily recognizable as such.

2. *AREA SAMPLE*

After considering the objectives of the household industries survey, and the funds available, the sampling staff developed a plan which may be summarized as follows:

(1) The areas to be sampled were enumeration districts (ED's) as defined for the 1970 population census.

(2) The 216 counties were classified into three groups depending on the proportion of households with industrial operations, as brought out in the 1970 census. In Group I counties, which had little or no industrial activity, a very small sample of ED's was selected. In Group II counties, there was a larger sample. As expected, the largest sample of all was selected from the Group III counties, those which had indicated a considerable amount of industrial activity in 1970.

(3) Overall, it was estimated that there were 30,000 households in the sample ED's. This amounted to about one percent of the 3,000,000 households counted in the 1970 census.

(4) Households to be enumerated on the special questionnaire (Form ECP-102) were limited to those with income from industrial activity of $500 or more.

(5) The data were limited to: number of persons engaged in industrial activity, differentiating between full- and part-time; and receipts from industrial activity, differentiating between sales of products and payments received for homework.

(6) Again based on rather sketchy and out-of-date information, it was estimated that 1,800 households out of the 30,000 would qualify for a report on ECP-102. All households in the sample areas were to be interviewed and listed on Form 123H (exhibit II-6-2) even when they did not qualify for a report on ECP-102.

(7) When the Forms ECP-102 reached the central office, the households were to be classified as primarily engaged in manufacturing, or primarily engaged in homework, depending on the source of the bulk of the income.

(8) The results of the survey were to be published for selected provinces and for Providencia as a whole, for selected industries, even though there were high sampling errors.

3. *ORGANIZATION OF FIELD STAFF*

In Providencia, it is assumed that the household survey will take place approximately 6 months after the completion of field work in the regular census. The field organization will consist of the individuals who worked on the census. The responsibility for the survey is centered in the Manufacturing and Mining Division; the Field Operations Division is responsible for data collection; and the actual field supervision and interviewing will be done by the provincial field offices, the county agents, and the enumerators who had been employed for the regular census. To a considerable extent, the interviewing skills required for the household survey are the same as the skills required for the industrial census; the interviewers must be able to read

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maps and instructions, do simple arithmetic computations, be diplomatic and resourceful, and conduct themselves with poise and with assurance. Although an understanding of the long-form concepts of inventories, assets, materials used, etc., is not necessary, a knowledge of industry definitions, borderline activities, and similar topics discussed in the Field Enumerator's Pocket Manual, is certainly required. The industrial activity in many households will resemble that of the short-form cases in the regular census. The lack of records, lack of understanding of census concepts, failure to comprehend the need for industrial statistics, will affect the quality of the survey. The experience of enumerators in the regular census, therefore, became extremely useful when the time came to conduct the household industries survey.

4. DATA COLLECTION PERIOD

The target date for completion of the household survey was December 1976. Since the regular census was scheduled for close-out in the field by 15 April, this meant that about 8 months would elapse before completion of field work for the household survey.

5. PERSONNEL REQUIREMENTS

Well before the data collection period, the central office had undertaken a county-by-county analysis of the workload, considering for each county the estimated number of households in the sample areas, based on the results of the 1970 population census, and the amount of travel time that would probably be required. The estimates of travel time were naturally higher in the rural ED's. Using these facts, the central office prepared an estimate for each sample area of the number of interviews that could be completed by an enumerator in one week (six days). Finally, the number of enumerators required for each county was calculated, considering the time required for call-backs, check interviews, etc. The number of interviews per week per enumerator was estimated all the way from 50 in some rural areas to as high as 250 in cities.

As in the case of personnel requirements for the regular census, the county agents reviewed these estimates and made corrections and amendments where necessary. For the country as a whole, the indications were that, in addition to county agents, the services of only 25 interviewers would be required. To the extent feasible, those retained for the household enumeration were the most skilled of the enumerators for the regular census. This was not possible where the enumerator lived a considerable distance from the nearest sample ED.

6. MAPS

The maps used in the household industries survey were those used in the regular census with the addition of large-scale maps for urban places (see exhibit II-3-2). As pointed out in preceding chapters, these maps had first been used in the 1970 census of population and housing, and many of the features useful in the population census but not in the industrial census had been retained. Some of these features (for example, the counts of household units and the symbols indicating dwellings, stores, apartment buildings, etc.) were very useful in the household industries survey.

In rural areas, the maps used in the household survey were the same maps used in the industrial census. Consequently, they had been carefully checked by the industrial census enumerators; and since this had been done very recently they were considered to be accurate and up to date for use in the household survey. In many instances, also,

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the enumerator of a particular area for the industrial census was assigned the same ED's for the household survey.

The large-scale rural map (exhibit II-3-1) showed individual dwellings in addition to churches, schools, factories, and mines. In cases where the existing maps are considered inaccurate or where there are no maps, a written description should be given to the enumerator. The description of ED 068 in exhibit II-3-1 is given as an example:

"This ED includes the hamlet of Chateau and some surrounding territory. Starting northeast at the intersection of Drum Creek and Morgan Road, the boundary is the southeast side of Morgan Road, up to 100 meters beyond Fala Cemetery. Here the ED boundary is also the ward boundary, and it turns at a 90° angle from Morgan Road across open country until it reaches Halde Trail. From Morgan Road to Halde Trail, the ED ward boundary is a straight line in a southeasterly direction. The intersection with Halde Trail is 175 meters west of Center Trail. Now the ED boundary leaves the ward boundary and proceeds in a southwesterly direction to Drum Creek along Halde Trail. Turning to the right (northwesterly) the boundary proceeds along Drum Creek back to the starting point, the intersection with Morgan Road."

Obviously, such a description would be lengthier and more difficult to write if the roads and trails were not named, but this difficulty could be overcome if someone who is familiar with the area were to write the description, referring frequently to compass directions, landmarks, angles of turn, etc. In this case study, it is assumed that county agents wrote descriptions for their enumerators only if they believed they were needed. Where the county agent was the only enumerator, he could dispense with a written description because of his familiarity with ED boundaries.

In urban areas, the large-scale map used in the household interviews is typified in exhibit II-3-2. This example differs from exhibit II-3-3 principally because estimates of the number of household units appear for each block. These numbers were based on the 1970 census and are therefore considered somewhat out of date, but were useful nevertheless in giving supervisors some check on the progress of interviewing.

7. *OTHER PROCEDURES: ROUTING OF MATERIALS*

The field office procedures, coverage control safeguards, screening, check interviewing, receipt register, progress reports, and transmittal of materials to the central office, were very similar to those employed in the regular census.

8. *CLOSE-OUT PROCEDURES*

Close-out of a county was indicated by a memorandum of completion from the county agent to the central office, with a copy to the provincial field office. The handling of refusals by the central office was similar to the methods employed in the small "regular" establishments, those with less than 10 employees. Wherever there was no evidence that the household was engaged in manufacturing, it was classified as out-of-scope. In other cases, estimates of the kind of industrial activity, number of persons engaged and the value of output were produced, based on whatever information the enumerator had been able to obtain by questioning neighbors and others.

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Unit V

DATA PROCESSING OPERATIONS

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Chapter V-1. BASIC CONSIDERATIONS AND PROCESSING FUNCTIONS

1. INTRODUCTION

The purpose of the data processing operations is to produce tables that present the results of the census. The data processing operations begin with the receipt of the questionnaires from the field and end with the preparation of the tables in form ready for printing. Actually, the data processing staff should have an important role early in the census planning; they should cooperate in the design of the questionnaires to assure that they can be easily processed.

Data processing includes several steps as follows:

(1) Receipt of questionnaires.

(2) Check-in of the questionnaires to insure that all forms have been received; check for missing forms and duplications.

(3) Editing/coding and verification.

(4) Key punching and verification.

(5) Preparation of editing and tabulating instructions if conventional equipment is used; preparation of computer programs if computer is used.

(6) Sorting and editing the punch cards if conventional equipment is used; sorting and editing the records on magnetic tape if computer is used.

(7) Tabulating the data.

(8) Review of the tabulations.

(9) Typing final tables. If final tables are produced by computer, they may be in form ready for printing.

2. INITIAL DECISION ON EQUIPMENT

One of the first decisions a statistical agency must make is the decision on how they will process the results. It will affect the budgeting, scheduling, design of the questionnaires, and the number and types of personnel needed to edit and tabulate the results.

If electrical accounting machines (EAM) are used, most of the editing will be accomplished manually, except for some "zero balancing" or "control checks." Data would be transcribed from the questionnaires to punch cards, which would be sorted and tabulated. Clerks would post the applicable tabulated cells to worksheets, which would then be typed and printed.

If electronic data processing (EDP) equipment is used, most of the editing would be done by computer. Data entry would be accomplished by punching cards and reading these cards into the computer. Or it may be possible to transfer the card images to magnetic tape or to enter the data directly to magnetic disk. If key-to-disk equipment is used, it would greatly reduce the number of punch cards required for data processing. In addition to editing, the computer can handle most of the control checks and can print the final tables in copy ready for printing.

The Providencia NSO had made a tentative decision to use the computer if possible. Consequently, the organization of their staff reflected this decision.

3. DISTRIBUTION OF FUNCTIONS

The Data Processing Division of the Providencia NSO would have major responsibility for processing the questionnaires. Their major functions would include:

(1) Document control. This would involve receipt of the questionnaires from FOD and MMD; check-in process to account for

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all forms; distribution of the questionnaires and other forms to the appropriate staff in DPD and MMD; control of documents from operation to operation within DPD; preparation of progress reports.

(2) Editing, coding, and verification of short form questionnaires except those identified for the attention of the MMD staff. This function includes the preparation of procedures or programs.

(3) Key punching and verification for all forms.

(4) Tabulation, including preparation of instructions, procedures, or programs.

(5) Preliminary review of the tabulations.

(6) Posting of final tables, including verification. If print-ready copy is produced by the computer, this function would not be necessary.

To carry out the above functions, the Data Processing Division of the Providencia NSO was organized into the following functional groups:

(1) Control Operations Branch

(2) Editing and Coding Branch

(3) Key Punching Branch

(4) Computer Programming Branch

(5) Computer Operations Branch

4. *RECEIPT AND SORTING OF COMPLETED QUESTIONNAIRES*

The questionnaires completed in the field are sent to the Field Office Division (FOD) with two copies of Form 123 (exhibit II-6-1). The FOD Receiving Clerk verifies that all the questionnaires are received. One copy of Form 123 is retained in FOD and the other is sent with the questionnaires to the Control Operations Branch of DPD.

The DPD Control Clerk enters the identification codes (province, county, ward, and ED) in the upper right hand corner of each questionnaire. The long forms are then reviewed to determine whether the proper form was used by checking both of the following:

(1) Total number of persons engaged or total annual payroll.

(2) Total value of shipments and receipts.

If these items fail to meet the criteria for use of the long forms, the long forms are replaced by short forms.

The DPD Control Clerk separates the forms into four groups (manufacturing-long, mining-long, manufacturing-short, and mining-short) and assembles them into work units (see section 10). The short forms are sent to the Editing and Coding Branch of DPD; the long forms are sent to MMD. These long forms are edited-coded in MMD, as are the long forms for the establishments on the skip list, which the MMD staff enumerated directly.

For establishments on the skip list, MMD prepares copies of Form 123 for FOD and DPD. MMD also prepares control forms (see exhibits V-1-3 to V-1-5) and sends copies to DPD.

5. *TESTING PROCEDURES*

Testing the procedures is a most important step in the development of an undertaking as large and complex as a census of a country. Each step in the data processing operation should be tested, revised, and re-tested; then a final test should be made on the operation as a whole. Operations that do not run smoothly can completely upset the time schedule, can cause deficits in the budget, and can adversely affect the quality of the data results. To wait until "live" data are available from the census itself is too late; revisions are usually too complex to be made quickly.

In the first stages of a test, the professional staff should try out the procedure, discuss difficulties, and revise as needed. In the later and final stages, the persons who are testing the procedures should include or be of

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the same level as those who will be carrying out the procedure--clerks should try out the manual editing-coding procedure, key punch operators should test the punching instructions, control clerks and messengers should test the control and transmittal procedures, etc. It is desirable that potential supervisors should first serve as clerks, editor-coders, key punch operators, or verifiers. This will help supervisors to analyze problems in the management of the various activities and to check their own written procedures.

For the early testing, data from field trials and pre-tests can be used. Or test data can be compiled by creating several hundred establishments, filling actual census questionnaires for them. Care should be taken to create establishments of various types so that the procedures for unusual as well as usual cases can be tested. Some inconsistent and missing information should be built into the test. Transmittals and control procedures (and forms) should be tested also.

Time and production records should be kept for those steps in which time and production are important elements. When a procedure requires a relatively large amount of time, the staff should determine whether certain costly steps are essential to the success of the program, or whether a more economical but satisfactory alternative could be used.

5.1 *Manual processing*

Editor-coders should use the test data (described above) to try out the instructions for editing-coding and the procedures for complete verification and sample verification (if used). The subject matter specialists should review the work and ascertain the reasons for errors through discussions with the editor-coders. If "live" data are used in the test, the subject matter specialists should review the number and kinds of entries that are changed or imputed. The time and production records should be examined to identify steps that are too complicated or costly. It is possible that more of the manual editing-coding can be accomplished more economically by the computer.

5.2 *Key punching*

Testing the key punch operation involves many of the same steps as testing the manual processing. Error reports by questionnaire item should be kept and analyzed to determine whether the instructions are unclear or whether the design of the form is faulty.

5.3 *Machine processing*

Most programmers will create their own test data to initially test their programs. The test data used in the manual processing and key punching should also be used. The computer programmers, systems analysts, and subject matter specialists all should be involved in the testing. Quite often situations will arise in the test data that are not programmed for or stated in the specifications.

The subject matter specialists should manually edit and tabulate the test cases, following the editing and tabulating specifications they prepared. The manual results should be compared with the edited and tabulated results produced by the computer, and differences should be resolved. This can be a fairly tedious and time-consuming activity, but it is well worth the effort. The type of editing changes that are made should also be reviewed for reasonableness.

Testing should cover the procedural instructions for computer control and operations personnel. Included would be such phases as correcting records, allowing for recovery of data, setting up work units, etc.

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5.4 *Organization and flow of work*

An important item that is frequently overlooked is the testing of the organization and flow of work. As experience will confirm, it is often the overlapping of activities, lack of clear understanding of responsibility, or unexpected problems with no planned alternatives that can cause a major breakdown of the project. A flow chart of the entire operation is useful not only for understanding the entire function but also for pointing up gaps or other possible deficiencies in advance of the census. In observing various organizational aspects, the staff would watch particularly for places where the flow of work is at a standstill and there is a considerable backlog of unassigned work.

Additionally, the various control and report forms should be evaluated for usefulness and simplicity. The question should be asked of each form, "Is it more troublesome than it is worth?"

Certain physical arrangements, or lack of adequate facilities, can seriously delay the flow of work. Some may seem to be relatively unimportant in themselves. Examples of inadequate facilities include such items as the ones listed below.

(1) Electrical power which is not adequate and electrical outlets which are misplaced and require many extension cords.

(2) Delivery carts that are too wide to permit one messenger to pass another in the halls.

(3) Storage shelves that are too narrow to hold questionnaires and other forms.

(4) Typewriters for which ribbons are no longer manufactured.

(5) No rooms for staff to meet to discuss problems and progress.

6. *PERSONNEL REQUIREMENTS AND FUNCTIONS*

In most countries, the staff of data processing specialists and technicians must be expanded considerably for the census undertaking. This can be accomplished in one of several ways. For example, it can be handled through temporary transfer from other government agencies to the NSO; by recruiting temporary workers on a short-term basis; or by contracting with individuals or data processing firms for the personnel with the necessary technical skills. In Providencia, it was determined that most of the positions could best be filled by recruiting from other Divisions of the NSO. Even though they were not new employees, they needed to be trained to handle the specific requirements of the 1975 Industrial Census.

6.1 *Editor-coders*

Editor-coders are needed primarily to perform the manual editing-coding operations and to carry out general statistical duties. For the most part, these persons should be semi-skilled employees. If the statistical office must recruit additional editor-coders, the applicants should be given a qualifying test consisting of two major parts: (a) a clerical abilities test containing questions on arithmetic, alphabetizing, name and number comparison, and inspection of number and letter order, and (b) a verbal abilities test containing questions on vocabulary and reading comprehension. Examples pertinent to the questionnaires, with appropriate accompanying instructions, should be included in the test.

6.2 *Key punch operators*

The NSO has only a small number of key punch operators to handle current operations. Some of them will be assigned temporarily as supervisors or key verifiers for the 1975 Industrial Census. If additional operators need to be recruited, or if some present NSO employees are transfered to the operation from other positions, they should have certain qualifications. Key punch operators should have manual dexterity and be able to comprehend

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simple written instructions. They should be given a test similar to the one administered to typists and should be given an opportunity to see and try the key punch equipment.

Early in the key punching, before there is a steady flow of work, key punch operators can be trained to assist in the editing-coding operation. This experience will contribute to their total understanding of the whole data processing operation.

6.3 *Project analyst*

In Providencia, the chief of the Data Processing Division will have many extra administrative duties as a result of the industrial census. Therefore, it will be wise for him to delegate to the most competent analyst the responsibility for many of the technical functions for the census processing. This person will be known as the project analyst. In this discussion, the term "project analyst" is identical with the term "senior systems analyst" or simply "systems analyst." He is the person who will submit the final system design for the processing.

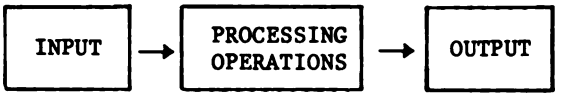
6.31 Develop a system.--The systems analyst must be able to develop a logical and practical system, or the volume of data will negate some of the advantages of speed and lower cost of the computer procedure. Editing and coding procedures, sequence of the tabulations, and the like, must be carefully planned.

In the initial planning stages for the data processing operation, it will be necessary that personnel from each division of the NSO work and plan together. The project analyst must be able to work in various phases of the overall project and he should be very familiar with the details of the various data processing areas. He must work very closely with the subject matter specialists to understand the tabulation requirements. He must translate these requirements into detailed operational steps and then to computer programs.

The analyst should keep in mind that data processing is only a means to an end. Machines do not by themselves solve problems; they only perform as programmed. If the analyst knows the problem to be solved and if he can devise a method for solving it, then he can make use of the appropriate equipment to obtain the solution.

Below are some basic guidelines which the analyst should follow in designing a data processing system:

(1) Understand the requirements of the proposed system (or existing system if the job is currently being performed). The inputs and outputs define the system, and the operations to be performed are determined by the inputs and outputs.



(2) Identify or specify the results that must be obtained from the data processing system; determine the output results that should be produced by the system.

  (a) Specify the objectives; know the goals of the project and the subject matter specialists.

  (b) Determine the flow of information.

(3) Design the data processing system which will most efficiently and effectively produce the desired results.

  (a) Specify the type of equipment (data processing tools). The project analyst needs a comprehensive knowledge of the equipment for which he is designing procedures.

  (b) Devise suitable procedures.

  (c) Develop and/or consider alternative procedures; then select the one most appropriate and practical.

  (d) After determining a basic procedural approach, follow up with flow charts and procedural steps.

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(e) Prepare test data; after the programs are written, use these data to test the programs.

6.32 Prepare flow charts or block diagrams.--The project analyst should prepare flow charts for each system and subsystem, showing the input, the process involved, and the output. A flow chart shows the sequence of operations and the flow of work. It usually includes both machine and manual processing steps which can be identified by uniform chart symbols. A flow chart is used as a basis for writing machine or computer programs.

Flow charts, often referred to as block diagrams, are generally constructed in several stages--starting with a major block diagram which expresses the entire program in summary form. The diagram should be simple enough to fit on one page, but complete enough to show relationships between various types of input and output and the general processing steps involved. It permits the analyst and the programmer to establish the basic logic of the program before they become involved in voluminous details. The analyst (or programmer) can then break down the block diagram into subsystems which can be expanded into more detailed diagrams, or he can go directly from the block diagram to detailed procedures. After the basic diagrams are complete, they should be made available to all persons involved in preparing detailed diagrams or in developing procedures.

6.33 Prepare procedures and test materials.--The project analyst is responsible for the punch card design and for the preparation of detailed written instructions for such operations as the card-to-tape procedure, machine editing, key punching, tabulating, and control. Finally the analyst should prepare a comprehensive test for the computer programs, using a deck of cards containing either live data from a pre-test or data for simulated establishments. The analyst should strive to have the test material cover all possible conditions that are likely to arise.

6.4 Programmers

Sometimes the role of programmer is not much different from that of the project analyst. In this discussion, careful differentiation will be made, but in actual practice these differences may not always be easily identified.

Essentially, the programmer is a coder, to the extent that he converts a concept into a machine language system. He may also assume the role of systems analyst if he actually helps in the design of the system. In preparing the programs for a national census, undoubtedly more than one programmer will be involved in the actual coding process. The project analyst, in the course of his work, will arrange planning meetings with the senior programmer and the programming staff. The purpose of these meetings will be to present to the programmers the procedures for the census processing.

The analyst will have prepared card layouts, magnetic tape layouts, report formats, written specifications, and fairly detailed flow charts. From these, the programmers will prepare block diagrams and the actual computer programs. The coded programs must be key punched, translated to machine language by the computer (or assembled), and tested (or debugged), using the test data prepared for testing other processing procedures.

It is most desirable that the programs be written and debugged even before the enumeration begins. This will permit programmers to concentrate on day-to-day problems that arise when the filled questionnaires come in--free from the pressure of having to keep ahead of key punch operators.

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6.5 Other regular personnel

In a large job like an industrial census, the permanent clerks, key punch operators, and machine operators will form the nucleus of the supervisory staff for the clerical and machine operations for the census. The persons who are not selected for supervisory positions will still be counted on for leadership during the training period and during the actual processing. Some can be used as instructors or training assistants, if qualified. The regular supervisory personnel will have an especially important role as the overall supervisors.

6.6 Temporary personnel

As mentioned earlier, the Providencia NSO was able to recruit most of the needed clerks, editor-coders, key punch operators, and other machine operators from various sources within the NSO. They trained them specifically for the 1975 Industrial Census well in advance of the time when the questionnaires were received.

7. TRAINING OF PERSONNEL

An organized plan for training the census employees is essential. The duration of the census is relatively short, and poorly planned training, or lack of training where needed, will not only delay the operations but will cause trouble in later stages and produce results of poor quality.

Traditionally, training has been divided into formal classroom training and on-the-job training. There may also be a need for individual training, which can be a combination of the two. Training for census operations must be directed to specific needs. The bulk of the employees should be trained to perform a limited number of specific steps. A smaller group should become familiar with a number of operations so that they can make intelligent decisions and know how such decisions will affect other phases of the operation. It would be misuse of funds and time to train all employees in too many operational phases. Experience has taught that it is necessary to train more persons than are required for the job. It is expected that many temporary census employees will leave as soon as they have opportunities for more permanent jobs.

A small staff of persons who will supervise various operations should be trained in advance of the date the operation begins so they will be free to concentrate on day-to-day activities. Systems analysts and programmers should be trained and actively working on applications for a new computer long before it arrives; otherwise, there will be inefficient use of the computer for some time.

7.1 Formal training

Formal training refers to a structured plan to teach the step-by-step operations. Usually, formal training is given to a group of trainees. The training should be practical; that is, it should have direct application to the job. Formal training is not sufficient; in each case, it must be followed with on-the-job training.

For editor-coders, the training should include the following elements: (a) brief background to introduce the basic census questionnaires and a summary of the enumeration procedures, with emphasis on skip patterns and codes, (b) discussion and explanation of those concepts (such as value added, unit of measure, type of product) which directly concern the editing or coding that will be performed, (c) practice exercises using the questionnaires which were prepared earlier when testing the editing procedures, (d) review of the practice exercises, and (e) instruction on how to fill the required

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control and report forms. The materials used in formal training should illustrate realistic cases and should include unusual as well as usual situations. In this respect, the formal training is superior to on-the-job training. During on-the-job training, an employee may work with a large number of cases before he will find examples of different situations.

For the key punch operators, the only formal training that is required includes (a) a brief description of the codes and the skip patterns of the basic questionnaires, (b) explanation of the various punch cards that will be used, (c) demonstration of the key punch equipment, and (d) instructions on how to fill the required control and report forms.

For the technical personnel working on the computer systems and programming, the manufacturers of the equipment or certain technical schools conduct training courses in this field of specialization. It is often overlooked that the programmer also needs some formal training in the subject area to assure his understanding of the specifications developed by the subject specialists. Again, the test data prepared for the procedures testing can be used as training documents.

Supervisors of the three groups of employees should have the same training. In addition, they should have special instruction on how to supervise a group of employees--how to motivate the workers, how to review their work and how often, what action to take for below-standard performance, what reports to fill, and similar management duties.

7.2 *On-the-job training.*

Formal training has limited value unless it is followed or accompanied by actual job experience. Questionnaires filled during pretest operations would be useful for this purpose. If not available, early returns from the census itself may be used. Supervisors or specialists should carefully review the work of each new employee and discuss his work with him as quickly as possible after he submits it in order to minimize his continuing the same errors.

A most beneficial procedure is to hold short discussion sessions at which subject matter specialists, programmers, systems analysts, computer operators, and control personnel are represented. Such discussions would help to resolve problems of communication and understanding, and would contribute to a smooth flow of work.

7.3 *Individual training*

Some employees will require individual training. Generally, these are persons who join the staff after the formal training has started. Training for an individual could utilize the same materials that are used in group training. Individual training permits the employee to proceed a little faster than if he were part of a group; on the other hand, it usually requires proportionately more of the instructor's time.

7.4 *Re-training*

Employees who have had formal training and on-the-job training still may not be able to perform the job satisfactorily, in which case they would need re-training on specific aspects. Re-training is sometimes a better course of action for the agency than to dismiss the person and recruit a new employee. If concentrated re-training still does not produce better performance, it would be more profitable to recruit and train a new employee.

8. *OTHER CONSIDERATIONS*

There are several other matters which should be considered with respect to their impact on the success of the data processing operations. These include the matter of how

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much editing should be done manually and how much by computer, the matter of whether to divert resources to produce advance tabulations, and the value of documentation.

8.1 *Manual versus machine editing*

Prior to the introduction of data processing equipment, it was necessary to perform the editing functions entirely by hand. This was a very slow and complicated procedure. With the introduction of punch card equipment some editing could be performed by the machines; but here again because of the volume of cards it was a time-consuming process.

With the advent of computers, the entire concept of machine editing has changed. Very rapid machine edits that can investigage multiple fields of data can now be performed as routine steps in all computer operations. By using the computer to make as many edits as possible, it is possible to reduce the amount of manual editing considerably. This permits a uniform application of edit rules and thus eliminates the need for many editors.

8.2 *Value of documentation*

Documentation of all procedures, instructions, and decisions should be required at all levels. It avoids misinterpretation and misunderstanding. It also encourages orderly discussion and saves much time when procedures require modification. Such documents provide an excellent basis for development of the procedures for the next census.

8.3 *Developing a calendar*

A calendar of operations contains a list of operations and the beginning and end dates for each step. It provides a means for seeing at a glance which operations are occurring simultaneously, how long it takes to complete each of them, and which personnel might be shifted from operation to operation. In compiling the calendar, it is necessary to take account of the availability of qualified personnel, the length of the workday, occurrence of holidays, and similar considerations. Allowance must be made for absenteeism, delays in receiving materials from the field, and unexpected problems that may arise.

Developing a calendar is a two-way operation. An optimum schedule can be forecast to provide the most desirable calendar; then the schedule must be modified by restrictions that adversely affect it. For example, the number of available qualified applicants for key punch operators may be considerably smaller than was anticipated. Therefore, the operation will require a longer period of time than was originally estimated.

The actual operations to be considered as separate functions are:

(1) Systems design and programming

(2) Manual editing-coding and verification

(3) Key punching and verification

(4) Machine editing-coding

(5) Tabulation

These five steps are separate and distinct operations even though the flow of work from one to another will overlap. Throughout all of these steps will be a management review which can be called methods review. This is a continuing review of all processing steps from the beginning to the final day of processing. Another review which is a subject matter review rather than a procedural one also takes place beginning with the first computer run and continuing throughout the computer operation.

9. *VOLUME OF WORK BY FUNCTION*

In order to adequately estimate the personnel requirements, it will be necessary

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to determine the workload by function and to calculate approximate production to be expected for each step of the census processing. For most operations, there is no standard rate of production which can serve as a guide. Persons responsible for estimating workload and personnel requirements can use the results of the testing procedures (discussed in section 5 above) to make time estimates, making allowances for unforeseen difficulties that arise.

9.1 *Systems design and programming*

The additional workload created by the census activity in the area of systems design and programming cannot be handled by the regular full-time staff of the NSO. The Chief of the Data Processing Division must decide at least a year in advance how many of his current staff can be retrained and promoted to positions of systems analysts, programming supervisor, programmers, computer processing specialists, computer operators, and control and tape storage specialists. Based on that decision, he can determine how many additional programmers and analysts will be needed. In some countries, the supply of qualified data-processing specialists will be critical or even non-existent. In Providencia, the NSO has been able to promote some of the existing staff, hire several beginning programmers, and hire several trainees who will be given on-the-job training at the NSO. The NSO planned to start training the programmers before the census is taken and to have programs prepared and tested before the census results are received in the NSO.

9.2 *Manual editing and coding*

In number of man-hours, the editing-coding process requires more time than any other portion of the census except the enumeration. The actual time schedule, therefore, will depend almost entirely on the number of clerks that are assigned to this operation. Ideally, it would be best to use a minimum number of highly qualified clerks, train them well, and establish a routine system of quality control. This may not satisfy the time requirements, however.

The number of editor-coders that are needed can be estimated from an examination of the production records that are kept during pre-tests and other testing activities. From these records, the staff can compute the average number of questionnaires edited per day and the number of man-days it would take to complete the operation.

It is important that a realistic average be used. If the estimate is too high, too few persons will have been estimated for the job; on the other hand, if the estimate was too low, too many persons will have been employed and it may not be possible to keep them fully employed.

9.3 *Key punching*

The estimate of the volume of work for key punching and key verification is dependent largely on the number of questionnaires, number of items on each questionnaire, and the number of cards (records per questionnaire). An additional consideration is the number of columns to be punched on each card.

9.4 *Computer processing*

The census operations to be carried out on the computer, in Providencia, will consist primarily of (a) the card-to-tape process, (b) the machine edits, and (c) the tabulations. Estimates of the volume of work take into account such factors as the length and number of records, number of reels of tape, number of tables to be produced and printed, number of geographic areas for which each table is to be compiled, and number of sorts and merges. The time required to process the data depends on the quality of the input media

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that is utilized; speed of input/output devices such as card readers, tapes, disks, and printers; size of core storage; design of the system (flow of work); and the capability and the experience of the personnel. The estimate should also allow for human errors and machine failure. The actual machine time required to process the census on the computer will be relatively small compared with the other census operations. The systems analyst has the responsibility for making and evaluating the estimates.

10. OPERATIONAL CONTROLS

In Providencia's industrial census, it is evident that many pieces of paper are transmitted to and from various parts of the NSO and the field and from one division to another within the NSO. The prompt transmittal of the materials and the keeping of complete and accurate records are necessary for successful and efficient implementation of the census program. Delay in assembling and sending materials to the field makes it impossible for the field staff to meet their time schedules; similarly, delay in routing materials through the various operations in the NSO may make it impossible to complete the work or to take remedial action based on review of the materials.

10.1 Importance of accurate control

Control is particularly important with respect to data processing. The DPD Control Clerk must verify that every document is received and finally tabulated.

Control records and procedures must be accurate. An error in transcribing the ED No. to the census form, for example, may result in including the wrong form in the data for a county or province. Similarly, illegible handwriting or misfiling may even make it necessary to repeat previous steps.

Control operations should be kept as simple as possible; the essentials must be included but the operation should not be cumbersome. For a one-time operation, like the industrial census, it is usually not necessary or practical to establish detailed procedures and numerous control forms.

10.2 Responsibility for control

The Control Clerk in the Control Operations Branch of DPD is responsible for the movement of materials to and from DPD and within DPD. In order to carry out his functions properly, the Control Clerk should be familiar with the overall plan for the census program and have specific knowledge of all the steps in the data processing operations. He is to verify that all the documents are received in DPD, sort the questionnaires, transcribe certain identifying information to each questionnaire, count the number of forms, assemble them in work units, and prepare progress reports. He also is responsible for reporting to the proper official any delays in sending or in receiving materials and for following through as directed.

10.3 Flow of work

Below is a simplified chart to show the flow of work through the data processing operations. It is assumed that verification of an operation would be performed in the same organizational unit but by different persons.

As the chart indicates, the Control Clerk has an important role in the flow of work. He is responsible for verifying that every document is received in DPD, assembling them in work units, recording the progress of each work unit, and maintaining records of errors made by the editor-coders and key punch operators. He is responsible also for noting where delays occur and reporting them to the proper authority.

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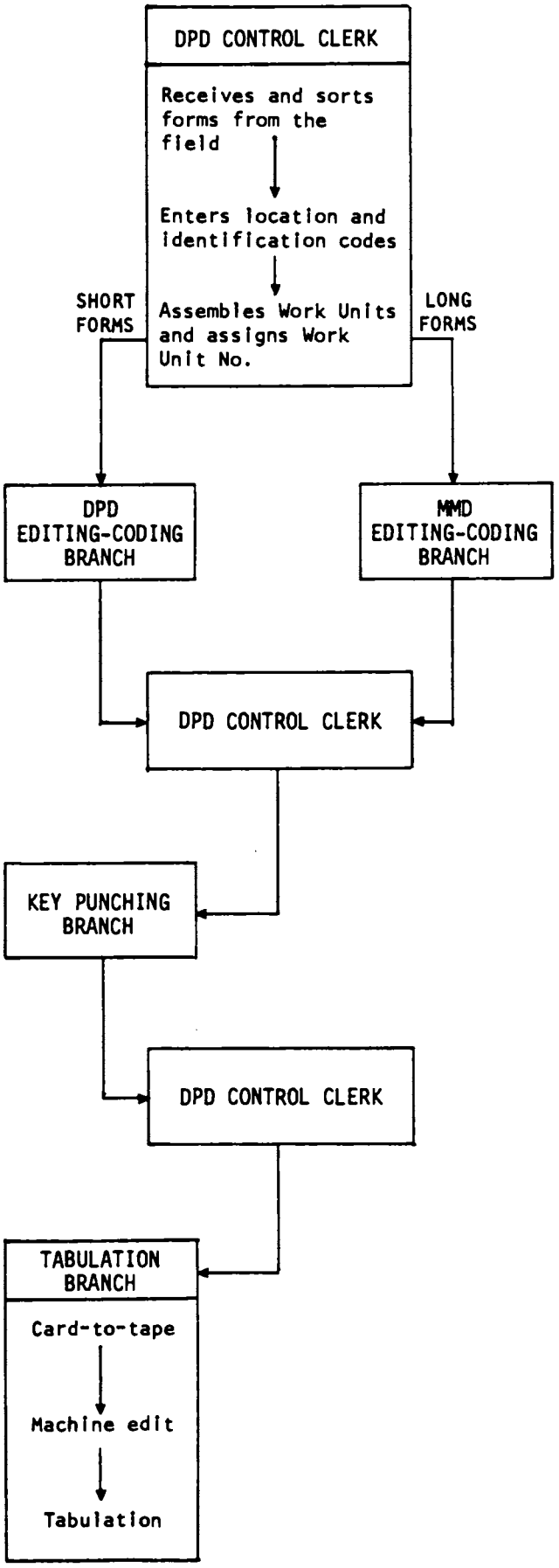

10.4 Unit of work

At first, individual questionnaires are checked against the ED and Serial No. entered on Form 123. For later operations, control by individual questionnaires is impractical. Before transmitting the forms to editing-coding, the Control Clerk combines the questionnaires for several ED's (within the same county) into one work unit. The number of forms to be combined would depend on the complexity of the operation but should be a workable number to enable the clerk to process within a reasonable time. For Providencia, the DPD Control Clerk assigned a 3-digit number; the first digit indicated the type of questionnaire and the other two digits were a simple sequence of numbers.

10.5 Principal control forms

Control forms should be designed for convenience, as well as for purposes of filling a need. For example, the Work Unit Label need not be a large sheet of paper; on the other hand, it should not be so small that it would be easily lost. Another example is the arranging of identification items in the same sequence on control forms in order to minimize errors in transcription.

The principal control forms used in the Providencia census are as follows:

(1) Master List of ED's, Form 230 (exhibit V-1-1)

Form 230 is used by MMD and Geography Division to assign ED numbers within counties prior to the enumeration period. After the enumeration, the form is used as a check list to insure that forms 123 and questionnaires are received for each ED.

(2) Master Control List for Non-Skip List Establishments, Form 501 (exhibit V-1-2)

This form is used by the Control Clerk in DPD to assemble the questionnaires for non-skip list establishments into work units and assign the Work Unit No. by type of form within county. It provides the count of forms in each work

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unit and is used as a reference list to locate the ED for follow-up when problems occur during editing-coding.

(3) Master Control List for Skip List Establishments, Form 502 (exhibit V-1-3)

Form 502 has the same functions as Form 501 except that it is used by the Control Operations Branch of MMD. Another difference is that it provides for the control of individual questionnaires for the skip-list establishments instead of all the questionnaires for an ED. Since there are so few skip-list establishments in relationship to their importance, it is felt that it is essential and practical to control by the individual form.

(4) Data Processing Control Sheet, Form 507 (exhibit V-1-4)

This form is used by the Control Clerk to control the routing of the work units through the various processing steps and to watch for any delays. A backlog in the releasing of work from any one step may signal a need for more personnel or some other problem. The form also is used in quality control; the number of editing-coding errors or key-punching errors may indicate a need for re-training or replacing inefficient personnel.

(5) Work Unit Control Label, Form 503 (exhibit V-1-5)

A Form 503 is attached to each work unit to identify the questionnaires and the resulting key punch cards as they are processed. It provides the means to compute error rates for editing-coding and key-punching. In addition, it provides a means to insure that all the cards (data) for all the questionnaires are punched and entered into the computer.

(6) Card-to-Tape and Computer Edit Control, Form 513 (exhibit V-6-3)

Form 513 is used by the computer staff to insure that all data are put on the computer and are machine edited. By means of this form, the staff can tell when all the data for a county has been accepted and merged with the rest of the data for a province. It also tells when a province is completed and ready for tabulation.

Other processing controls are provided by the Master ED File and Listing of Tabulated Counts (exhibit V-6-1) and the Card-to-Tape Diary (exhibit V-6-2). These provide counts which are compared with the totals on Forms 501, 502, and 503 to insure all the data are entered into the computer. In addition, diaries of machine processing give information on either control totals or the quality of the data; for example, a diary might indicate the number of punched cards that were entered on a tape or the number of editing changes that were made.

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Chapter V-2. SELECTION OF DATA PROCESSING EQUIPMENT

1. INTRODUCTION

The plan for Providencia's 1975 Industrial Census provided for using Electronic Data Processing equipment for a considerable portion of the editing and tabulating. Much of this chapter, therefore, is concerned with computer equipment. Procedures for punching cards in Providencia assume the use of conventional electromechanical equipment, which most countries already possess and have some or considerable experience in using. Details on the considerations that affect the selection of key punch and conventional equipment and detailed procedures for their use, therefore, are not dealt with in this case study.

2. BACKGROUND FOR DECISION-MAKING ON USE OF COMPUTER

A discussion of some important considerations that are involved in the use of a computer is given in the following sections. Factors which influence the decisions should be carefully considered by the data processing staff, subject matter staff, and management.

The choice of computer equipment (hardware) may not be a matter of decision by the statistical agency taking the industrial census. In some countries, a central computer office has been established to offer computer services to various government agencies. Sometimes the computer will actually be installed at the Office of Taxation or another agency and will be available to the census office for specific projects.

The procedure for the selection of the appropriate equipment by the statistical agency can be a simple cost consideration or it can be an involved study with long range implications. A number of considerations are necessary, and these will vary from country to country. This discussion is not intended to be a plan for a feasibility study, but rather a general presentation of factors to be considered.

In most countries, the technology of data processing has developed from punch card accounting machines to electronic computers of great speed and complexity--known as the "third generation" computer level. Wherever punch card tabulation equipment must be operated on more than one full shift every day (more than 8 hours of machine time per day), the cost comparison will nearly always favor the computer over the tabulation equipment.

In a marginal operation, where the justification may not be as apparent, benefits other than cost can be used to justify the computer. The installation of a computer system will introduce a new dimension of ideas into an organization--ideas which are not possible without a computer. These extra dividends that are difficult to measure may be more important than the savings in direct cost. Where they can be identified or recognized, they should be used in the justification.

In a census of manufactures and minerals, the factor of timeliness can be as important as the cost. Census data lose some part of

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their usefulness every year. If a computer can help reduce the time from enumeration to publication of data from 4 years to 2 years, for example, this certainly will be a valid benefit even though there is no way to measure the benefit in terms of cost.

A number of other factors will have an effect on a feasibility study and on the actual installation of a computer. Some of them are discussed below.

3. *ANALYSIS OF DATA PROCESSING NEEDS*

One of the first steps in determining what kind of data processing equipment should be used is to analyze the data processing needs. In making this analysis, it is important to examine and to document (in detail) such matters as what is to be done, how it can be carried out, frequency required, complexity of the process, and the uses to be made of the results. The following specifications represent the minimum information that would be required for this purpose.

(1) Input--method or medium by which data are received, format of the data, and the daily volume (including peak workloads).

(2) Maintenance of information--volume of records, methods of file maintenance, data management organization, methods of accessing (retrieving) the data.

(3) Output--kinds of output (for example, punched cards or printed reports), daily volume of output, time to accomplish each process.

The selection of the data processing equipment should be made within the framework of the analysis of the needs. Most manufacturers are willing to demonstrate their equipment and some may even assist in writing the programs. Discussions with users of the equipment are often very beneficial, since the manufacturers usually describe the equipment from an operating point of view rather than from a marketing point of view.

The cost of a small computer system generally is almost equivalent to a good electric accounting machine (EAM). Many countries will find that the versatility, performance, and upward growth capability of a small computer system will outweigh the performance of the less sophisticated EAM equipment. Card punch machines and verifiers should be regarded as necessary equipment. Such support equipment as "decollators" and "bursters" also should be considered, even though they are regarded as optional equipment.

4. *CUSTOMER SERVICE*

In making a decision in favor of a specific make or model of a computer, the availability of competent customer service should be included in the evaluation. Can the computer manufacturer offer such a service when the machine needs repair? Is there another compatible computer installation close by for emergency use if the computer breaks down?

5. *PURCHASE OR LEASE*

Generally speaking, it is more practical for a government agency to purchase rather than lease a computer. The turning point for deciding in favor of buying is estimated to be somewhere around 60 months. Most computer systems of today can be expected to make a major contribution long beyond that time even though newer, faster, and less expensive models become available. Whether to purchase or rent may also depend on whether there are other computers available for the census processing outside the statistical office.

Most computer manufacturers have a lease with option-to-purchase arrangement, which gives the user an opportunity to purchase, at some later time, without losing rental credits. It is also possible to purchase some units of the computer system and lease other units such as tape drives and disks.

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6. *PHYSICAL ENVIRONMENT*

Adequate provision must be made for the proper physical environment for the processing equipment. Computers require controlled temperature and humidity surroundings. The person responsible must determine where the computer will be installed and what building remodeling is needed prior to installation. Usually the computer manufacturer will make recommendations concerning the physical preparations, and these recommendations should be given proper consideration. Other physical considerations are listed below.

(1) Special work areas or offices for programmers. Programming requires intense concentration and attention to detail. Much greater production will result if private work areas are provided for the programmers.

(2) Electrical wiring and connecting cables. The various accessory components such as the printer and the magnetic tape units are all connected to one another by heavy cables. Machine operations can be improved considerably if the floor of the computer room is raised and the wiring is installed between the lower and the raised floors. The flow of electricity must be dependable; interruption in service could accidentally erase data or otherwise adversely affect the operation.

(3) Computer room portable furniture. Small carts for moving cards, tapes, and documents into and around the machine processing room are essential in order to achieve a smooth-running operation.

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Chapter V-3. GENERAL CONSIDERATIONS FOR EDITING AND CODING

1. *INTRODUCTION*

By editing is meant the inspection and correction of data, when necessary, in accordance with predetermined rules. Editing of data may be done during an office (field or central) editing and coding operation, or it may be done at other stages of the census; for example, during machine processing, and during the technical review prior to publication of the results. Coding is a process of translating word classifications into numbers so that it is feasible to transfer information on the questionnaires to a punch card (or other record) for tabulation. The coding structures in Providencia were devised to provide simple and consistent codes. Codes for most of the questions were adopted from international recommendations; for example, type of industry is coded according to the recommendations of the United Nations.[1]

1.1 *Purposes of editing*

If all the data reported on a questionnaire were complete and internally consistent, there would be no need for editing--only for coding. But the enumeration process is a complex operation and often results in the recording of inconsistent and sometimes obviously erroneous data; or it may result in the omission of entries which are essential for an adequate census. The editor, therefore, performs several necessary functions in preparing the questionnaires for tabulation and in preparing tabulated data for publication.

Everyone familiar with enumerative surveys, including censuses, knows that it is impossible to get complete and accurate data on all items from 100 percent of the cases to be covered. On the other hand, there appears to be relatively little deliberate falsification by either the respondents or enumerators, though there are systematic biases in certain items--probably the result of human differences and cultural factors.

The problem, then, becomes one of making the data received from the field as nearly representative of the universe as possible, eliminating "inconsistencies" and "unknowns" where deemed appropriate. Some major guiding principles of questionnaire editing include the following:

(1) Eliminate the significant errors and inconsistencies among the entries.

(2) Supply entries for certain missing items, using (wherever possible) other entries for the same type of activity as a guide, always in accordance with specified procedures.

(3) Make the minimum possible number of changes in the originally recorded data.

1.2 *Coding methods*

Coding may be combined with the editing operation or carried out as a separate process. Whether the editing and coding are combined or made two distinct operations depends on the

[1] United Nations Statistical Office, *International Standard Industrial Classification of All Economic Activities (ISIC)*, Statistical Papers, Series M, No. 4, Rev. 2 (New York, 1968).

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nature of the questionnaire, as well as the complexity of the classification of entries.

As in the editing procedure, the type of mechanical equipment which will be used in the tabulations and the nature of the item itself determine how much coding should be done manually and how much can be accomplished by machine. Similarly, the number and complexity of the various items govern the amount of specialization which should be introduced into the coding operation. In summary, the advantages of specialization are: (a) shortening the learning period for assigned tasks; (b) improving the quality of the work; and (c) increasing the speed or production rate for a given job.

Specialization, however, does introduce additional problems of control and even involves repeated handling of questionnaires. However, since subject matter specialists or personnel trained in mass data processing are in short supply in Providencia, a procedural scheme that breaks down complicated steps into simple ones had a real attraction. In consequence, the administrative structure adopted by Providencia has been organized, for the most part, along functional lines.

As will be seen, the processing steps which Providencia adopted provided opportunity for the exercise of judgment by the professional staff in dealing with the edited questionnaires. The question, of course, is how much exercise of judgment? A limit was set on what was defined as a "small establishment." Below that level, no correspondence or other special checking was used and figures on such questionnaires were adjusted, by use of industry averages or in other systematic ways. The professional staff used judgment in applying the broad standards specified for correspondence with "large cases."

2. *TYPES OF EDITS*

Editing, as noted previously, can and frequently does occur at almost every phase of a census or survey. The principal types of edits are outlined below.

2.1 *Enumerator edit*

The enumerator who reviews his entries at the conclusion of the interview is performing an edit. His instructions may involve nothing more than "review your work to make sure it is correct," or they may consist of a set of step-by-step instructions.

2.2 *Field edit*

In some organizational schemes, the field supervisor receives the questionnaires from the enumerator. Before he transmits them to the central office, the supervisor or his staff may perform an edit. This edit may be nothing more than a random check; it may involve an elaborate procedure; or it may fall somewhere in between, with an examination of the more important or difficult items which experience has taught are often in error. These are frequently referred to as field edits and are generally devised to catch only the more glaring and obvious errors.

2.3 *Preliminary office edit*

A further cursory edit is sometimes carried out when the questionnaires are first received in the central office. This edit, sometimes called a preliminary office edit or screening, is performed when it has been decided to send questionnaires back to the field if certain key questions are not answered satisfactorily. This screening prevents unacceptable questionnaires from being further processed and, at the same time, shortens the elapsed time between the original interview and the subsequent corrective one.

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In any type of personal interview census or survey, it is a good policy to perform the enumerator edit of questionnaires and to require that it be done immediately after the interview takes place. The amount and kind of subsequent field edit and preliminary office edit or screening, however, is contingent on time, personnel, budgetary considerations, nature of the survey, precision sought, and other factors.

2.4 *Office edit*

The next step in the editing procedure is the manual office edit. This edit should be performed under rigorous conditions with precise and detailed edit instructions.

The office edit differs basically from the enumerator edit where corrections are made while in contact with the respondent. In the office edit, decisions are generally reached on the basis of what is assumed to be the most probable entry. For an editor to perform a complicated office edit, he must be thoroughly familiar not only with the edit instructions but also with the questionnaires, concepts, and the enumerator's instructions. The office edit, too, can sometimes be minimized or even eliminated, depending on the nature of the survey and the type of data processing equipment that is available.

2.5 *Mechanical edit*

Basically, the mechanical edit is the same as the office edit. However, in the mechanical edit, instructions are prepared for the tabulating equipment and corrections are made on the punch card or record rather than on the questionnaire. It is a good policy to do as much of the editing mechanically as is possible. The mechanical edit assures a degree of accuracy and uniformity which is unattainable in a manual edit. The mechanical edit takes place after the card punching operation, and thus corrects punching errors as well as the errors of the enumerator (and editor-coder, if manual editing has been done). As indicated earlier, the mechanical edit may minimize or eliminate the manual edit.

The mechanical edit using EAM equipment lends itself most readily to simple uncomplicated questions. Mechanical editing on electronic computer equipment combines all of the advantages of manual editing and of mechanical editing on EAM equipment. At the same time, it has many additional refinements. In the computer edit, the correctness of an entry can be checked by examining the consistency of numerous sets of conditions simultaneously. Further, the entry can be changed automatically without recourse to the sorting and re-punching which is involved with EAM equipment. Imputations of missing characteristics can be performed on the basis of comparable data from a previous census or sample survey.

3. *KINDS OF ERRORS*

The kinds of errors which can occur on individual questionnaires fall into several categories. In some instances, an error may be classified in more than one category.

3.1 *Omissions*

This is simply the case where the enumerator or respondent failed to insert an entry. When the possible choice of answers is limited, the correct answer usually can be determined from other entries on the form. However, when an omission involves a choice of several responses, subjective selection of the most probable one based on other entries may not be possible.

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3.2 *Impossible entries*

Impossible entries are those which are prohibited by the coding system. For example, if form of ownership Code 1 represents government enterprise and Code 2 represents private enterprise, any other digit would be an impossible entry.

3.3 *Inconsistent entries*

Inconsistent entries occur when two or more items must bear a particular relationship to each other, but do not. An example would be an entry of 10 full-time production workers with a total of only 1 day of production.

3.4 *Unreasonable magnitudes*

This has reference not necessarily to an error, but to an entry which appears unreasonable, such as a production worker with an income far in excess of the average for that particular industry group. Such an entry may be correct, but it deserves investigation.

4. *DEVELOPMENT OF AN EDITING PROCEDURE*

In the development of an editing procedure, numerous factors must be taken into consideration. The principal consideration is whether the questionnaires are sufficiently complete so that tabulations may be derived from them. Obviously, some items on a questionnaire are more important than others. For some missing, clearly unreasonable, or inconsistent entries, it may be possible to determine--with a high degree of accuracy--the correct entry from related information on the questionnaire. In other cases, depending on the nature of the item, such imputation or assignment of an entry is not readily feasible. Thus, one of the first decisions to be made in the development of an editing procedure is to determine which items create problems of imputation. For such items, the question then arises as to what action can be taken. Where time, funds, workload, and logistical facilities permit, returning questionnaires to the field (or contacting the respondent directly) for completion of critical omissions or incorrect entries is a possibility.

Ideal conditions for returning to the field rarely exists. And often, even if they do, the nature of the question itself may prohibit such action. For example, it may be useless to send questionnaires back to the field for completion if the questions involve serious problems of recall such as "number of days worked" during a specific period. Even if the return-to-field procedure is employed, there will always be some incomplete questionnaires. Returning questionnaires, therefore, does not solve the problem of unacceptable entries but only minimizes it.

4.1 *Specialization in editing*

It is well-established in manual editing that many advantages may be derived through specialization (see also section 1.2 above). Specialization is nothing more than the process of taking a large and perhaps complex entity and reducing it to simple, manageable component parts. The extreme in specialization with regard to census-type questionnaires would be to have a separate editor for each item on the document. The other extreme would be a total absence of specialization, whereby each editor would edit the complete document. Somewhere between these two extremes lies the optimum. As specialization increases, control problems increase and, if carried too far, the benefits of specialization are lost. Extreme specialization in editing also reduces the overall responsibility of an editor and thereby reduces the possibility of his recognizing documents that are basically faulty.

The judicious use of specialization, however, can result in savings in time and

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money. When operations are repeated again and again, decision time is reduced to a minimum, and the editor makes the decision with little reflection. Furthermore, editors trained in a limited number of functions learn more readily and can be trained more quickly; the investment in editors trained in only a few functions, therefore, is relatively minor and facilitates replacement of inefficient editors.

Specialization generally results in improved quality. Fewer errors are likely to be made when the task assigned is not complex, and when the operation is done repeatedly. Moreover, it often permits utilization of special aptitudes to the fullest extent.

4.2 *Evaluation of editing-coding personnel*

The editing-coding procedures serve the main function of ensuring "processability" of the documents. The procedures can also be used to evaluate other aspects of the program, especially during pretesting. As already indicated, poor enumerators can often be detected through editing. However, care must be exercised to make sure that the enumerator is at fault and that the error is not due to some other cause. If relatively few enumerators make a large number of errors, it may be assumed that they are incompetent. If, on the other hand, a pattern of errors occurs on a widespread scale, it may be evidence that the fault lies with the questionnaire itself. Perhaps the wording of a question or an instruction, or the sequence of questions, is misleading or confusing.

4.3 *General procedural rules*

Providencia decided to combine editing and coding and to use some specialization. The following rules, which are among tested methods for promoting efficiency, were adopted.

(1) All editing-coding should be done with a sharp colored pencil or fine-point pen. In Providencia, the color chosen was red. The actual choice of color is not important, except that the contrast with the respondent's entries (handwritten or typed) should be unmistakable.

(2) When a correction is made to an existing entry, the figure being corrected should never be erased. Instead, the editor-coder should line through the figure and enter above that figure the correct one. Blank or omitted entries should also have any figure entered with a colored pencil or pen.

(3) Verification should be done with pencil or fine-point pen of a color other than the one used for editing-coding. Providencia selected blue as the color to be used.

(4) In verification of editing-coding, the original entry should not be erased, but should be crossed out and the correct code entered above it. This is important for quality control purposes.

(5) The initials of the clerk or analyst performing the editing-coding steps of a given sequence should plainly appear in the margin, followed by the date. The initials and date should appear near the section of the questionnaire being processed, rather than on a separate routing or editing worksheet which may become detached from the questionnaire.

5. EVALUATION OF EDITING PROCEDURES

In the conduct of an industrial census, the basic philosophy underlying the editing specifications may well determine not only the quality of the data eventually published, but also the ability of the census authorities to evaluate their own editing procedures.

This evaluation aspect of editing tends to be discounted or treated as a side effect during the course of data processing, when all the emphasis quite naturally is placed on expediting the movement of good figures to final tabulation. Then, when the final posted tables are being reviewed for the published report, the thought arises, "What can we say, as

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professional statisticians, about the limitations and qualifications of the data to be shown in our published tables? And more particularly, what should we be in a position to say, in text or tabular notes, about the weaknesses or shortcomings in the data as reported by respondents to the enumerators?"

The whole processing structure, but especially editing, must proceed with this objective in mind, if definitive answers to these questions are to be forthcoming at this final stage in data processing. Such evaluation concerns the criteria for accepting or correcting reported entries, for contacting the respondent in the case of dubious entries, and for estimating blank or omitted entries. Deviations from any set of criteria or procedural rules will, of course, occur in the processing of mass data, but such departures should be the exception, and for cause.

A clear understanding at the outset that strict adherence to the editing rules is to be the norm provides the setting for a valid post-census appraisal. The consistency of the editing and the type of record kept affect this ex post facto evaluation in at least two important respects:

(1) Qualifications and analytical studies of the published results.

(2) Guidelines for planning future censuses and commodity surveys.

The mere mention of carrying out post-censal evaluations and analytical studies may seem academic, if not wholly unrealistic. This is especially the case when most countries are hard pressed to stretch their statistical dollars to cover eventual publication of data. Nonetheless, any given budget for conducting an economic census will yield more value, in terms of economic intelligence about a country's industrial complex, if the editing procedures provide a basis for such evaluations.

6. *ORGANIZATIONAL STRUCTURE FOR EDITING AND CODING*

The organizational structure of Providencia's NSO has, for the most part, been set up along functional rather than subject matter lines. Thus the Control Operations Branches have been given full responsibility for receiving all completed questionnaires coming into their Divisions.

Editing-coding and verification of editing-coding are performed by the Editing and Coding Branches--in the Data Processing Division for short forms and in the Manufacturing and Mining Division for long forms. In MMD, product and materials editing-coding are carried out by specialists and clerks who are closely supervised; this procedure is essential if establishments are to be assigned their proper activity codes.

The Control Operations Branches count and sort the questionnaires by subject census and transmit them in work units to the various other branches, where tests for processability, scope, and reasonableness are performed. Any rerouting of questionnaires that is necessary during the editing-coding operation is to be handled primarily by the Control Clerk in the DPD Control Operations Branch (see also section 10 of chapter V-1).

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Chapter V-4. MANUAL EDITING AND CODING

1. INTRODUCTION

The computer will be used as much as possible to edit and code the questionnaires. However, some editing-coding is not feasible by computer (all material is not machine readable) and some would cause too many records to reject and eventually cost more in time and money.

The manual processing that is planned for Providencia primarily consists of insuring that questionnaires are processable. To be processable means that (a) the questionnaires must be complete, (b) all identification codes must be on each questionnaire, (c) all data must be in machine readable form, and (d) each entry must be in its appropriate place.

The manual editing and coding specifications refer to the manufactures long and short questionnaires. Procedures for the questionnaires for mining and for the electricity and gas industries would be similar.

2. SEQUENCES

In the course of developing its editing and coding specifications, the NSO established the following principal procedural sequences for manual editing and coding:

(1) Sequence A--Tests for completeness

(2) Sequence B--Establishment identification coding

(3) Sequence C--Editing and coding of products and materials

Sequences A and C are shown in detailed flow charts (exhibits V-4-1 and V-4-2). Similar charts can be prepared for other sequences.

The manual editing and coding sequences for the long and short forms are written as one procedure, although they were performed one at a time. The processing starts with a series of completeness checks. The basic question to be considered is: "Is the form processable?" In the case of establishments engaging 10 or more persons, only a clear answer of "Yes" to this question keeps the report in the regular processing stream. This means that the tedious and sometimes complicated steps involved in coding and editing location, products, and materials are reserved for the large establishments--those that make such an investment in staff time worthwhile.

3. TESTS FOR COMPLETENESS (SEQUENCE A)

The purpose of this opening sequence is to determine whether the questionnaire can be processed. For this test, the NSO selected five critical items. These critical items of inquiry--number of persons engaged, total annual payrolls, cost of material, value of shipments and receipts, and nature of primary activity--appear on both the long and the short forms. For convenient reference in tabulating as well as editing, they are designated by the same item number. The lack of an entry for any one of the critical items means that the questionnaire has failed to meet the NSO processing standards. For the purpose of these tests, an entry is defined as a numeric value.

As the detailed flow chart for steps A-1 through A-5 for this sequence shows, all questionnaires that fail one or more of these

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completeness checks are to be identified (see exhibit V-4-1). A critical item (or items) missing is a reason for rejection. The item number is to be circled and referred to as flagged. Since the NSO processing standards do not permit any formula for estimation of entries for critical items in the case of establishments with 10+ TEP (total engaged persons), the respondent must be asked to correct the deficiencies.

In the manual editing, when no total has been reported for an item by the respondent, the procedure calls for deriving that total by adding the reported detail. In the process, there is a check made as to whether the item's last detail entry is the total of the item's previous detail entries. If the last detail entry is not the total, the sum of all detail should be entered on the required total line. If the last detail, the editor-coder should delete it and transfer that total to the appropriate line.

4. *ESTABLISHMENT IDENTIFICATION CODING (SEQUENCE B)*

The purpose of sequence B is to identify numerically all of the establishment characteristics that are required in the tabulation plans, except for the assignment of the economic activity code which will be handled by the computer edit. Thus, the instructions cover the steps for assigning codes in the "For NSO Use Only" boxes printed at the top of each form. Codes will be punched on each data card to distinguish the following characteristics of establishments:

(1) Location--province, county, ward, and ED number

(2) Legal form of organization (F/O box)

(3) County Register No.--(for identification on listings only, not for tabulation)

The long form questionnaires going through this operation (sequence B) have all passed sequence A, which is the test for completeness. The short form questionnaires, however, may have passed only a portion of sequence A.

4.1 *Step B-1: Physical location of establishment*

The entries in item 2, physical location of establishment, were checked and the appropriate codes entered in boxes 1 through 4 and 10 through 15 by the Control Operations Branch of DPD. Also, the item 6 total (TEP) was checked by the Control Clerk in MMD for the skip-list establishments and in DPD for those not on the skip list to make sure the form qualifies as a long form.

4.2 *Step B-2: Form of ownership*

If either box has been checked in item 4a, and if the entry is consistent with the name of the establishment in item 1 and Form 123, the numeric code is to be entered in box 16 at the top of the form under the legend F/O. If neither is checked, the name of the establishment in item 1 is to be compared with the name on Form 123. Then check the appropriate box of item 4 and enter the corresponding numeric code in box 16 at the top of the form.

4.3 *Step B-3: Register No.*

For both the long and short form, boxes 5 through 9 labeled "Register No." should have been completed in the field. The digits should have been entered in the correct position working from right to left, using leading zeros if necessary. For example, if the number is 2001 it should be entered as "02001." If the zeros were omitted, the card punch operator can be instructed to insert them.

With a short form, if the boxes are blank or if the entry is suspect, the form is returned to FOD. If the same conditions exist on a long form, the questionnaire is to be returned to MMD for follow-up.

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5. *EDITING AND CODING PRODUCTS AND MATERIALS (SEQUENCE C)*

The objectives of sequence C in the prepunch processing are two-fold: (a) to realize the maximum publishable information on individual classes of products and materials and (b) to make sure that the assignments of economic activity codes to establishments are done in a systematic rather than a haphazard manner (see exhibit V-4-2).

Probably in no other sequence of the editing and coding operations do the lines between "editing" and "coding" become so hazy. This is evidenced by the fact that the chief end-product of the products and materials "editing" is a "code." To be sure, this is not a routine code, as in sequence B, but rather is what the literature commonly refers to as a "research" code.

Professional analysis of the reporting of product shipments and materials consumption is a pre-requisite to the proper classification of manufacturing and mining establishments according to primary economic activity. This review work occasionally involves consulting external sources of information, and always demands the exercise of good judgement. Moreover, for some industrial sectors, knowledge of technical terms and the institutional structure is very desirable, if not absolutely essential.

5.1 *Step C-1: Product code (long form)*

This edit is to insure that for every product listed in item 18, col. (B), lines 1 through 9, there is a code listed in col. (C) and that the code is correct.

Each code is examined in terms of the Product Reference List Booklet, the entries in item 16, col. (B), and the information shown in item 17. Any improper code necessarily must be corrected.

If a product code is missing, it is verified that the value in col. (F) is activity-determining. In other words, does the sum of the values of the uncoded entries equal or exceed the sum of the coded product entries plus any contract work receipts shown on line 10? If not activity-determining, the missing product codes are assinged in accordance with the Product Reference List Booklet. Then the codes assigned are reviewed.

If these uncoded entries are activity-determining, the form may require field follow-up and is referred to the commodity specialist. If the specialist determines that the entries in question are uncodable, "C-1 reject" is marked in the upper left corner of the first page and the form is given to the staff handling field follow-up.

5.2 *Step C-2: Product code (short form)*

The product descriptions entered in col. (B), lines 1 through 5 of item 18 are compared with the definitions in the Product Reference List Booklet and the appropriate code for each product is entered in col. (C).

5.3 *Step C-3: Product quantity (long form)*

There should be an entry in col. (E) of item 18 for the product listed that has the highest value entered in col. (F) and for all products with an entry of $100,000 or more. For each product that has an entry in col. (E), the value in col. (F) is divided by this entry. The resulting implicit unit value is compared with the price range information available in the editing and coding manual. If the implicit unit value is beyond the acceptable range, the form is referred to the commodity specialist. If the value is within range, the sequence continues with step C-4.

If the product with the highest value, or any other product with an entry of $100,000

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or more in col. (F), does not have an entry in col. (E), an entry is imputed using the price range information available in the editing and coding manual. For each product, the median of the known price range is calculated and the resulting value is divided into the entry in col. (F) to get an entry for col. (E). If the information is not available in the manual, "No basis for estimating" is noted for this product.

5.4 *Step C-4: Cost of materials (long form)*

Is the total reported for cost of materials in col. (F) line 7 of item 16 the same as the figure entered in 13a?

If it is, the Materials Coding Booklet and information given in item 16 col. (B) is used as the basis for correcting or entering the appropriate code in col. (C) for each material listed. The detail on lines 1 through 5 is then added and line 6, col. (F) is used for any balancing entry needed to bring the total on line 7 and the sum of the detail into agreement.

If the total is not the same, the item 16 total is replaced with the item 13a entry. Then it is made certain that the entry on line 6 of item 16 effects a sum balance against the new total for item 16.

6. *ROUNDING*

The purpose of rounding is to have all entries expressed in terms of common units of measure before they are sent for tabulation, and to make certain that published figures are significant to the smallest digit called for in publication plans.

Providencia has carefully considered the advantages and disadvantages of different methods of rounding prior to punching. The rounding rules may be summarized as calling for rounding the three digits to the left of the decimal point so that all value entries except weekly payroll will be expressed in terms of the nearest thousand. For example, a figure of $18,329 is rounded to "18" while a figure of $18,589 is rounded to "19." Where reporting is in terms of physical units, the full figures are punched and tabulated.

7. *VERIFICATION OF EDITING-CODING*

All questionnaires reaching this final stage in the pre-punching processing stream should be visually inspected. This inspection does not need to be on a 100-percent basis. In Providencia's case, questionnaires were assembled in work units by type of questionnaire. This favored the use of systematic sampling to accomplish the inspection of reports before data processing.

The sampling rates cannot be foretold in advance. However, after a 100-percent inspection of the first work unit for any particular activity group, equally reliable results are achieved by visual scanning of progressively smaller samples of succeeding work units for that type of questionnaire (activity group). The initial sampling rates vary according to: (a) the proportion each work unit bears to the universe, or number of questionnaires expected for the activity group in question, and (b) the quality of editing and coding, or fraction defective. The quality is measured by the rate of errors that are reported by the verifier upon complete inspection of the first work unit(s) for the particular type of questionnaire.

8. *WORKLOAD CONTROLS*

The number of questionnaires by type determines the workload for editing and coding. The following estimates were prepared by the NSO.

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Number of persons engaged	Total	Mining	Manufacturing	Electricity and gas
Total	39,600	2,000	37,500	100
< 10	24,800	800	24,000	-
10+	14,800	1,200	13,500	100

It is very important that controls are accounted for and processed. This objective is accomplished through the use of the Work Unit Control Label (exhibit V-1-5). When questionnaires are removed for correspondence or callbacks to make them reasonable for processing, blank cards and blank questionnaires should appear in the Work Unit Control Label to account for their absence. The count of the number of questionnaires for each work unit is entered on this control form which accompanies the questionnaires to Key Punch. This control count by work unit is also entered on the Data Processing Control Sheet, Form 507 (exhibit V-1-4) along with a control count of the number of errors found in editing-coding.

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Chapter V-5. KEY PUNCHING

1. INTRODUCTION

The procedures in this unit provide instructions for (a) transcribing data from the census questionnaires to punched cards (key punching) and (b) verifying the accuracy of the information punched in the cards by comparing with the original information on the questionnaires. The receipt, check-in, and transmittal of questionnaires, the posting and checking of control totals, the maintenance of required control forms and records, and the preparation of administrative and other reports were done by the Control Clerk in the DPD Control Operations Branch. Card punching, card verification, error-card correction, reverification of corrected cards, and the card counting operations were done by the Key Punching Branch.

Card punch and verification procedures are presented in two types of instructions: (a) general and (b) detailed. The general instructions are applicable to the punching and verification of all cards required for the censuses. The detailed instructions are presented for the Census of Manufactures only. Similar types of detailed instructions would be prepared for the Minerals and the Electricity and Gas forms. Detailed instructions should be considered as a supplement to the general instructions.

Included as part of the card punch and verification procedures are certain other related topics which are essential to an effective card punch/verification operation. These include:

(1) Definition and control of work units

(2) Receipt of documents

(3) Routing and assignment of work

(4) Relationship of card form to questionnaire key reference system

(5) Problem questionnaires which cannot be punched

(6) Transmittal procedures

(7) Forms and records

(8) Production standards

2. GENERAL CONSIDERATIONS

Considerations discussed below apply to both key punching and verification of key punching. Specific instructions for selected operations are described later.

2.1 Card punch and verification equipment

The type 029 card punch machines were used for transcribing all census data to cards. Type 056 was used for card verification and the type 083 sorter with a card counting device was used to count the cards for control purposes.

2.2 Prefixing necessary zeros

Information on the questionnaire is punched into a card "field" which consists of one or more card columns. When a questionnaire entry does not have the same number of digits as there are columns in the card field, the card punch operator must prefix the digits with the necessary zeros in order to fill the entire card field. For example, if the number of production workers is 12, to be punched in a 4-digit card field, this information will be punched "0012."

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2.3 *Rounding*

Payroll and other quantitative entries on the questionnaire are rounded in the manual editing-coding operation. For example, if annual payroll for production workers was rounded to thousands, an entry of $1,215 is punched "0001" in a 4-digit card field. An entry of $1,615 would be punched "0002."

2.4 *Questionnaire items with no entries*

If a questionnaire item is blank, or if there is a dash (-), the card punch operator should punch "X" in order to X-skip the card field.

A questionnaire with an original entry of "none" in a given field is converted to a "0" entry and the card punch operator punches "zeros" in the card field. A sufficient number of zeros should be punched in order to fill all card columns in the card field--"000" for a 3-digit field, etc.

2.5 *Problem questionnaires*

A questionnaire with incorrect codes, unreadable entries, or any data that cannot be punched should be referred to the supervisor. When the problem questionnaire is removed from the work unit, a reserve (blank) questionnaire should be inserted in its place. A supply of reserve forms is maintained in the card punch area for this purpose.

A blank questionnaire is inserted in the work unit in place of the problem questionnaire in order to mark the place of the removed questionnaire. Unused reserve forms should be included in the back of the last work unit folder after the card punching operation has been completed.

After the problem questionnaires have been corrected and returned to the key punch supervisor, the necessary cards should be punched, verified, and filed in their respective sequence. The questionnaires should be reinserted in the work unit and the blank reserve form should be removed.

2.6 *Program card*

A program card is very helpful in the operation of the IBM Card Punch Machine. The program card is designed to control the card columns which will be punched, duplicated, or skipped during normal card punch operations.

When a census questionnaire requires several cards in order to transcribe the necessary data, the sequence in which these cards will be punched and verified (and the routing of the questionnaires during the card punch/verification operations) will be determined by the program card variations.

3. *CARD CONTENT*

When the questionnaires for Providencia were designed, it was assumed that the computer would not be available and that items that are related to each other (or were to be cross-tabulated) must be punched on the same card. Therefore, a "key" number was printed next to each item to indicate the location of the item on the card format. The key consisted of two numbers separated by a dash (-). The first number represents the card number and the second is the card field. For example, key 1-9 adjacent to item 7a on the long form indicates field 9 in card 1.

Later, the Providencia NSO decided to use the computer for processing. Although various card types are needed, the punching for a particular card type follows the items in the same sequence and lines as they appear on the questionnaire.

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The content of each card type is presented in exhibit V-5-3. The Manufactures Long Form requires six different card types, while the Short Form requires two. Cards 5, 6, and 9 are multiple card forms. Estimates of the number of cards of each type are as follows:

Subject	Long Forms	Short Forms
Number of questionnaires...	13,500	24,000
Number of cards....	144,000	72,000
Card No. 1.....	13,500	-
Card No. 2.....	13,500	-
Card No. 3.....	13,500	-
Card No. 4.....	13,500	-
Card No. 5.....	45,000	-
Card No. 6.....	45,000	-
Card No. 7.....	-	24,000
Card No. 9.....	-	48,000

4. CARD PUNCHING

As mentioned above, the card field number (second portion of the "key" number) that is preprinted on the questionnaire is not applicable when the processing is done by a computer, as in Providencia. Instructions to the key punch operator follow the items in sequence.

Specific punching instructions, by item, are presented in exhibit V-5-2. Instructions for other cards can be prepared in a similar manner.

When the key punch operator completes the work unit, he enters his name and date on the Work Unit Control Label Form 503 (exhibit V-1-5). He also fills a "separator" card (exhibit V-5-3) which he places in front of the work unit. The "separator" card should be a different color and should have the opposite corner cut for easy identification.

5. CARD COUNT

After the cards are punched, a count can be obtained using the 083 card counting device. The counts are posted to the Work Unit Control Label.

6. CARD VERIFICATION

The verification operation will utilize the same program cards, card format designs, routing and control procedures, card punch instructions, and control forms as used in the card punch procedure.

The 056 verifier should be equipped with a device for "notching" the cards as they pass through the machine. Providencia plans to key verify all cards (100% verification).

6.1 Error cards

An error card is defined as (a) a card containing one or more punching errors consisting of incorrect or omitted punches, or (b) an omitted card, or (c) a duplicate card (except in cases where the "duplicate" is a correction card preceded by the error card).

Error cards should have the incorrect punches circled in red pencil, and the cards should be kept in proper sequence, but turned on end in the card file so that the card correction operator can easily locate the error cards. When the omission of a card is discovered, a different color marker card will be inserted in sequence and turned on end. The word "omitted" will be stamped or written across the marker card. Duplicate cards will be marked "duplicate" and both of these duplicates will be turned on end. The questionnaire should be marked with a paper clip to indicate the item which was punched incorrectly, omitted, or duplicated.

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6.2 *Correction procedure*

The card correction operator should refer to the item on the questionnaire which has been marked with a paper clip, and correct the corresponding error card as follows:

(1) Create a new card by duplicating the correct portion of the card, and re-punch the error portion of the card.

(2) Create new cards for the "omitted" cards.

(3) Replace marker cards with both the error card and the corrected card, standing on end.

6.3 *Re-verification of error correction operation*

The re-punched portion of the corrected cards should be re-verified; the cards should be filed in the proper sequence and substituted for the error cards. Similarly, omitted cards should be re-verified and inserted in the proper sequence.

6.4 *Verification of card count by card type*

After error card corrections have been completed, the card count for each card type within the work unit should be verified. Necessary corrections should be posted to the Work Unit Control Label.

7. CONTROLS

The control procedures and forms for key punching and verification are described in section 10 of chapter V-1. The flow of work also is discussed in section 10.

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Chapter V-6. MACHINE EDITING, CODING, AND TABULATING

1. INTRODUCTION

As will become evident in the discussion of machine processing, it is easier and faster to accomplish a large data processing operation on an electronic computer than on conventional equipment. It is essential to use a computer if the initial tabulations are to be published within a reasonable amount of time. For Providencia, it is assumed that the computer is a relatively small one. It is assumed also that preliminary results published by industry, for such items as employment and sales, are scheduled for publication within 1 year after the census date; the final results illustrating product detail and cross-tabulations by industry and province will be published within 2 years of the end of the reference year.

The machine data processing operations consist of the following steps:

(1) Card-to-tape runs for all data

(2) Machine editing

(3) Tabulation of the data

(4) Advance tabulations (processed in advance of regular tabulations)

(5) Control functions

2. CONTROL FUNCTIONS

For convenience, control functions are discussed first. The concept of quality control is discussed fully in chapter V-7. The need for adequate controls has been emphasized in earlier operations, and machine processing is no exception. The big question seems to be in defining "What is adequate control?" There is often a tendency to over-control in the area of machine processing because the data cannot be held, read, shuffled, erased, and re-marked, counted and re-counted like pieces of paper. On the other hand, under-control would probably be more harmful. The optimum is neither over-control nor under-control. The controls discussed in this chapter were considered adequate by the Providencia NSO.

The controls are concerned with three main points:

(1) Corruption or distortion of data

(2) Duplication of data

(3) Loss of data

All data processing personnel, from the Director of the NSO to the last shift machine operator, should be aware of the control procedures in order to prevent the above conditions from occurring.

Except for the possibility of a machine malfunction, the computer programs will run exactly the same every time they are used on the same data. Therefore, if the programs are adequately tested prior to the actual runs with "live" data and the output is conscientiously reviewed, the output will be consistent if not entirely accurate.

The basic machine processing control procedure is based on balancing the number of establishments by ED. In addition, control necessitates balancing total records from key punch through verification, the transfer to tape or disk, and on through tabulation. Not all of these will be balanced at every step. The choice depends on the stage of processing and the availability of the control item.

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The success of any large and complex operation is due, to a considerable extent, to good planning. The plans must include well-designed controls and procedures with some flexibility to handle unanticipated actions.

2.1 Master ED File

The entire country of Providencia was divided into small areas called enumeration districts (ED's). Since the ED's covered every part of the country and since they were uniquely numbered, the list of ED's provides the first basic control of the census--starting with materials going out to the field. A file of all ED's with appropriate identification is the beginning step in the control of the census.

2.11 Content and preparation.--The Master ED File print-out (first four items of exhibit V-6-1) was prepared from the Master List of ED's, Form 230 (exhibit V-1-1). The print-out contains all the valid geographic identification codes that would be used in the census processing. The geographic codes identify the basic ED's by province, county, ward, and ED number. The additional codes to prepare tables for other levels of publication include place name, industry code, and the code for the type of questionnaire.

The names of the publication areas need to be included so that the table print-outs can be used as the final tables. The estimated count of establishments by form is needed for some of the basic control forms. A change (correction) code facilities updating the file and the questionnaire code identifies the long (code 1) or short (code 0) form.

All entries to the file (taken from the Master List of ED's) were in a format suitable for key punching. Ideal for this purpose is a standard 80-column coding sheet with vertical columns numbered from 1 to 80; the paper is similar to graph paper on which the squares have been enlarged enough to easily print a letter or number.

The information about the ED's should be carefully verified, key punched, and key verified. For convenience, the Master ED File should be transferred to tape or disk. A double or triple spaced listing of the ED file should be prepared for review and for future revision.

2.12 Use of the file.--As discussed earlier, control forms are needed in various steps of the data processing operations. Many of the records must be kept by individual ED number in order to assure that every ED is accounted for in the process. To save time and, more importantly, to assure that the lists are the same on all the forms, a copy of the Master ED File print-out can be pasted (or otherwise attached) to the stub of the control form. Other control forms in the processing operation may use some of the items in the Master ED File print-out.

If stubs of these forms were prepared by hand, there would be considerable opportunity for error. If changes occur, such as combining of ED's, it would be virtually impossible to assure that every one using the control forms would have all the changes. By updating or correcting the file, new lists can easily be printed.

The Master ED File is used frequently during the computer processing. It is used to check for valid location codes and to correct codes if necessary, to supply codes which were not available from the punched cards, to detect missing ED's, and to provide area names for the tables.

2.13 Revision of the Master ED File.--Revision of the file can be accomplished by either of two methods. One method would be to correct the card file and create an entirely

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new tape or disk file by using a utility card-to-tape or card-to-disk program (usually a manufacturer can supply a written program). The other method would be to punch the revisions and update the old tape or disk file by means of a special program. With the second proposal, change codes will be needed. These may be as simple as 1 for delete, 2 for add, and 3 for replace. The simple actions of deleting duplicate or completely erroneous records and adding new records or supplying omissions from the original file are easily accomplished by a code 1 or 2. The changing of items other than the location and identification codes requires only one card with a code 3. For changes in the location identification codes, one card (code 1) will be needed to delete the old record and one card (code 2) to add the new record.

2.2 *Hand counts*

The hand counts are the DPD Control Clerk's counts of the number of establishments for each ED by type of form. The counts are posted to the Master Control Sheet (exhibit V-1-2 or V-1-3). These counts are the control factors throughout processing.

The hand counts may contain some errors. To verify the count before tabulation is not usually worth the time and effort. The best way to verify the hand count is to compare it with the number of establishments punched for the ED. This comparison will be made in Providencia after the cards for an ED are punched and the data are put on tape; significant differences are investigated and corrections are made on the tape as necessary. In the meantime, the hand counts are accurate enough to serve as estimates of production for the editing-coding and key punching operations.

2.3 *Magnetic tape filing control*

One very important part of a control system is the establishment and maintenance of a filing system for the computer tapes. Since several hundred tapes will be required to adequately handle the full census program, there may be filing difficulties if the supply of tapes is not sufficient or if they are not adequately controlled.

Occasionally, information on a magnetic tape is erroneously erased. This can be caused accidentally by using the tape at the wrong time or (as happens only rarely) the tape may be exposed to a strong magnetic force that will erase or change the magnetic images on the tape. To provide for this contingency, backup tapes should be kept and filed in the tape library. Backup tapes are copies of the tapes used for processing. They are normally kept for one phase of the processing until the next phase or two have been completed, reviewed, and corrected as necessary. Then if data need to be re-created, only one step is needed to bring the tape to the desired or current status. When the computer staff keeps a backup tape for each batch processed, the number of tapes that are needed can multiply very rapidly. Of course, all tapes can be re-used eventually, so the cost is not a waste. In calculating the budget, however, the initial cost of extra tapes should be included.

Because a large number of tapes are needed for the census, it is essential that ample space be provided for setting up a tape library. It should be close to the computer and away from large motors, generators, or equipment that may create a strong magnetic force. The library should be equipped with multiple sections of shelves designed specifically to hold magnetic tapes. The number of shelves and the amount of space needed for the shelves must be provided for in the plan for filing the tapes. If some of the shelves are free standing, allowance must be made for passageways wide enough for a cart or other carrier. If the sections are labeled and each tape position (or slot) within the section is

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numbered, than a record of the location of any one tape can be maintained. To facilitate that record, definite sections should be assigned to each major area of processing. Under no circumstances should blank or work tapes be stored with good data tapes.

The control and tape storage specialist, or simply tape librarian, is responsible for setting up the library, assigning the sections, filing and maintaining records on individual tape locations, insuring that the proper tape is used for each step in the processing and tapes are not lost or damaged, verifying that the proper tapes are blanked for re-use upon request, and seeing that unauthorized persons do not have access to tapes.

2.31 External labels.--Another valuable aid in tape control is a good system of tape labeling, both internal and external. External labels are visible labels, physically attached to the reel of tape. They contain information such as file number or name, reel sequence number, date of run, description of the contents of the reel, and the library location. As soon as a tape reel has been created, the "file protect" ring should be removed in order to prevent accidentally writing over the good information.

2.32 Internal labels.--Internal labels are actual records written on the magnetic tape. For each tape that is used in Providencia, a standard header label and a standard trailer label will be inserted by the computer. The header labels (at the beginning of the tape) are automatically checked by the computer when used in subsequent runs to insure that:

(1) The correct tape is being processed.

(2) The tapes within a file are being processed in the correct sequence (when more than one reel is involved).

The trailer label (at the end of the tape) is the last record written on each magnetic tape. It contains two totals:

(1) Record count--the count of the total number of establishments.

(2) Block count--the count of the total number of blocks written on the tape.

A block consists of several records (see section 3.5). All input/output operations for the computer should be written to include standard header and trailer labels.

2.4 *Card-to-tape control*

Control during the card-to-tape process provides for the computer to compare the hand counts (which were punched in the ED cards) with totals tabulated from the actual punched data. To aid in resolving any differences between the hand counts and the data as punched, the card-to-tape diary lists the individual establishments, the hand counts of establishments and card types, the tabulated counts of establishments and card types, and the percentage of variation by ED and work unit.

A diary is a print-out of certain information which is important in the analysis of the procedure. The diaries are examined by subject-matter specialists, who determine what action, if any, is to be taken. An illustration of a card-to-tape diary is found in exhibit V-6-2.

2.5 *Edit control*

Control during the machine edits is provided by review of the edit diary. Tabulated counts similar to those in the card-to-tape diary by ED and work unit, and the number of imputations by item, are provided for review. In the diary, records with a high imputation rate can be shown in two forms: (a) the record as punched and (b) the record with the imputations; this would reassure the subject-matter specialists that the imputations have been made in an acceptable manner where required. For example, particular items from the questionnaire

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will be zero balanced during this edit procedure; that is, totals for specific items must be the sum of the individual fields in that item. The edit diary would essentially act as a zero balance listing in this instance.

When the tabulated counts appear not to balance, the card-to-tape diary should be checked to assure that the latest or accepted version is being used, and that the tape input was the accepted or corrected tape. An investigation of a high number of imputations may disclose that: (a) the instructions need to be revised or personnel should be re-trained at one or more points in the processing, or (b) the problem occurred during the enumeration process and the only possible action is to review the imputation process.

2.6 *Tabulated control counts*

The Master ED File print-out and diary serve a very useful purpose. They provide tabulated counts for the various geographic areas for use as control totals during the tabulation process. For each tabulation thereafter, the Master ED File print-out gives the final counts for each ED.

2.7 *Filing punched cards*

At times during the machine edit and the diary reviews, it is necessary to refer back to the punched cards. Provision should be made to file the materials so that they can be located readily. Paper and boxes of punched cards are heavy. Shelves should be of material sturdy enough to carry the weight. An estimate of the number of boxes of cards provides the basis for estimating the amount of shelving and the area for passageways. For example, the standard size box for punch cards is approximately 37 by 19 by 9 centimeters (14 1/2 by 7 1/2 by 3 1/2 inches) and holds approximately 2,000 cards. Provision must be made for accommodating such equipment.

3. *CARD-TO-TAPE RUNS*

This step transfers the content of the tabulation cards to magnetic tape. Thus, computer editing, sorting, and tabulation can be performed more efficiently.

3.1 *Advantages of magnetic tapes*

There are several reasons why magnetic tape is used to process data through the computer. Some of them are:

(1) Tape records can be read at speeds of 20,000 to 60,000 characters per second. (This compares with roughly 1,300 characters per second for cards.) Transferring the cards to tape and using tape for all subsequent processing will be many times faster than any system that uses cards throughout the operation.

(2) The use of tape greatly facilitates the edit procedure. Unedited information can be read into the computer from one tape, edited, and corrected (if necessary), then written out on another tape.

(3) When thousands of cards are processed, it is almost impossible to avoid all errors that can arise. However, errors due to the human factor and machine malfunction can be greatly reduced once the cards are transferred to tape.

(4) Punch cards are not suited for extensive processing or for long-term filing and re-use. During processing, when cards are repeatedly handled, sorted, and tabulated, they can become so worn and damaged that they must be reproduced before processing can continue. This is a time-consuming procedure, and it is bothersome. When the cards are filed and sorted, care must be taken to provide satisfactory temperature and humidity.

3.2 *Validity tests*

The program for the card-to-tape run will include the following tests to make sure the cards are basically processable:

(1) Work unit. Each unit must be preceded by ED cards with form counts.

(2) Card code. This test determines that particular items about the establishment are included.

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(3) Province. Since it was decided that data from only one province should be put on any one tape at this point in the processing, a test should be made to determine that the cards are all from the same province.

(4) Minimum data. Each record should be checked for the minimum number of items as established by the subject-matter specialists.

If any errors are detected, an appropriate error message (or code) will be on the card-to-tape print-out. A single card or an entire ED may be rejected, depending on the type of error.

3.3 *Output record format*

The card formats designed for Providencia have been effective up to now. From this point on, the advantages of magnetic tape will be taken into consideration in the planning.

The card designs that were described earlier for the most part included all the data to be punched from the questionnaires and the necessary geographic identification. However, there are some additional items that are needed in the tabulation process, and there needs to be some re-arrangement of the record formats. It is wise to consider the total requirements when the layout is first planned so that the record will be long enough to accommodate all the items that will be needed. The following is a list of items (codes) that are needed and the processing step in which the codes can be added to the record:

	Item (code)	Process
(1)	Record of imputation	Machine edit
(2)	Geographic identification for each record	Master ED File Print-out

To re-arrange (re-format) the records each time an additional item is needed requires additional programming effort and additional effort to keep in mind the various formats and sizes. The decision needs to be made to completely re-format during the card-to-tape run, allowing space for codes that would be needed but would not be available until later.

3.4 *Tape blocking*

Before the computer can write data on a tape, the tape must be moving past the read/write head at the required speed. The read/write head is the mechanism which actually reads or writes the data.

After the write, the tape stops moving. The same is true when reading data. The amount of tape that is passed during the speed-up and slow-down is called an inter-record gap and is approximately 1 1/2 to 2 centimeters (0.6 to 0.75 inches). Since one record for the various card types requires approximately 0.2 centimeters (0.08 inches), most of the tape would be blank if the record for each establishment were to be written as a separate record on tape. Also, the start and stop time would be greater than the actual read or write time. For efficiency, the normal procedure is to write several records as one physical tape record. This procedure is called blocking and the physical tape record is called a "block."

There are several factors to be considered when determining how many records should be combined to produce an efficient block size. The major factor is the amount of computer memory that will be available to store the block throughout the entire processing system.

If all records are of the same size, it becomes a matter of determining how many records will fit evenly into the space available. For example, if the maximum amount of computer memory available for tape input and/or output (read/write) throughout all the

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processing steps is 1,000 positions, the blocking factor would be 12 records per block. With the use of blocking factors generally, space would be well utilized and total data access time would be decreased.

3.5 *Card-to-tape diary*

At the time of the card-to-tape run, a diary or printed list will be prepared. Like any diary, it tells what actually happened during the processing for each ED. The diary serves as a control, a record of processing, and an aid in balancing the ED totals with the totals as tabulated from the punched cards.

3.51 Content and preparation of diary.--The cards are read and checked for errors as described earlier under validity tests. When an error is detected, an appropriate error code and the identification of the card in error are printed in addition to the tabular portion shown in exhibit V-6-1. Upon completion of the work unit, the total establishments and card types from the work unit card, the tabulated counts, the percent of variation between the two, and a total record count are printed. Each work unit will start on a new page and all pages will be clearly identified as in the example and numbered. As an aid to balancing the totals, the serial number of each establishment is listed. The serial number makes it easy to locate the discrepancy.

3.52 Review of the diary.--The diary is reviewed for each Work Unit. The reviewer should be a subject-matter person who would consult (when necessary) with a data-processing specialist and would recommend what action should be taken. The reviewer should be assisted by a clerk, who could look into many of the discrepancies. Errors in geographic identification codes will likely cause an entire ED to be rejected for re-punching.

The most likely discrepancy will be a variation between the counts (as reported by the Control Operations Branch) and the actual count of establishments and cards that have been punched. It is expected that there will be some work units for which the card count on the tape will be higher and some will be lower than the counts reported by the DPD Control Clerk. It is assumed that the quality control procedures affecting manual editing-coding and card punching will have minimized discrepancies by the time the cards are put on tape. To check punch cards one by one with the Control Clerk's entries would be a time-consuming and costly operation--out of proportion to its value. Simple manual checks of this type are also subject to considerable error.

In Providencia, tolerances were set up to permit small differences between the Control Clerk's count and the count of cards on the tape. If the two counts differed by more than 2%, the reviewer would investigate the discrepancy and make whatever corrections are required. As the reviewer gains experience, he will learn where to look for likely errors.

3.53 Corrective action.--Some programming routines are already available which provide for correction of data already in a tape file. A correction routine provides for additions and deletions to the file. For processing a census which is taken infrequently, the time and cost to write the correction routine may be greater than the clerical cost to correct the work unit. It may be more feasible to re-punch the cards for a rejected work unit and then re-process that unit.

An alternative procedure would reduce the total amount of processing but would add to the task of controlling the movement of materials. A list of rejected ED's by work

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unit would be submitted for re-punching. A card would be punched for each rejected work unit. These cards would be sent to the computer to be processed with the work unit tape and the run to drop rejected work units. The rejected work units would be dropped and the remaining ones would be processed through the computer edit.

The normal process would be to re-punch the rejected work units, destroy the old cards, and repeat the card-to-tape operation for rejected work units. Providencia chose this alternative in order to permit the accepted work units to move immediately to the machine edits.

4. PLANNING FOR MACHINE EDITS

After the data have been transferred to magnetic tape, the next procedure will be to have all of the entries on the tape undergo a thorough machine edit by the computer to prepare the data for further processing. A full edit procedure (not usually practical) would incorporate all the individual routines that are developed by subject-matter specialists in the NSO.

4.1 *Control units for machine editing*

The unit of control for the machine edit will be the unsorted tape records for provinces. They may consist of one or more of the work units as established earlier. As mentioned earlier, ED's within a province can be put onto the tape in any sequence as long as all ED's within an edit batch are from the same county. The edit batch can be as small as a single card-to-tape work unit or as large as all the work units for an entire province. As with the card-to-tape work units, the most important thing to consider in planning the size of a work unit for editing is the availability of the computer.

The initial work units for editing should be small. Also, there may be some benefit from printing those records which require more than the specified minimum number of corrections of imputations. The subject-matter analysts could review this detail to make sure the edit program is functioning properly. When it is determined that the edit program is satisfactory, the work units can be larger; this will reduce time for set-up on each run.

4.2 *Methods of error correction*

As discussed in chapter V-3, there are three types of error situations which must be corrected. These are: (a) omissions, (b) impossible codes, and (c) inconsistent entries. They result from enumeration error, coding error, or key punch error. No matter what the source or what type of error, these situations are similar in that a valid code must be inserted in place of a blank or erroneous entry.

When possible, a correct code is determined on the basis of other entries for the same type of establishment in the same ED. That is, an entry is imputed or assigned for most items and omitted for a few items.

One method of assigning an entry is to determine the estimated distribution of possible answers based on data from previous censuses or surveys, then fill blank entries in accordance with the general distribution.

Another method of imputing entries is to use "live" data from the census itself. This procedure would assign the code of the last previous establishment that shares certain characteristics, rather than using a weighted average of possible responses. In this way, local variations in the distribution of characteristics are automatically taken into account. This method is sometimes referred to as the "hot deck" procedure.

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Under certain circumstances it is inappropriate to fill a blank entry with a valid code. This is true if there is insufficient information upon which to base a decision. In this case, it is often better to insert a code for "not reported" than to assign a code which might distort the results. Even if sufficient data are available, the computer edits necessary to determine accurately which code should be assigned could be extensive. If the item is of secondary importance it would be unwise to use computer time and space with extensive editing which may not significantly improve the data. Thus, the category "not reported" could be published for several of the items on the Providencia questionnaire.

4.21 Definition of "hot deck."--Many of the imputations in Providencia will be made by the "hot deck" procedure. This method is so named because the data are constantly changing. Storage locations in the magnetic core of the computer are assigned for those items which will use this method of allocation.

This location then becomes the "deck" or "hot deck" cell where the data are stored. With the response of each new establishment, the answer to a specific question is inserted into the cell to replace the response of the previous one. Therefore, the data are changing rapidly; they are known as "hot" data. Since the deck is constantly being updated with a new entry, whenever a blank item occurs that uses the "hot deck," the data are taken from the most recent entry of a particular "hot deck" cell. The amount of storage space needed in the computer will depend on the number of "hot decks" the edit routine requires.

4.22 Definition of "cold deck."--In the event that the first establishment to be edited has a blank item, there must be values available for imputation. These initial or starting values, as developed by the subject-matter technicians in the NSO, are referred to as "cold deck" entries; these represent the most likely answers. Also, when the computer finishes processing the data for one county and begins with a new editing unit from another county, it may be inappropriate to use the information in the hot decks, since it was derived from the previous county. Therefore, for each hot deck storage cell, the computer has stored in its memory a "cold deck" entry. Before an edit work unit is examined, the computer transfers these "cold deck" cells into the hot deck storages. The "cold deck" response is kept in the hot deck storage only until it can be replaced by a valid entry for that cell from an establishment in the new county. Very soon, all of the "cold deck" entries will have been replaced, and the "hot deck" storage will be totally filled with locally reported responses.

4.3 Edit diary

At the time of the edit run, a diary will be prepared. The diary will provide information which will enable the analyst to determine whether the edit procedure has an adverse affect on the data, and whether the edit rules are reasonable. It is also a means of evaluating the quality of the census.

4.31 Description of diary.--The edit diary will be prepared by county within the province (an ED is considered too small for this purpose). If individual records are printed because the imputation rate for the county exceeds the specified maximum, the record would be printed in two ways: (a) as it appeared on the punch card and (b) as it was changed by the edit. A summary would give, in addition to basic control counts, the total number of imputations for each item and the imputation rate for each. Such information can be extremely valuable in evaluating current censuses and planning future statistical programs.

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4.32 Review of diary.--The reviewer will review the diary to determine the acceptability of the data and to take corrective action where indicated. For purposes of control, the first items that should be checked are the tabulated counts of the number of establishments in the county. The county counts tabulated after the machine edit should agree with the accepted county counts that were produced after the review of the card-to-tape diary.

The next item to inspect is the number of imputations and the imputation rate. It is possible that imputations for a single count could exceed the acceptable rate but that it would have little or no effect on the data for the county, province, or other publication area. A pre-determined error percentage should be agreed upon, and those counties which show an error rate higher than the acceptable figure will have to be fully reviewed and manual corrections made. The Providencia NSO plans to include in their published reports some statistics on the extent of imputations for the principal items, and the reason for the imputation procedure.

4.33 Corrective action.--When counts tabulated during the edit do not agree with the accepted card-to-tape counts, the discrepancy must be resolved. When the imputation rate exceeds the desired limit, there is a possibility that the instructions for editing-coding or the procedure for the machine edit should be revised. This type of corrective action normally would be handled in the pre-tests or in connection with the review of the first few work units that are edited.

If the computer programs have been accurately written, they should be more reliable and more consistent than a manual editing procedure. Therefore, when a county is rejected, it is likely to be an unusual one; for example, it may contain blanks or inconsistencies because the editor-coder omitted many codes or the enumerator did not get the information. If the rejected county will affect the data for the publication area, the reviewer may want to re-process all or part of it or, as a last resort, attempt to have an enumerator get the desired information.

5. *MACHINE EDIT SPECIFICATIONS*

The computer editing consists of tests for scope and reasonableness, activity coding, consistency checks, corrections and imputations. The speed and accuracy of the computer will be utilized for further, more sophisticated edits than were performed manually. Further, the machine edits cross-check the totals that were coded manually; for some items, the machine edits check the key punching also. The records are processed through all of the edit steps before being rejected or accepted. This permits all errors to be detected and individually noted on an error print-out sheet. The specifics of the machine edit for scope and reasonableness are outlined in sequence A.

5.1 *Tests for scope and reasonableness (Sequence A)*

The three scope tests (A1 to A3) are designed to determine whether the nature of the primary activity of the establishment comes within the scope of the industrial census.

The first test of reasonableness (A-4) seeks to find out if the report makes "economic sense." This is done by comparing the reported current income against the reported current outlays. The relationships are not considered "reasonable" if the report shows that current outlays ("out-of-pocket costs") amount to less than 40 percent of current revenue. At the other extreme, out-of-pocket loss situations (that is, where payrolls,

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materials, etc., costs equal or exceed total receipts) are not considered reasonable.

The final test in this sequence, A-5, asks only that total value of shipment and receipts be largely accounted for by the detail entries appearing in item 18. (See detail flow chart for Sequence A--exhibit V-6-4.) The following specifications for the five "Scope and Reasonableness Tests" are concerned with the records relating to the manufactures questionnaires (long and short). Modifications of these specifications are required for the mining and electricity and gas forms, especially in item number references.

5.11 Step A-1: Value of resales (VR).--Does the value of resales (VR) exceed the sum of the product entries and contract work? If this is the case, the entire questionnaire is printed along with the message "Out-of-Scope Business," plus any other errors detected later in this process. If there is no entry for VR, the edit checks to see if there is an entry for products bought and resold (cost of resales). Then VR is imputed as 100/85 of the cost of resales.

5.12 Step A-2: Value of receipts for repair and installation (VIR).--If there is an entry for VIR, does this entry exceed the sum of products and contract work receipts? If it does, the records are flagged and the message "Out-of-Scope Construction," is printed along with all items on the questionnaire.

5.13 Step A-3: Value of other miscellaneous receipts (VO).--If there is no entry for VO, the entries have passed the scope tests and are ready for step A-4. Otherwise, do the entries for VO exceed the sum of products and contract work receipts? If they do, the message "Out-of-Scope" is printed along with all records for the questionnaires.

5.14 Step A-4: Ratio of input to output.--Input is the cost of materials and payroll; output is the value of shipments and receipts. The relationship between input and output should be reasonable.

The ratio is completed by adding total cost of materials and total payroll and then dividing this sum by the item 18 total. If the resulting ratio falls in the range between 0.4 and 1.0, the edit proceeds to step A-5. If it does not, the edit substitutes the sum of the detail for each of these critical items rather than the entry shown on the total line. If such substitution for the total in items 7, 13, and 18, tested successively, does not bring the ratio within the acceptable range of 0.4 to 1.0, the report fails the A-4 test. Such failures are flagged by the printed message "A-4 Reject."

If substitution of the sum of the detail for one or more of the entered totals yields a ratio within the acceptable range of 0.4 to 1.0, the edit corrects the total and proceeds to step A-5.

5.15 Step A-5: Total value of products, contract work, and other receipts.--Does the sum of the entries for value of products, contract work, and other receipts in item 18 equal the total of item 18 plus or minus $25,000? If it does, and the records have not been flagged, the scope and reasonableness tests have been passed. If it does not, a message is printed indicating this fact and whether this sum is smaller or larger than the given tolerance.

5.2 *Activity coding (Sequence B)*

This sequence establishes the proper classification of manufacturing establishments according to primary economic activity.

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5.3 *Consistency checks, corrections and imputations (Sequence C)*

This sequence tests all records against standards which were determined from the actual reports submitted by industry in the reference year, 1975. Editing by ratios then applies these separate standards in passing judgement on entries to the 12 principal items of inquiry. This method is also applied to provide a valid basis for imputing missing item totals.

6. *TABULATION OF DATA*

A great deal of time, money, and effort will have been expended on the census up to this point. Unless the statistics are tabulated and printed in understandable form with minimum delay, they will lose some of their effectiveness. Data that are produced from an industrial census are presented in tabular form. Tabular presentation can be defined as an orderly arrangement of numerical information in columns and rows. A well-designed table presents statistical information in a concise and orderly fashion. Most of the tables that will be published in Providencia will be computer print-outs.

6.1 *Review of table formats*

As described in chapter III-6, heading consists of the table number, title, and headnote when necessary. The column head is that portion of the table which identifies the individual column and describes the data in each column. The stub or caption describes the specific data in a row and makes clear the relationship among items.

The body consists of the statistical and other information appearing in the tally cells. The cell is the basic unit of presentation. The description of a cell entry consists of the combination of the row stub and the column head. These cells are tabulated from the collected data.

Table formats should be developed early in the census planning to insure, first of all, that all items and categories are provided for in the collection of data. The table outlines are usually set up by the subject-matter specialists in close collaboration with the data-processing technicians. The latter will need to analyze the table outlines in order to develop the most efficient procedure for writing the computer programs--editing, sorting, interpreting concepts, performing computations, balancing, etc.

6.2 *Appraisal of resources*

The cost, time, and method of tabulation are mainly dependent on the personnel and machine resources that are available. The number and type of tables and the amount of data will also have a definite effect, but not as great. Well-trained and highly capable personnel can do a great deal to compensate for lack of machine resources; however, a large, high-speed computer can do little to compensate for the lack of human resources.

6.21 Machine capabilities.--All digital computers in use today have the ability to process a census. The speed and ease of processing may vary greatly. The computer with the fastest internal speeds (calculations and data movement) is of little benefit if the amount of memory is too small, and/or the input/output media is slow. Small memory may require that the more complex tables be prepared by two or more runs (programs). Input media such as cards or very slow tape units will slow the computer to their speed.

An initial input of cards, as has been suggested for Providencia, combined with high speed tapes is quite satisfactory. A computer with high speed input/output units and adequate

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memory for the most complex tables is the most desirable for census processing. Census processing, like most business data processing, has a high ratio of input/output operations as compared to calculations (internal processing).

6.22 Personnel.--Well-trained, experienced and capable personnel are the greatest asset, because they can overcome machine shortcomings with their ability and ingenuity. Aptitude, logic, and adaptability, however, often are more desirable assets than training and experience. Systems analysts must have a thorough knowledge of the census and the machine capabilities. They must be able to foresee the most efficient method of accomplishing the desired results. They must also have the logic to develop the detailed specifications necessary to implement the plan. The final method of tabulation usually cannot be determined until after the programming staff has shown its ability on early assignments. The systems analysts may have to demonstrate their adaptability by modifying the processing plan when necessary.

6.3 Programming considerations

There are basically two approaches to programming the tables--the individual table approach and the multi-table approach. This is an over simplification, as there are several methods which may be used in each approach. The selection of a method will depend mainly on the resources available for the census.

6.31 Individual-table approach.--One table is produced each time the data file is read. This is probably the least efficient but most frequently used method. The ability and/or experience of the analysts and programmers and the computer size often cause this method to be selected. There will be at least one program per table. It may be necessary to tabulate the data in one program and write tabulated data on tape or disk. The file is sorted and then a separate program prints the data.

6.32 Multi-table approach.-- The multi-table approach results in producing more than one table each time the data file is read into the computer. There are four methods of implementing this approach:

(1) This first method uses one general-purpose program which will tabulate and print a number of tables based on specifications read from punched cards or parameter cards. The number of tables that may be prepared at one time will depend on the memory available and the complexity and size of the tables. This method would seem to be the most efficient because only one program would be needed to produce all of the desired tables. The parameter cards, if well designed and documented, could be coded by non-programmers with a minimum of training. Actually this method is probably the most impractical of the four, because the extreme complexity of such a program would require a large number of the best qualified personnel, a long period of time for development, and a very large computer.

(2) The second method uses more than one general-purpose program to tabulate and print a number of tables. The table specifications are read from parameter cards by each program. The number of tables that may be prepared by one running of the programs depends on the memory available and the complexity and size of the tables. This method can be very efficient.

(3) The third method uses one program to tabulate and print specific tables. This method requires well-qualified personnel, a considerable amount of time to develop, and a medium-to-large computer.

(4) The fourth method uses more than one program to tabulate and print specific tables. This method requires less than method three in terms of personnel qualifications, development time, and computer size.

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6.4 *Intended use of print-outs*

Computer print-outs are provided for several reasons. They serve as the final tables, as worksheets for analysis and review, and as documents for historical purposes. For example, card-to-tape diary print-outs provide information for review and later serve as records of the processing.

6.41 Final publication.--Print-out tables can be programmed so that they will be complete and ready for the printing reproduction process. The title, column heads, and stubs are properly spelled, punctuated, centered, and spaced. The data in each cell are properly aligned and punctuated with decimal points and commas as needed.

6.42 Work tables.--Print-outs can serve as work tables from which final tables can be prepared. In some cases, categories in the work tables will be combined because the separate cells would disclose information for an individual, or the figures in the individual cells are insignificant. The analysts often require work tables when they do not have enough information from previous censuses to establish the precise detail in advance.

7. *ADVANCE SAMPLE TABULATIONS*

The concept of advance sample tabulations appears useful but difficult to develop into a working model. In principle, the purpose of the advance tabulations is to publish selected sample tabulations as soon as possible after the enumeration. The figures for Providencia would be simple distributions of selected items for the total country.

7.1 *Value of advance sample tabulations*

In the course of the pre-enumeration publicity and nationwide interest at the time of the census, there will be a great demand from official and unofficial sources for some figures from the NSO. By planning an advance tabulation procedure and following through with it, the NSO can eliminate some of the pressure for census figures as the processing develops.

Advance tabulations can also be an insurance against an incomplete publication of census data. Occasionally, some countries may start out with a plan that is too ambitious and they may not be able to complete the tables for all parts of the country. If this occurs, some parts of the country will have no figures at all unless advance tabulations have been prepared. (On the other hand, the census planning staff should be aware that too much effort on the advance tabulations may make it impossible to complete the regular census tabulation program.) Advance sample tabulations are also beneficial to the morale of the NSO employees as they will be able to see some fruits of their labors early in the processing cycle.

Careful time records should be kept of the various stages of the processing of the tables. These records will be valuable for making estimates of the time and money needed to process the entire census. Some changes in plans may be required in order to have sufficient resources for the analysis and evaluation of the census results. A final benefit from producing advance tabulations is the opportunity to test the computer programs and other processing operations.

7.2 *Planning a procedure*

As discussed earlier in the census plan, there are several factors to consider in recommending the advance tabulations. Some are:

(1) How much extra work will the advance tabulations create?

(2) How does the NSO develop a sample for the advance tabulations--one that is simple for the staff to carry out?

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(3) How can bias be reduced in the special handling and processing of the questionnaires selected for advance tabulations?

(4) Will the value offset the disadvantages of having the final tabulations delayed by the extra work necessary to produce the advance tabulations?

The sampling technician or statistician will need to develop a sample to use for the advance tabulations. A sample of ED's would need to be selected prior to the editing-coding operation. However, they should not be marked in a way that will identify them as belonging to a special group. The field personnel and the office clerical personnel should not be aware of the existence of such a designated sample.

An alternative plan is to select every n^{th} establishment as the forms are received in the NSO. A sample of this design requires fewer cases (consequently less punching and editing) and may avoid some bias, but is much more difficult to administer and control.

During the data processing operations, the advance sample ED's should be controlled by one supervisor who will monitor the progress of the advance work through all the stages of processing. This must be done without interrupting the regular flow of work.

The Providencia NSO decided against advance sample tabulations. However, they gave priority to some full-count preliminary tabulations.

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Chapter V-7. QUALITY CONTROL OF DATA PROCESSING OPERATIONS

1. INTRODUCTION

The basic purpose of a census is to produce statistics; for example, statistics from an industrial census might reflect the industrial capacity of a city, the fuels consumed by industry, number of employed persons in various industries, etc. These statistics are used primarily in making decisions which result in some action. The prime requirement is that they should lead to the correct decision.

The uses to which statistics are put should determine to a large extent how accurate they must be. Thus, the greater the precision required, the higher the quality of the statistics upon which the decision is based. On the other hand, it is "dis-economy" to require of statistics a quality higher than is actually necessary for the use for which they are intended.

2. CONCEPTS OF QUALITY CONTROL

Quality control in a census consists of the procedures used to measure the accuracy of performance and to limit the number of errors to a degree that is acceptable. Quality control applies to many operations: (a) pre-enumeration operations such as question wording, printing and assembling forms, sampling specifications, preparation of maps, distribution of materials, (b) enumeration activities including pre-listing, completeness of questionnaires, observation and review of enumerator's work, and (c) data processing operations such as editing, coding, key punching, and tabulating.

This chapter emphasizes control of the quality of data processing operations--largely the clerical operations. The term "clerical operations" is defined to include such tasks as assembling and labeling materials, sorting, counting, transcribing information from one form to another, editing-coding, key punching, and the verification operations such as verification of editing-coding, and verification of key-punching.

Quality control applied to an operation attempts to limit the amount of error occurring in a batch of work; the limits are determined in advance. Quality is accomplished by reviewing the work and removing as many human errors as possible.

Quality control applied to individual employees requires that their work be measured by verification and that records be accumulated to provide data by which their performance can be evaluated. Employees who have the best productivity with acceptable quality are rewarded by advancement to more responsible assignments or given longer employment. Those with poor performances are re-trained, encouraged to improve, or removed from the work.

2.1 Objectives of quality control

The output of a clerical operation is the product of human rather than machine effort--a type of output which is highly variable in both productivity and accuracy. Clerical personnel should be aware that their performance is being observed and that poor work will be identified. The prime objective of quality control is to obtain the best possible

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performance from each employee without the expenditure of excessive amounts of time and money. In cases where errors beyond tolerance are discovered, the work must be redone. In most cases, however, a few errors are acceptable provided they have no important effect on the final data that are to published.

The managers of the census are responsible for not only applying professional techniques to the processing of the data but also for accurately measuring the quality of the output. It is not sufficient to "believe" that the quality was controlled; there must be statistical evidence that a plan for doing so was developed and applied properly. Records of the performance of clerks must be maintained; an error rate, specifically defined, must be calculated both for the clerks and for each of the operations. The measurement of an error rate for an operation is itself subject to some possible error; nevertheless, all information relating to its use and application should be part of the history of the census and should be available for analysis if questions arise as to the validity of the published data.

2.2 Techniques for controlling quality

It is a maxim of clerical operations that there is no substitute for good supervision. Maintaining the quality of clerical output involves the following:

(1) Selecting clerks or machine operators who have an aptitude for doing the work that has to be done.

(2) Establishing an effective continuing training program which informs the individual of errors he has made.

(3) Identifying individuals responsible for work of poor quality and re-training or removing them from the operation, as may be necessary.

(4) Identifying work of substandard quality and re-doing it or correcting it.

2.21 Verification of output.--Verification of the process itself as a system of controlling quality of output of clerical operations is usually the first to come to mind. Verification is the use of a second person (or system) to search for defects or errors, or to check or test the accuracy or correctness of an item or operation. Verification of all items and verification of a sample of items are discussed in section 3.

2.22 Consistency checks.--Under a system of consistency checks, a questionnaire or other document, a tabulation, or a set of tabulations is subjected to one or more of the following tests:

(1) "Are quantities which should be equal to each other actually equal?" These are equality checks. They are most frequently employed in comparing stub and footing totals in statistical tables. A variation of these tests asks the question: "Are quantities within pre-determined limits?" In this form, the applications of these checks are limitless.

(2) "Are quantities which should be greater than other quantities actually greater?" These are inequality checks.

(3) "Are quantities, conditions, or ratios reasonable?" This is the check for reasonable (or unreasonable) magnitudes or conditions.

Consistency checks are primarily devices for isolating serious errors which can be corrected at the point of discovery. They are simple enough to be carried out, particularly when tabulating equipment or a computer is employed.

2.23 Error detection at later operational stages.--This technique calls for postponement of a decision whether the quality of a component is good until an assembly of components is verified. As a simple example, two different types of coding may be verified in one operation after both have been completed. Such a system is best when corrections made at the

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later stage do not result in unreasonable additional cost (such as that required to reprocess source data) and when later corrections do not result in the loss of information produced at intermediate steps. The primary considerations in adopting this technique should be costs and savings and the capability of the verifying operator or operation.

2.24 Stratification.--Frequently, in processing data, some subset of the items being processed demands differential treatment. Examples of such cases include (a) documents or punch cards on which it is necessary that there be no error in identification information, but on which a certain amount of error in the data fields can be tolerated, and (b) a small identifiable proportion of the documents, to be included in a summary tabulation, accounting for a major category of the tabulated data.

In the first example, it is usually possible to devise some system for giving greater attention to the identification information while giving routine treatment to the remainder of the card or document. In the second example, it is possible to assign the best qualified personnel to those segments of the work which require expert attention and to treat the remainder in a routine manner at a savings.

2.25 Removal of substandard personnel.--The best method of insuring good output is to insure good input. One method of doing this is to remove persons doing substandard work from the production operation. This system can be used both with personnel who are in the training process and those who are experienced but deteriorate in quality. By this simple device, it is possible to improve the quality of output without increasing costs. The major part of the cost function is the cost of training replacement personnel. In a flexible organization, the employees removed from one operation may be transferred to another not requiring the same qualifications.

3. AMOUNT OF VERIFICATION

In order to answer the question of how much verification should be done, it is necessary to answer three other questions: (a) why verify the work, (b) what is the relationship between the error rate before verification and the required quality of output, and (c) what cost of verification can be afforded? Answers to these questions offer a guide to the amount and type of verification. The answer may lead to verification of none, some, or all of the output.

Some of the reasons for verifying are:

(1) If the error rate in the production process is too high and there is no way of making changes in the operation to reduce the error rate, verification is necessary to eliminate errors. This is probably the least desirable reason for verifying.

(2) If the error rate is equal to or less than the desired level, verification is used to assure that the quality of the operation does not deteriorate and to indicate when action is necessary.

(3) A third reason for verifying is to obtain information about the quality of output for current use and for use in similar operations in the future.

The other two questions (questions b and c above) are considered as part of the discussion that follows.

3.1 *No verification*

One answer to the question of how much verification is to say "None." This is by far the most economical approach when the only cost of verification is in terms of the number of items verified. However, this system provides no measure of the quality of output and it gives no basis for maintaining control.

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A product is intended to be used. With any product, there is always the problem of the effect of errors upon the user or consumer and, in turn, on the producer. Where the product is verified on a sample basis, as a minimum there is the ability to predict the number of defective items the consumer will receive. Where all items of production have been verified, the expectation is that the number of defective items remaining after verification will be very small. But if the product is not verified, there is no way to know anything about the quality until it is used. Neither the consumer nor the producer is able to plan intelligently for the occurrence of defective items.

It is usually relatively simple to identify a defective item at the time it is used. For example, there is the simple mating of nuts and bolts in an industrial operation. If the two fit, all is well; if they do not, either one or the other is defective. Measurements will tell which one. It is a simple matter to set aside the defective item, use another in its place, and return the defective one to the producer for replacement. A mechanical edit for individual punched cards gives very much the same picture for a clerical operation. But the question is: "How many times will this happen; what will it cost?" As the operation becomes more complicated, the cost multiplies rapidly.

There are occasions when no verification can be justified. This is true of a statistical undertaking as well as an industrial operation. Some cases in which no verification is justified occur when--

(1) The total cost of finding and replacing defectives from a non-verified operation at a later stage is cheaper than the cost of verifying.

(2) It is known beforehand that the proportion of errors is so low and, no matter how the process deteriorates, the product will be good enough for the intended use.

(3) There are other controls on the operation which make verification unnecessary.

(4) The producer chooses to forego his determination of the quality, letting someone else (the consumer) do it for him.

(5) The consumer is willing to accept the output regardless of its quality; that is, the quality of output does not affect him.

In a census, it is usually determined that some verification is necessary. It is too costly an undertaking to forego all check on the quality of the data, it is not possible to assure a low error rate in advance of the undertaking, and it is not practical to reprocess and correct the data after the consumer detects errors.

3.2 *Complete verification*

In complete verification, the verifier repeats an operation for all the items in a unit of work and corrects all the errors that he discovers. Complete verification attempts to assure "perfect" quality of output. In actual practice, it never does so. In fact, if the verifier and corrector both tend to make errors, complete verification of a clerical operation may result in more errors in the final product than will sample verification.

Complete verification, in terms of the number of items verified, is the most expensive type of verification. It can provide the most information about an operation and the quality of output, and it controls the errors at a low level; but the additional information and control are seldom worth the effort.

In spite of cost, there are conditions under which it may be desirable to perform complete verification rather than to do sample

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verification. The following are two such conditions:

(1) When the error rate before verification (incoming error rate) greatly exceeds the required limit; for example, an operation with an editing-coding error rate of nine percent from which is required an average error rate after verification not to exceed one percent. In such a case, the total cost of verifying a sample, then adding to the sample because it exceeds the desired level, can very well exceed the cost of doing 100% verification in the first place.

(2) When the total production is so small that the savings in cost from sample verification would not be worthwhile.

3.3 *Sample verification*

Sample verification is a specific type of partial verification. The selection of the items to be verified, the rules for making decisions, and the action taken after decision are of such a nature that the (a) results can be predicted and (b) estimates of quality can be made with measurable reliability. Sample verification requires that the items to be verified must be drawn in a random manner. The least that can be expected from a sample verification plan is that it will yield a measure of the quality of output.

3.31 Time utility.--While actual money cost is the usual point of reference, another aspect of cost is in terms of time utility. Time utility is important in any operation where a printed report is the final product. The earlier the user receives the statistics, the more useful the data are to him. The value of a statistics-producing organization increases with the speed in which accurate reports are published. Because not all items are verified, sample verification makes possible an earlier publication with a smaller expenditure of money.

3.32 Cost compared with complete verification.--The cost of complete verification is equal to the cost of locating and verifying each item produced or processed. Sample verification, when properly used, is generally less expensive than complete verification.

The cost of sample verification includes at least two components, and usually three. Of necessity, there is the cost of selecting the item for verification, and there is the cost of verifying it. Additionally, since most sample verification plans require complete verification of rejected work, this component must be included. In its simplest form, the cost of operating a sample verification plan is the cost of selecting the sample items plus the cost of verifying them plus the cost of complete verification to replace rejected work. On a cost-per-unit basis, sample verification is more expensive than complete verification.

In a short-term operation in which the number of clerks or operators is relatively large (as in a census), a high proportion of the work may undergo complete verification during the period of training. The cost of verification during the training period is just as much a part of the quality control budget as the sample verification later. A sample verification plan, compared with complete verification, begins to save money at the point where the quality of output is controlled at a desirable level and the point where most of the work is being verified for only a sample of cases.

3.4 *Spot checking*

Spot checking, sometimes called subjective sampling, is much older than statistical quality control as a method of judging and controlling quality. The term covers a

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multitude of different devices, but generally it involves a subjective selection of items for verification. This may mean a haphazard selection of items, selection from parts of the production that seem suspect, or selection by some other intuitive device. Much depends on the intuition of the selector of the items to be verified. His intuition may be perfect (he somehow can spot all the errors); or it may be entirely erroneous (he can spot none of the errors). Most likely it falls somewhere in between but nearer to the entirely erroneous end. If his intuition is perfect, there is the advantage of obtaining quality as good as could be obtained under complete verification but at a smaller cost. If entirely erroneous, the cost of spot checking is excessive; the quality is the same as would have resulted from no verification but the cost is greater. If in between, there is a tendency to reduce the number of errors in the output and perhaps take some action quality-wise, whether right or wrong.

Spot checking is economical from the point of view that fewer items are verified than under a system of complete verification. There is the possibility also that fewer items are verified than under a more efficient sample verification plan. But there are disadvantages which go with this economy. Verification of the selected items may cause alarm when there is no need for alarm or--equally as bad--it may lead one into a sense of security and calm when in fact there is real danger. Further, it provides no estimate of quality and no regular system for maintaining quality.

3.5 *Token verification*

Token verification is a special type of partial verification in which a small random sample is used. For the short run, the sample is purposely selected too small for estimating the quality of output or for taking action with a high degree of reliability. Token verification can be useful in certain field and office operations. It depends, in part, on the psychological effect the presence of some verification has on the clerks or operators. For large operations, it is economical in terms of the results that can be obtained quality-wise. The shortcoming of token verification is that it postpones quality decisions and, in those cases where there is damaging deterioration, the deterioration may be detected too late.

4. *MEASUREMENT OF QUALITY*

Quality of a census operation is often measured in terms of an error rate (or rates). The rate may be expressed as the percentage of establishments missed in the enumeration, the percentage of incorrect codes that a coder assigned to product entries, or the percentage of incorrect codes punched into a batch of cards.

4.1 *Definition of error rate*

The error rate may be computed by dividing the number of errors found in verification by an appropriate base, such as establishments processed or cards punched. Thus, a 3% error rate in key punching would mean that 3 cards in 100 punched were found by the verifier to have one or more errors. Since a key punch operator would be punching many columns on each card, he would not, in fact, make errors on 3% of his key strokes; however, it is not practical to count all the key strokes, and experience has shown that relatively few errors are made by trained key punch operators. An error rate that is shown as a percentage of cards punched is more easily understood, and it effectively measures the performances of key punch operators.

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Similarly, in editing and coding, a clerk may examine many entries and enter several codes for each case that he processes. His error rate, though, can be determined by the number of establishments he incorrectly processes per 100. It is unlikely that any one item on the questionnaire would have an error rate of anything close to 3%, since errors made by editor-coders would probably be scattered over several items.

4.2 *Establishment of acceptable levels of performance*

Good administration requires that each employee be told the acceptable levels of performance expected of him for the work to which he is assigned. The determination of these standards is a very important responsibility of management. In almost any operation where performance can be measured quite accurately, such as editing-coding, a new employee is likely to ask, "Do you want quantity or quality?" The answer to this question is, "We want as much production as possible provided the quality of your work remains within the acceptable error rate." The performance of an employee can be measured solely on his rate of production provided his error rate is acceptable. If his error rate is not acceptable, his work must be corrected; thus, his performance is not satisfactory. On the other hand, if a clerk has a low error rate and low productivity rate, he may be working too cautiously; or he may even be doing the work over and over to avoid making errors. He may be advised that his productivity can be improved by placing less emphasis on quality since he gains no credit for producing work with an error rate better than required.

Experience that is gained in pre-tests of clerical and punching activity should indicate that each employee in an operation must complete satisfactorily a specified amount of work per day by the end of a learning period. If employees are required to meet a high performance standard, experience has shown that most of them will produce at a higher rate than might have been thought possible. Thus, it is probably better to seek greater performance than is generally expected, rather than set a standard that employees may exceed without effort.

Ordinarily a good standard is high enough so that about 5% of the employees have great difficulty in meeting it. It is better to set the standard too high rather than too low. A standard may be lowered by management without difficulty, whereas a standard established at too low a level usually cannot be raised without widespread complaints.

4.3 *Significant and non-significant errors*

In every operation, errors are made that have varying effects on the quality of the final data. In certain instances, the error is not significant because--

(1) It happens so seldom that no damage is done to the final product.

(2) The erroneous code is within the same tabulation group when the data are published; for example, punching the number of persons engaged as 33 instead of 23, when the size class is 20 to 49.

(3) The error will be discovered and corrected in a later operation without undue effort; for example, failure to enter a total cost of materials when the computer edit program will provide the total by adding the detail items.

There are cases, however, where the error is significant because it will result in serious problems at a later stage of operations, or because it will seriously affect the accuracy of published data. Examples of significant errors would be (a) assigning a missing serial number in such a manner that duplicate serial numbers are created, (b) punching an erroneous ED number and thus creating a serious problem

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at the time of the computer tabulations, or (c) failure to correctly transcribe the establishment or TEP counts to the ED controls which are used to check the card-to-tape operations, thus creating a reject problem that really does not exist.

Significant errors might also include some misunderstandings on the part of the employees which result in their making numerous errors. It is important that these errors be brought to their attention as quickly as possible in order to avoid a continuation of the same type of error.

4.4 *Dependent verification*

In dependent verification, the verifier looks at the work which the person in the previous operation has done. He determines in his mind whether the entry which he sees is correct or incorrect. He is influenced in making his decision by what the previous person has done; thus, there is a dependency element in the verification. The effect of the influence seems to be greatest in the verification of operations which require complicated reasoning, such as coding activity for an industry.

In some operations, dependent verifiers have been known to find and report as few as 15% of the errors to which they were exposed. They almost never find and report as many as 80% of the errors present. It is advisable, therefore, either to replace dependent verification whenever possible or to control the quality of the dependent verifiers.

4.41 Error noting.--One method of controlling the quality of verifiers is to use a system of error noting. Under this scheme, a highly skilled and very attentive verifier (usually a person in a supervisory category) "pre-verifies" a subsample of the documents which the verifier will verify. On a separate report, he records the errors he finds, but he makes no marks on the documents themselves. After verification is completed, the list of errors that are noted at pre-verification is matched against the list reported by the verifier. The verifier's effectiveness is measured in terms of the proportion of noted (pre-verified) errors which the verifier has found and reported.

4.42 Error planting.--If the proportion of errors made by the editor-coder or key puncher is small, it will be necessary to pre-verify a very large sample of his work in order to obtain a reliable estimate of his effectiveness. In such cases, error planting may be used. Under this scheme, documents containing errors are substituted for documents without errors. This may be accomplished by making erratic changes on the error-free documents. Effectiveness is measured in this case in the same manner as in error noting (described above). Important requirements in error planting are:

(1) The errors must be planted in such a manner that the verifier cannot identify them as such (no special markings, color, or handwriting).

(2) The distribution of errors by type must closely approximate the distribution contained in the production process.

(3) There must be provision for removing the documents with errors and replacing them with the correctly processed original documents before sending the documents to the next operation.

4.43 Pre-verification.--Still another method of measuring the performance of verifiers is pre-verification. Pre-verification has some of the features of error noting in that a sample is verified by a highly skilled verifier before the work is assigned to the regular verifier. This method does not require that the sample of pre-verified documents be a subsample of the documents verified by the

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verifier. Unless the pre-verification sample is large, it will not yield a highly reliable estimate of the verifier's effectiveness. In practice, a smaller sample is pre-verified, but corrections are not made on the documents. The error rate in the process is estimated from the pre-verifier's sample and from the verifier's sample. By testing the significance of the difference of two error rates (the verifier's and the pre-verifier's), it is determined whether the two error rates can be said to come from the same population. If the difference in the estimated error rates is not significant, the verifier is said to be doing an acceptable job; otherwise, he is not.

4.5 *Independent verification*

In independent verification the verifier does not see the work of the coder or key punch operator and therefore is not influenced by it. A good example is the verification of card punch operations, since the verifier is required to repeat the punching without being able to see the decisions of the original key punch operator. If the verifier does not make exactly the same decision, the equipment will stop or otherwise alert the verifier of a disagreement.

In other clerical operations, it is difficult to apply independent verification; there are few ways of preventing the verifier from seeing the entries of the production clerk and being influenced by them. To perform a completely independent verification would be inefficient and very costly. There are, however, several sample procedures that permit an evaluation of clerical performance by the use of independent verification.

4.51 Two-way independent verification.-- A scheme for independent verification, with reconciliation, is outlined as follows:

(1) Have the "verifier" perform the same work as the production clerk but on an independent sample of the output (usually on a duplicate set of documents).

(2) Match the "verifier's sample" against the identical documents processed by the production clerk.

(3) Note the differences and have them reconciled (resolved) by an expert.

(4) Assign errors (to the production clerk or the verifier) according to the results of the reconciliation.

This scheme has two desirable characteristics: (a) it provides an estimate of the production clerk's error rate without the bias of his influence upon the verifier and, (b) it provides a measure of the verifier's effectiveness. For most efficient operations, this scheme requires that the verifier be a higher quality clerk than the production clerk.

Independent verification of this type requires that the production clerk not know which items or documents fall in the "verified" sample, and that he have no indication of what the "verifier's" results are. This may be accomplished in a number of ways. Among them are the following:

(1) The documents falling into the sample may be reproduced by some method such as Xerox or Thermofax. (In this case, the sample may be processed simultaneously with the regular production.)

(2) Information from the sample documents may be processed on a specially prepared form or on a blank form identical with the original document. For example, in coding, the second verifier's codes could be entered on a properly identified blank questionnaire. (In this case, the sample would have to be processed before the regular production.)

In any event, the sample documents should be returned to their original places in the file.

The disadvantage in this system is that there is some dependence introduced in the

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reconciliation phase. The reconciler is influenced by whatever one or the other of the disagreeing coders said; however, because the reconciler sees only those cases in which there are differences, the degree of dependence is small.

4.52 Modified two-way independent system.--A modification which can be made on a system of two-way independent verification with reconciliation is to substitute a third clerk for the reconciler; that is, have a third clerk perform the operation only on those cases where the production clerk and the verifier disagree, and then apply a majority rule (as described in section 4.53 below). However, this scheme has several disadvantages:

(1) A method must be found for reproducing the disagreement cases in such a manner that the third person will not know what either of the first two did.

(2) The mechanics of reproducing only the differences at this point can greatly retard the work schedule.

(3) If a complete third set is reproduced in anticipation of the differences, there is the added cost of waste for those cases not used and cost to sort out the identical cases from the disagreement cases in the third set.

4.53 Three-way independent verification.--A three-way independent verification scheme has all the advantages of independent verification with reconciliation plus the advantage that it incorporates a further degree of objectivity in measuring the error rate. Under three-way independent verification, two verifiers perform independently on a sample of the output as though they were production clerks. These two identical samples are matched mechanically against each other and against the identical documents from the regular production clerks. Differences and difference rates which may be equated to errors and error rates, respectively, may be determined by a majority rule. The majority rule states simply that (a) if all three of the clerks are in agreement for a given entry or set of entries, all three are correct; (b) if two are in agreement and the third disagrees, the two that agree are correct and the third is in error; (c) if all three disagree, then each may be said to be in error; or, if the occurrence of such cases is small, they may be excluded from the computations. This system yields error rates for the production clerks as well as for the verifiers.

Three-way independent verification requires that all three of the clerks have about the same training and experience. It eliminates the need for specially trained and expert verifiers. If under these conditions the occurrence of cases in which all three clerks disagree is relatively large, it is an indication that the clerks need re-training or that the instructions they are expected to follow are poorly stated or are too complicated.

The function of three-way independent verification is to sort out those cases where there is a difference in conclusions. These are the cases having a high probability of error. The majority rule for the most part is an objective, effective, and economical method of allocating the error to the proper clerk. This system may be modified to call for submitting all difference cases to a technical person who determines where the error is. In general, such a system is slower and more expensive because it requires a number of expert verifiers to keep the flow of work active.

4.6 Quality-control plan for Providencia

The NSO census director and planning staff were in agreement that they should develop a systematic plan for controlling the quality of

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the data processing clerical operations. They agreed that it would be improper use of time and funds to do complete verification of each employee's work. Moreover, they would want a procedure to identify and control employees who were doing poor-quality work.

4.61 Priorities.--The aim of any operation, particularly a large operation such as a census, is to accomplish the task with a high degree of accuracy in as little time as possible. However, during the initial period of learning, it is usually not feasible to emphasize speed and accuracy at the same time. The NSO agreed to proceed in the following order of priority.

(1) Train each production clerk to carry out the instructions; train him on all types of situations; stress accuracy.

(2) After the clerk learns his job, emphasize speed.

(3) When it is established that the employee can perform at an acceptable rate of speed and accuracy, apply a quality-control procedure through verification and computation of error rates.

At first, verify his work completely. When it is determined that he has learned the procedure, verify a sample of his work. The sample size is based on testing production and accuracy to determine at what point the clerk demonstrates that he will consistently produce work of acceptable quality.

If his work falls below the acceptable level, again verify his work completely until it is demonstrated that he re-qualifies for sample verification.

(4) If an employee cannot qualify for sample verification, he should be either re-trained or re-assigned.

4.62 Application of procedure.--The successful application of the procedure requires that the following conditions be met:

(1) Verification of a clerk's work is done in the same order in which the work is performed. The work is considered to be a continuous operation where quality, in part, is a function of the learning process. This learning process has an effect on how soon a clerk will qualify for sample verification.

(2) The lapse in time between the processing step for a Work Unit and verification of the same Work Unit must be held to a minimum.

These conditions are important. During the training period, if a clerk repeats the same kind of error, he can be re-trained immediately; and, during the post-training period, quality assurance is based primarily on controlling the process rather than on the correction of errors. An early detection of changes in quality is necessary in both the "complete" and the "sample" verification for economy as well as for quality reasons.

4.63 Basis of plan.--A fundamental difference between industrial operations and clerical operations is in the occurrence of errors over time. If a machine is set to produce items of acceptable quality and its settings are left alone, the quality has a tendency to deteriorate as more and more items are produced. On the other hand, if a clerk is trained, placed on a job and left alone, there is a tendency for him to have a high error rate at first, but as he produces more items his error rate tends to converge on his maximum quality capability (rather rapidly early in the operation and then more slowly as time goes on). After having reached his maximum, there is a tendency for his errors to rise again but to remain in the general region of his maximum quality capability. An important technique in controlling the quality of clerical operations is to take advantage of this principle.

For making estimates of personnel and time for many of the operational steps, the NSO relied on the results of pre-tests. The number of editor-coders that were needed was

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based on the performance of clerks who experimented with the instructions and filled questionnaires. Similarly, a few key punch operators tried out the procedures to provide estimates of production and accuracy of key punching.

The results of the various tests also made it possible to accumulate some data on the learning and performance levels of production clerks. The staff discovered that results were affected by such factors as (a) complexity of the operation, (b) previous experience of the clerks, (c) numeric or alphabetic punches, or a mixture of the two, and (c) questionnaire and forms design--whether the arrangement makes it easy to follow the items or whether the arrangement is such that the editor-coder and the key punch operator must skip around.

To carry out the plan of sample verification, the NSO had to specify the number of persons to be verified in the editing-coding verification and the number of punch cards to be verified in the key punch verification. Presumably, these amounts would be sufficient to indicate whether the clerk was able to perform at an acceptable level of quality and whether he would do this consistently.

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Unit VI

REVIEW OF TABULATED DATA

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Chapter VI-1. FINAL REVIEW

The review of tabulated data in the form of statistical aggregates is the final step in the census processing prior to publication. It is the culmination of a long series of operations in which the census universe has been determined and individual reports have been collected, coded, edited, and tabulated.

1. *IMPORTANCE OF FINAL REVIEW*

In the conduct of a census, no single step or operation can be designated as more critical than any of the others; but assuredly the post-tabulation data review is at least as important as any prior processing step. Not until the data are available in aggregate form can they be scrutinized to judge whether they afford a valid picture of the phenomena being measured. For an industrial census, such as the one Providencia has taken, it is only at this point that the results can be compared against past censuses, current surveys, or related series pertaining to Providencia or to other countries with an economy similar to Providencia.

The census statistician should keep firmly in mind that the analytical review of census results is truly the last opportunity to validate the data. Once past this point of no return, the statistics are in print for the users to accept or question and ultimately to weigh heavily in the reputation accruing to the statistical office that produced the data. Accordingly, there should be no compromising of the resources (either in terms of time or funds) allocated to the task. In the same way that emphasis was placed earlier in this case study on the need to reserve money for publication and not spend it for any other purpose, the budget for an adequate review of tabulated data should be established before the census is taken; thereafter, it should not be drawn upon to rescue other processing steps that encounter trouble.

2. *QUALIFICATIONS OF REVIEWERS*

Unlike the earlier stages of the census, the final review is not a mass operation; rather it requires the time and judgment of a staff consisting of a limited number of highly qualified personnel. There should be some individuals on the staff who are well-informed about the uses of economic statistics. The entire review staff needs to be well aware of all of the processing operations preceding the post-tabulation review. In particular, the reviewers should possess detailed knowledge of the edits performed on the census returns, whether the edits were performed manually or by machine. As discussed more fully in the section on "Methodology to be Followed in Final Review," the final review staff should be provided with documentation of the entire census processing.

3. *STAFFING FOR FINAL REVIEW*

The final review is staffed by professionals, paraprofessionals, clerks and secretaries. These are individuals who have other continuing functions in the NSO. They should be among the more qualified members of the staff because the review must necessarily be a high-quality operation.

It is important that there be an effective division of labor followed in the final

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review. The census professional should not spend his time on housekeeping corrections (correcting routine or semi-routine errors made in the census processing); these are the responsibility of the paraprofessional who lightens the load of the professional in many ways. The paraprofessional is a job classification that has emerged on the scene only in recent years. A paraprofessional is an individual whose experience qualifies him to perform duties more complex than would be assigned to a clerk. Though not possessing advanced statistical training or a university degree, the paraprofessional has gained sufficient knowledge of statistical theory and practice through work experience to operate on a level comparable with the junior professionals. The paraprofessional works under the general supervision of a professional staff member.

Good planning for the industrial census calls for setting aside an adequate provision for post-tabulation review, both as a percentage of the total census budget and in terms of man-years of the personnel categories assigned.

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Chapter VI-2. NEED FOR INDUSTRIAL CENSUS DATA

1. INTRODUCTION

As a first step in the review of tabulated industrial census data attention should be paid to the purposes served by economic statistics in general and census statistics in particular. The informational needs satisfied by the industrial census are the only reason for its conduct. The choice of items on the questionnaires, the classification systems used to tabulate the data, the design of the publication tables, and the definition of the sectors covered are for the sole purpose of meeting the requirements of data users.

2. INDUSTRIAL CENSUSES AND ECONOMIC MEASURES

In the course of the 20th Century there has occurred a phenomenal increase in the use of statistics in decision-making by all segments of society. Accompanying this trend has been a greater participation by governments throughout the world in the economic affairs of their people.

With increased industrialization has come much greater specialization and this has resulted in vastly more interdependence by users within a country and among countries. Both within the government and the private sector increased requirements for information have taken place in all types of economic and social systems. The development of sound public policy depends upon the use of such measures as national income, gross national product, input-output analysis, and other measures of the national accounts as well as reference to production and price indexes, employment, materials consumed, and productivity data; it depends also on the analysis of interrelations of data involving concepts such as constant prices. None of these measures can be adequately developed without censuses.

3. INDUSTRIAL CENSUSES AND PUBLIC POLICY

As one illustration of the use of economic census statistics, consider the case of international banks and other agencies that are responsible for approving loans or grants. Such bodies must review carefully the data submitted to support the many competing requests for such assistance. The quality of the supporting data will affect the speed with which action can be taken on the requests. If the accuracy of the data is uncertain, the funding agency may have no choice but to delay approval until better supported facts are available.

It should be recognized, of course, that censuses are only part of a statistical system. Many types of decisions depend upon current data or upon other kinds of information such as price quotations, foreign trade, or bank credit, not usually covered in regular censuses.

Policy decisions are typically based on overall measures such as the national accounts, production and price indexes, and balance of payments. However, these policy judgments can be effectively made in the real world only in terms of particular economic sectors, geographic areas, and commodity categories. The types of materials, equipment, and labor skills needed by each industry and the markets to which the industries sell are specific but very diverse; hence, the need for statistics by industry. Similarly, the distribution of raw materials, people, transportation, and power

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is never geographically uniform; accordingly, the requirement for regional statistics.

4. ADDITIONAL USES OF CENSUS STATISTICS

Additionally, the census data for individual establishments will be used for many purposes beyond those satisfied by the published tables. The examples that follow illustrate post-publication uses of census data.

(1) For special tabulations and analyses, including economic research.

(2) For benchmark totals representing special selections or rearrangements of data not provided for by the published figures.

(3) For designing efficient samples of establishments, or complete coverage of establishments, for current or special surveys taken after the regular census.

(4) For editing and evaluating data reported in current or special surveys and to serve as the basis for inflation factors for sample surveys in the statistical program.

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Chapter VI-3. THEORY AND OBJECTIVES OF FINAL ANALYTICAL REVIEW

1. *REVIEW AGAINST BACKGROUND OF PRIOR PROCESSING*

The final analytical review should allow for the fact that many actions have been taken in previous stages of the census processing to produce a complete and accurate census and the final review is in no sense intended to duplicate them. In fact, one of the principal objectives of the final review is to ensure that the earlier operational stages have been successfully completed.

Post-tabulation review of data must be viewed against the background of what prior coding and editing has been done. What was the nature of the clerks' and analysts' review of individual returns? How many changes were made in the reported data and to what effect? What were the actions taken in the computer edit if one were performed? What were the types of computer edit referrals; how many were there of each type?

2. *REVIEW IN TERMS OF DATA SIGNIFICANCE*

The overall philosophy of the review of final data should be one of a review in terms of data significance and data problems. The staff doing the review should believe that statistics tell a story; they should avoid becoming engulfed in the arithmetic of the figures. The analyst should examine the cells of aggregated data carefully, look at historical changes, and pose the question of "What do the data tell me?" With a background knowledge of the structure of his country's economy and the state of business conditions at the time, he should be considering whether the tabulated results constitute a valid representation of the industries, geographic areas, etc. that were included in the census.

3. *EXAMINATION OF TABULATIONS FOR SIZEABLE ERRORS*

Final review is a time to be looking for sizeable errors remaining in the data. The review period is too short and the cost and potential added error involved in correcting data are too great to justify searching for discrepancies other than those materially affecting a data cell to be published.

Some errors will be serious, such as a punching error that shifts the decimal point several places; others will be relatively minor, such as the transposition of the two least significant digits of a six-digit quantity. If left uncorrected, the first type of error could significantly damage final results. Other examples of potentially serious errors are the omission or duplication of records for large establishments, reporting in the wrong unit of measure, sizeable entries made in the wrong column or on the wrong line, etc. The improper coding of the industry of a single large manufacturing establishment may distort the industrial picture as much as several thousand errors in coding individuals to industry in a population census.

The goal of final review is to publish accurate results on a timely basis but to avoid paying an undue price to reduce relatively small errors to zero. In addition to being a misguided concept, the complete elimination of statistical error is impossible.

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4. OBJECTIVES OF FINAL REVIEW

There are four basic objectives of the final review: (a) assure internal consistency, (b) evaluate comparability with historical data, (c) evaluate comparability of data with current surveys, and (d) describe the limitations of the data.

4.1 *Internal consistency checks*

The first objective is to insure that the tables are internally consistent and that the various items of data bear a reasonable relationship to each other and to corresponding figures for other industries, regions, size classes, etc. These checks are expressed in terms of significant economic relationships or ratios. Exhibit VI-3-1 lists the data relationships that apply to the manufacturing sector; with minor modifications these ratios apply to the mineral, electricity, and gas industries.

Among the tables in the Census of Manufactures final reports, tables 1, 3, and 4 in the industry series and tables 14 and 15 in the geographic series (exhibit III-5-4) offer the best instruments for applying internal consistency checks. These tables contain nearly all the key items of information collected in the manufactures sector of the industrial census. Therefore, they are excellent vehicles for comparing the internal consistency of the economic data. Where questionable relationships are discovered, the specific location of the suspect data cells often can be determined by reference to tables 16 and 17, principal statistics by major industry group within province (exhibit III-5-4).

The bulk of the final review concentrates on the data by industry because the orientation of the professional review staff tends to be in that direction, and most of the available outside comparative statistics are expressed as industry totals.

4.2 *Comparability with prior census data*

The second goal is to assure comparability with data for previous industrial censuses. Nearly every country has some such information for its key industries and many countries have historical data for their principal geographic and/or administrative subdivisions.

Three of the key tables in the manufactures series of Providencia's census publications (table 1 and table 14) provide information from the previous industrial census conducted for 1963. Comparisons over different periods of time are among the most important results yielded by an industrial census. Therein lies the story of the growth or decline in regions and industries, in changes in the economic condition of workers, and in the extent of technological progress. What can be published historically and what historical information can be used for review should be determined on the basis of the situation in each particular country.

The review of Providencia's 1975 data for subjects and industry/geographic levels not shown in the two comparison year tables specified above should be conducted with the 1963 census data as reference material. In particular, internal relationships for 1975, such as average annual payroll per employee and value added per production worker, should be within a reasonably predictable range of the 1963 ratios.

4.3 *Comparability with current surveys*

A third objective of the review is to examine the comparability of census data with other and usually more current sources of information. Examples of these may be the

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monthly data on employment and earnings, annual financial data from the tax authority, business population statistics from the licensing and regulatory agencies and, in the context of the products made and materials used data, the export and import commodity statistics. The census product data are also matched against statistics released by trade associations, central banks, government agencies, and product-oriented news media such as trade magazines. Because the census results will be used as benchmarks for current series, it is additionally important that the final review operations of the census include a comparison to related current data.

4.4 Description of limitations of data

The fourth and final function of the review is to develop the necessary knowledge to prepare an adequate textual statement of the limitations and qualifications of the data and to assure appropriate descriptions of tables and items of data.

The data shown in the statistical tables are subject to error arising from a variety of sources: response variability, nonresponse, estimation of missing data, and processing error. Some of these sources of error are more susceptible to measurement than others. For example, the extent of imputation of data can be quantified, whereas the calculation of processing error is a very difficult undertaking.

In some cases, comparability of census data with the past cannot be achieved because of changes in classification systems, geographic boundaries, or coverage. These come to the analyst's attention most explicitly in the review operation and should be explained in footnotes or the text accompanying the tables.

With respect to imputation in censuses, a 5-percent limit is supported by mathematical statisticians as a desirable objective. This standard is based on the principles that almost any rational method of imputation cannot cause serious trouble if it is applied to less than 5 percent of the aggregate. The main gains from imputation are gains in convenience--convenience to the users of the statistics who would otherwise have to make "ad hoc" table-by-table adjustments for nonresponse, and convenience to the data producers in simplifying the processing and publication of the census results.

Exhibit VI-3-2 shows the effect of imputation for blanks and zeros in the 1967 U.S. Census of Manufactures; as can be seen, the number of industries with imputation ratios exceeding 5 percent is greater than the statistical office would have liked.

5. MEASURES OF EFFECT OF PROFESSIONAL REVIEW

The impact of the professional review on the tabulated census statistics varies with the quality of the originally reported data, the effectiveness of the prior edits, and the resources devoted to the review operation. Exhibit VI-3-3 provides measures of the effect of professional review on the preliminary statistics of the 1963 U.S. Census of Manufactures.

6. CAPABILITIES OF THE ELECTRONIC COMPUTER

The advent of the electronic computer has made it possible to carry out more precisely and rapidly most of the editing, coding, and correction or imputation work that formerly was performed clerically. The computer has opened the way to applying more complex tests on the reported data and to observing and recording more adequately the consequences of the editing procedures as they were applied.

Accordingly, the question arises, "Will the computer make the critical review of data

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by professional staff unnecessary at some date in the future?" The answer is "No." There will continue to be an essential role to be played by the trained statistician in exercising judgment. Intervention by human beings is required especially for assessing the joint impact of a combination of circumstances, and it is not possible to anticipate each situation and provide rules in advance. In addition to discovering hitherto undetected errors, the professional staff review of the tabulated results deals with problems that were identified but not previously resolved and corrects deficiencies that occurred in the earlier processing steps.

It is anticipated that, with further improvement in editing and imputation techniques, the review task of the professional statistician will be substantially reduced in the future.

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Chapter VI-4. METHODOLOGY TO BE FOLLOWED IN FINAL REVIEW

1. INTRODUCTION

The concept to be followed in the final review is one of accomplishing the review promptly and issuing the data in timely fashion. The data are not to be "massaged"; there is little enough time for the necessary substantive review that the professionals must avoid becoming buried in details. Resolution of the latter should be left to paraprofessionals whose role is discussed in the section on staffing for final review (chapter VI-1).

Essential to an effective review is the approach of resolving the problem case when it occurs and not delaying that action. Due to the tight time schedule, telephone calls rather than letters should be employed to obtain missing data or resolve questionable entries. Final review is structured as a single round of corrections with early publication of a limited amount of data on an advance basis and not two rounds of correction and publication. The scope and depth of the final review are, of course, conditioned by the staff resources available to the statistical office. Also, post-tabulation review is dependent on the quality of the processing done earlier; that is, on the number of cases examined and the extent to which errors were found and corrected.

The methodology of the review is to isolate, by a series of tests, a limited number of aggregates to check into and correct if necessary. The tests consist of (a) data relationship checks, (b) zero balance checks, (c) examination of large changes made in pretabulation edit and imputation, (d) comparisons with related data, and (e) the evaluation of general reasonableness of the data using professional judgment. In essence, these checks parallel the edits performed during the pretabulation stage with the difference that they are applied at the total level rather than the individual establishment level.

2. DATA RELATIONSHIP CHECKS

Prior to the tabulation stage, there occur a number of manual and machine tests of the validity of the establishment data. The tests are designed to validate such relationships as wages per production worker, man-days per production worker, and value added as a percentage of shipments (see exhibit VI-3-1).

For the final review, these relationships are examined in terms of industry, geographic area, size class, or cross-classifications of these categories. Appropriate adjustments are made in the tolerance limits used for pretabulation edit; this usually consists of a narrowing of the parameters due to the statistical impact of a sizeable number of observations in most of the data cells. At the statistical aggregate level (the smallest area being reviewed), the tolerance will be set with wider limits as the number of establishments in the data cells is smaller and vice versa.

It is critical to set the tolerances so as to maximize printing out for review those cells that should be corrected or verified and to minimize the examination of cells that are not truly suspect. During the early processing stages, the analysts should examine the results carefully to determine whether the tolerance limits are satisfactory.

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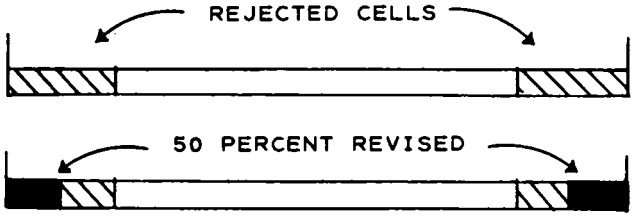
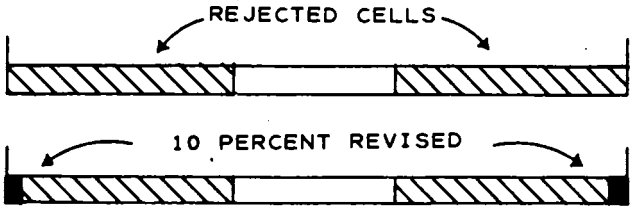
It is considered that a good balance is achieved in setting tolerance limits if about 50 percent of the rejected cells are revised, as indicated in illustration A.

Illustration A. Acceptable tolerance limits



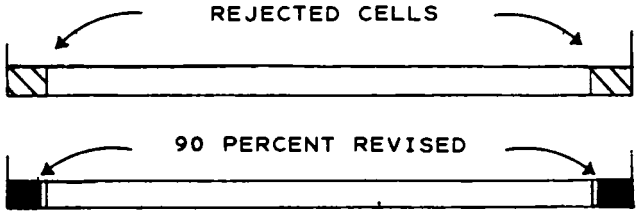
If only 10 percent of the rejected cells are revised, this indicates that the tolerances resulted in too many cases being rejected and reviewed (see illustration B).

Illustration B. Unacceptable tolerance limits--too many cells rejected



On the other hand, if 90 percent of the rejected cells are revised, then probably not enough cases were rejected and reviewed (see illustration C).

Illustration C. Unacceptable tolerance limits--too few cells rejected



If an individual relationship is significantly different from the average and cannot be explained in terms of the review or by the professional's knowledge of the situation, it should be looked into. For example, if payroll per employee in the food industries in one of the provinces were twice as high as those in most other provinces, this would justify an examination of the establishment data to find an explanation or to locate one or a limited number of reports in the tabulations still seriously in error. To implement that review, two edit runs are made. One run flags, by industry, the outlier establishments (that is, those establishments at the extremes of the distributions of specified characteristics) and which are above a certain employment size (for example, 20 employees). The other prints out, for each of the suspect geographic cells (province or county), those outlier establishments from the industry run which are located in the particular province or county. The establishment size cutoff directs the analyst's attention to those cases that significantly affect the tabulated aggregate.

3. ZERO BALANCE CHECKS

In this phase of the final review, the set of tabulations is subjected to the following test: "Are amounts which should be equal to each other actually equal?" These are equality checks. They are most frequently employed in comparing stub and column detail with totals in statistical tables. Variations of the test range from two to a dozen detailed items that should add to a total, either horizontally or vertically in the table. Sometimes the check consists of assuring that four quarterly figures add to an annual total. The nature of the balance test is determined by the design of the particular table.

4. COMPARISONS WITH RELATED DATA

Several data series were mentioned in an earlier chapter (section 5 of chapter VI-3) as prime candidates for this segment of the final

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review procedure. To those mentioned might now be added (for some countries) administrative records such as the number of persons or payrolls covered under social security systems. Such totals from an independent source are very valuable in assessing the completeness of the census tabulations. Another example of related data is information on exports which can be used to test the reliability of production data on minerals and manufactured products when the bulk of such products is exported.

Certain items of information of the type collected in the census also exist from other sources, as for example, the monthly and annual statistics on sugar refining and coffee roasting in Providencia; these should be compared with the corresponding census figures.

In addition to matching against current data sources the final review should compare the tabulated totals with corresponding census totals for previous periods, if such exist. Such comparisons are made by industry, geography, and size groupings for principal items of data such as total employment and value added. As in the case of internal ratio tests, extraordinary changes from previous periods should be checked. This set of procedures applies especially to countries whose censuses occur fairly close together; for example, no more than 5 years apart. For Providencia, the gap of 12 years between industrial censuses limits the usefulness of this historical comparison check. The overwhelmingly difficult task of matching individual establishments over a great span of years precludes a census-to-census comparison at the micro level.

5. EVALUATION OF GENERAL REASONABLENESS OF THE DATA

The judgment of the professional statistician should play an important part at every point in the final review, supplementing and weighing the evidence afforded by the sophisticated but still mechanistic tests described above. The trained analyst will treat a battery of statistical tests as a series of simultaneous equations, the solution to which he is uniquely able to achieve. This is not to suggest that judgment can be used as an automatic override over statistical edits or be employed in other than a balanced, restrained manner as one element, although a critical one, in the whole review effort.

In examining a data cell personal judgment should be applied by itself only as a last resort in the absence of any designated checks listed previously or of any similar data for a previous census or other survey. In such instances, the expert reviewer would benefit by exercising his judgment in a comparison of the tabulated totals with data available for other countries with similar economies.

6. STATISTICAL AIDS USED IN FINAL REVIEW

6.1 Complete establishment records

It is crucial to have in hand the appropriate analytical tools to review problem areas at the post-tabulation stage. In addition to the outlier listings (rare or extreme values) at the aggregate level, it is necessary to have machine listings of individual establishments to check where the statistical aggregates are questionable. The listing should contain a master record of the establishment as finally entered into tabulation. There are two arrangements of the establishment record. The one most frequently used in the final review is organized by industry, by descending size class within industry and by identification number (ID) within size class. For the 1975 Industrial Census of Providencia, the industry is the

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four-digit ISIC and the size class is in terms of total persons engaged. Such a listing helps greatly, for example, if a question arises as to whether value of shipments per person engaged is too high for the machine tool industry. In that case the reviewer could scan the value of shipments column in the industry ID listing to ascertain whether some establishments appear to have shipment values grossly out of line with their size as indicated by total persons engaged.

The other listing is one in which the establishments are listed within geographic units (province and county). In this arrangement the four-digit ISIC is the second basis for classification, employment size class the third, and ID number the lowest level.

6.2 *Log of exceptional cases resolved earlier*

The final review will be helped greatly if exceptional situations relating to large establishments that are encountered and verified (or corrected) in various processing steps are logged (written down) and a record of them given to the professional analyst who reviews the data. These conditions might involve a birth, death, change in industry code, or an exceptionally high or low wage rate, materials cost, or output per employee. Access to such a record will complement the other analytical tools available to the analyst and significantly facilitate his final review effort. It would be wasteful indeed to retrace steps that had laboriously proved the accuracy of a reported condition which at first appeared to be unusual or even impossible.

6.3 *Check totals*

In addition to the above, records of the number of questionnaires should be rigorously maintained at each stage of the processing stream. Once the total number of questionnaires mailed to the skip-list establishments and those obtained through interviews at non-skip-list establishments has been established, that count should be satisfied at each juncture of the processing stream--questionnaires received, coded, edited, and tabulated. The number received should be divided between those with data and those that are blanks; for those on the mail list, there will be a separate figure for postmaster returns (i.e. no adequate address, no longer at that location, etc.)

If there is mechanical editing of the returns, counts should be kept of the number of machine (computer) rejects, their resolution, and re-entry into the processing. Once the number of processable reports has been determined (i.e. reports with sufficient data that can be coded industrially and geographically, edited, and tabulated), that total should be utilized through the final stage of tabulation. The published tables should show the same number, except for counts of cases explicitly removed from the processing for designated reasons, e.g., duplicates, out-of-scope, etc.

The success of an industrial census (or more frequent inquiry, for that matter) depends very largely on the care and skill with which reports from the large establishments are handled. A highly skewed distribution of value of output, value added, or employment can result from the fact that large establishments affect the survey totals in a manner disproportionate to their number. The definition of large will vary by country but, for purposes of special handling and separate control on the establishment counts described above, a "rule of thumb" of 50 employees for manufacturing and 20 for minerals is a useful starting point.

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Another type of check that is effective in final review is the validation of the totals for key items in the preliminary tabulation. These preliminary figures should be used as an initial point of departure for reviewing the final data. Except for late changes in the preliminary totals which were not carried back to the machine records (and for which adjustments must be made), the figures shown in the final tabulations (before review) should be a mirror image of the published preliminary data. With allowances for corrections arising from final review, a complete reconciliation should be possible between the preliminary and final tabulations of the census.

6.4 Documentation

The methodology and procedures employed in final review of the data should be documented and made a part of the procedural history of Providencia's Industrial Census. That history should cover every phase of the census undertaking from the initial planning and budgeting to final publication of the results. An important feature of such a listing is an objective evaluation of the merits and limitations of the procedures followed in the entire census operation.

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Chapter VI-5. CORRECTION OF TABULATIONS AND RECORDS

1. TECHNIQUE OF A SINGLE CORRECTION DOCUMENT

Corrections detected in the final review should be carried to one and only one listing. That listing should contain all the data for the entire establishment. In performing his review and making revisions the analyst may choose to annotate the product and materials listings as appropriate and derive new totals on those listings. However, he does not have the option of introducing corrections both on those listings and on the separate listing for establishment-type data; that is, "general statistics"--employment, inventories, capital acquisitions, etc. Experience has demonstrated that when the reviewer has been given the option of making the corrections in both places the procedure has resulted in different sorts of corrections to the same establishment and has caused duplicates to appear. Also, the single master listing offers a more efficient mechanism for executing industry and geographic code changes that permeate every record of the establishment. The technique of utilizing a single correction document also helps to assure the quality of the correction operation. It permits clerks to perform additive checks immediately prior to entering the corrections into the record. For example, if TVS (total value of shipments) for the establishment is lowered in the final review, the value of some individual product(s) shipped by the establishment would need to be reduced by an equivalent amount.

2. COST OF CORRECTION OPERATION

The review of the tabulations is not aimed at detecting small errors. The post-tabulation corrections are more costly and difficult to make than are corrections prior to tabulation. Carrying corrections and obtaining new totals at the review stage is time-consuming, and it occurs at a stage of the census processing when time is crucial. Moreover, there is a multiplier effect to many types of corrections with consequences throughout most or all of the records of an establishment or between establishments.

3. NEED FOR PROMPT RESPONSE TO INQUIRIES

It should be recognized that the review of tabulated data comes very late in the census cycle and at a juncture when pressures for publication are especially strong. For this reason a mechanism for prompt communication with large respondents should be established when their figures are missing or are questionable.

4. CORRECTION OF DETAILED ESTABLISHMENT RECORDS

In countries that have compiled industrial censuses, particularly in the mining and manufacturing sectors, there is a large demand for special tabulations after the completion of the regular census publications. Accordingly, it is important to carry establishment corrections to the final detailed records to facilitate additional tabulations at a later date. Such an action guarantees that there will be a complete and accurate historical record for comparisons with subsequent censuses and for longitudinal studies of economic phenomena at the micro level.

The consistency of later special tabulations with the published census totals is

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assured by the creation of a disposition listing. That listing displays each line of information as it appeared in the original record and also shows a revised figure where a change was made. The listing is in two sequences: (1) by industry and (2) by establishment identification number (ID). When an analyst proceeds to compare revised tabulated totals resulting from the changes he has posted in his review to totals arrived at in later tabulations and finds discrepancies, he will utilize the disposition listing to resolve the problem. For example, if a variance occurs at the industry level, the analyst can track down the cause by referring to the disposition listing and ascertaining which corrections were improperly carried out.

To repeat, it is essential to correct the establishment records in order to make possible valid manipulation of the file post-census. Sometimes time pressures at final review entice one to consider compromises. There is a tendency to make mass changes in imputation factors only at the publication cell level. Also last-minute changes in industry and area totals are all too easily made without the discipline of altering the establishment records, especially where the change is a difficult one, such as a change in industry classification of an establishment. Such shortcuts should not be permitted by the census statistical office; they weaken the future use of the census file.

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APPENDIX

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Exhibit I-2-1. ESTIMATED URBAN AND RURAL POPULATION, BY PROVINCE: MID-YEAR 1974
(Estimated on basis of average growth rate of 2.3 percent per year since 1963)

Province	Total population	Urban		Rural	
		Number	Percent of total	Number	Percent of total
Providencia.....	14,500,000	5,700,000	39.3	8,800,000	60.7
Catedral.....	1,750,000	580,000	33.1	1,170,000	66.9
David.....	1,650,000	353,000	21.4	1,297,000	78.6
Estrella[1].....	2,575,000	1,802,000	70.0	773,000	30.0
Falcon.....	650,000	217,000	33.4	433,000	66.6
Girardot.....	1,250,000	513,000	41.0	737,000	59.0
Miranda.....	850,000	290,000	34.1	560,000	65.9
Puerto Nuevo.....	1,400,000	393,000	28.1	1,007,000	71.9
San Jose.....	650,000	260,000	40.0	390,000	60.0
Santa Elena.....	1,025,000	345,000	33.7	680,000	66.3
Tres Hermanas.....	1,025,000	360,000	35.1	665,000	64.9
Trocadero.....	525,000	130,000	24.8	395,000	75.2
Zapata.....	1,150,000	457,000	39.7	693,000	60.3

[1]Contains the capital city of the same name.

Exhibit I-2-2. ESTIMATED POPULATION, BY AGE: MID-YEAR 1974
(Estimated on basis of average growth rate of 2.3 percent per year since 1963)

Age	Number	Percent of population
Total population...	14,500,000	100.0
Under 5 years.....	2,320,000	16.0
5 to 9 years.....	2,050,000	14.1
10 to 13 years.....	1,430,000	9.9
14 years.....	295,000	2.0
15 to 19 years.....	1,595,000	11.0
20 to 24 years.....	1,445,000	10.0
25 to 29 years.....	1,140,000	7.9
30 to 34 years.....	870,000	6.0
35 to 39 years.....	840,000	5.8
40 to 44 years.....	655,000	4.5
45 to 49 years.....	515,000	3.5
50 to 54 years.....	440,000	3.0
55 to 59 years.....	280,000	1.9
60 to 64 years.....	270,000	1.9
65 to 69 years.....	170,000	1.2
70 to 74 years.....	125,000	0.9
75 to 79 years.....	45,000	0.3
80 years and over.....	15,000	0.1

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Exhibit 1-2-3. TYPE OF ECONOMIC ACTIVITY FOR POPULATION 14 YEARS OLD AND OVER: MID-YEAR 1974

Economic activity	Number	Percent of total	Percent 14 years and over
Total population..	14,500,000	100.0	...
Under 14 years.....	5,800,000	40.0	...
14 years old and over...	8,700,000	60.0	100.0
Economically active[1]..	5,075,000	35.0	58.3
Economically inactive.....	3,625,000	25.0	41.7

NOTE: Figures are estimated by the National Statistical Office using the 1970 Census of Population as the base and projecting straight-line growth rates of 2.3 percent per year.

[1]Including those seeking work but not gainfully employed.

Exhibit 1-2-4. ECONOMICALLY ACTIVE POPULATION, BY INDUSTRY: MID-YEAR 1974

Industry	Number	Percent
Economically active population 14 years old and over..	5,075,000	100.0
Agriculture, forestry, fishing, hunting.....	2,741,000	54.0
Mining and quarrying.....	85,000	1.7
Manufacturing.....	705,000	13.9
Electric light and power, gas services.....	13,000	0.2
Water and sanitary services.....	4,000	0.1
Construction.....	176,000	3.4
Transportation, storage, communication.....	176,000	3.4
Wholesale and retail trade.....	280,000	5.5
Services (government, business,, personal).....	895,000	17.6

NOTE: National Statistical Office estimates are projected from the 1963 Economic Censuses at rates varying from 2.3 percent per year (for services), which is the average population growth, to 4.0 percent per year growt in output (for manufacturing).

Exhibit 1-2-5. NUMBER OF COUNTIES AND WARDS, BY PROVINCE

Province	Counties	Wards
Providencia.....	216	1,500
Catedral.....	15	112
David.....	25	216
Estrella[1].....	36	319
Falcon.....	10	62
Girardot.....	22	165
Miranda.....	18	90
Puerto Nuevo.....	16	70
San Jose.....	24	146
Santa Elena.....	19	95
Tres Hermanas.....	7	44
Trocadero.....	14	112
Zapata.....	10	69

[1]Contains the capital city of the same name; the city and county are coextensive and comprise the Federal District.

Exhibit 1-2-6. NUMBER OF MANUFACTURING ESTABLISHMENTS, BY PROVINCE: 1975

Province	Establishments	
	Number[1]	Percent
Providencia.....	37,500	100.0
Catedral.....	3,050	8.1
David.....	2,550	6.8
Estrella.....	14,000	37.4
Falcon.....	1,050	2.8
Girardot.....	2,600	6.9
Miranda.....	1,500	4.0
Puerto Nuevo.....	3,000	8.0
San Jose.....	1,300	3.5
Santa Elena.....	2,400	6.4
Tres Hermanas.....	2,600	6.9
Trocadero.....	700	1.9
Zapata.....	2,750	7.3

[1]Estimated.

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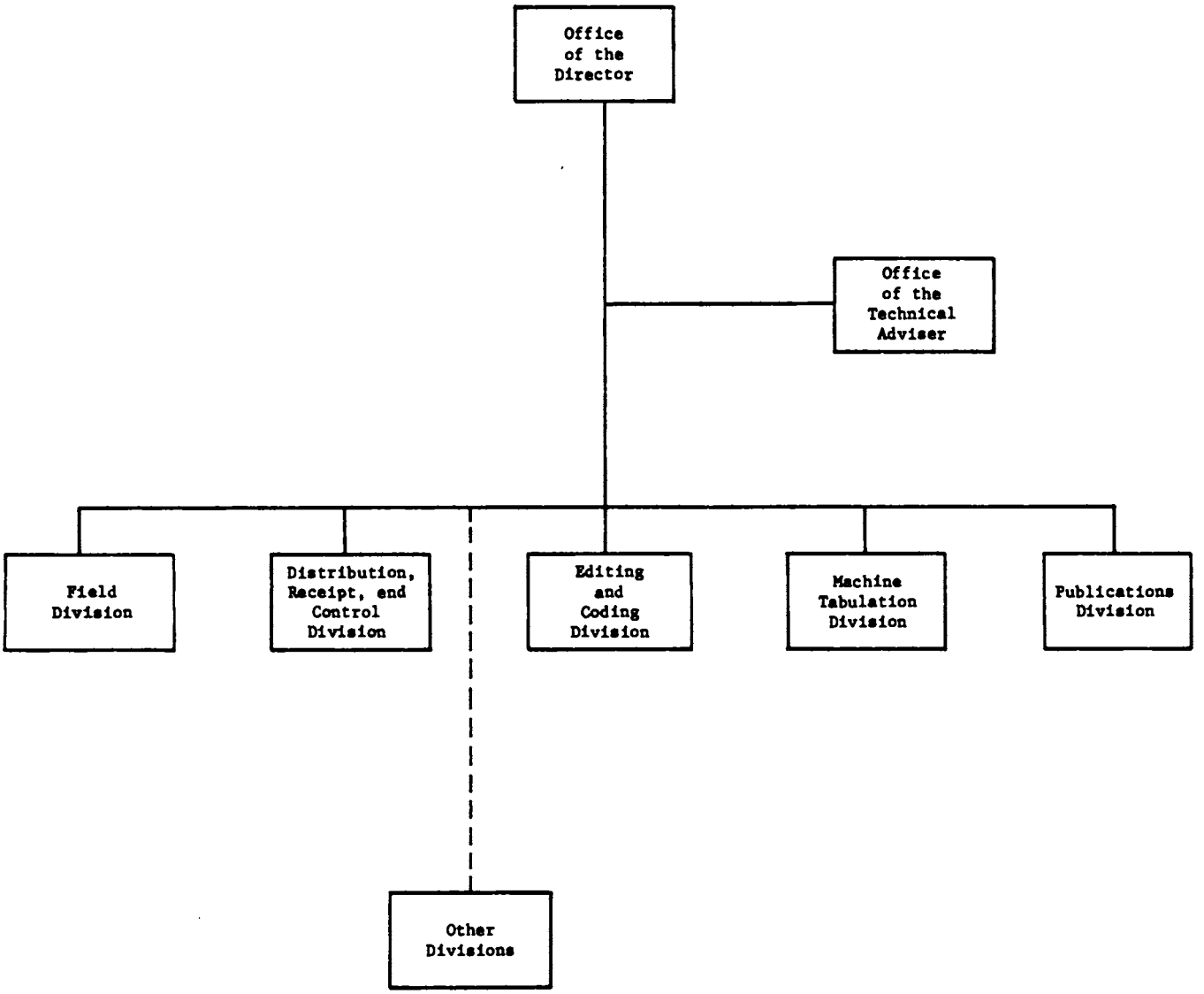
Exhibit 1-3-1. ORGANIZATION OF THE NATIONAL STATISTICAL OFFICE FOR THE 1963 ECONOMIC CENSUSES



NOTE: This simplified chart is presented here to help set the organizational stage for the case study; it is not necessarily a recommended model for other countries.

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Exhibit I-3-2. ORGANIZATION OF THE NATIONAL STATISTICAL OFFICE FOR THE 1975 INDUSTRIAL CENSUS

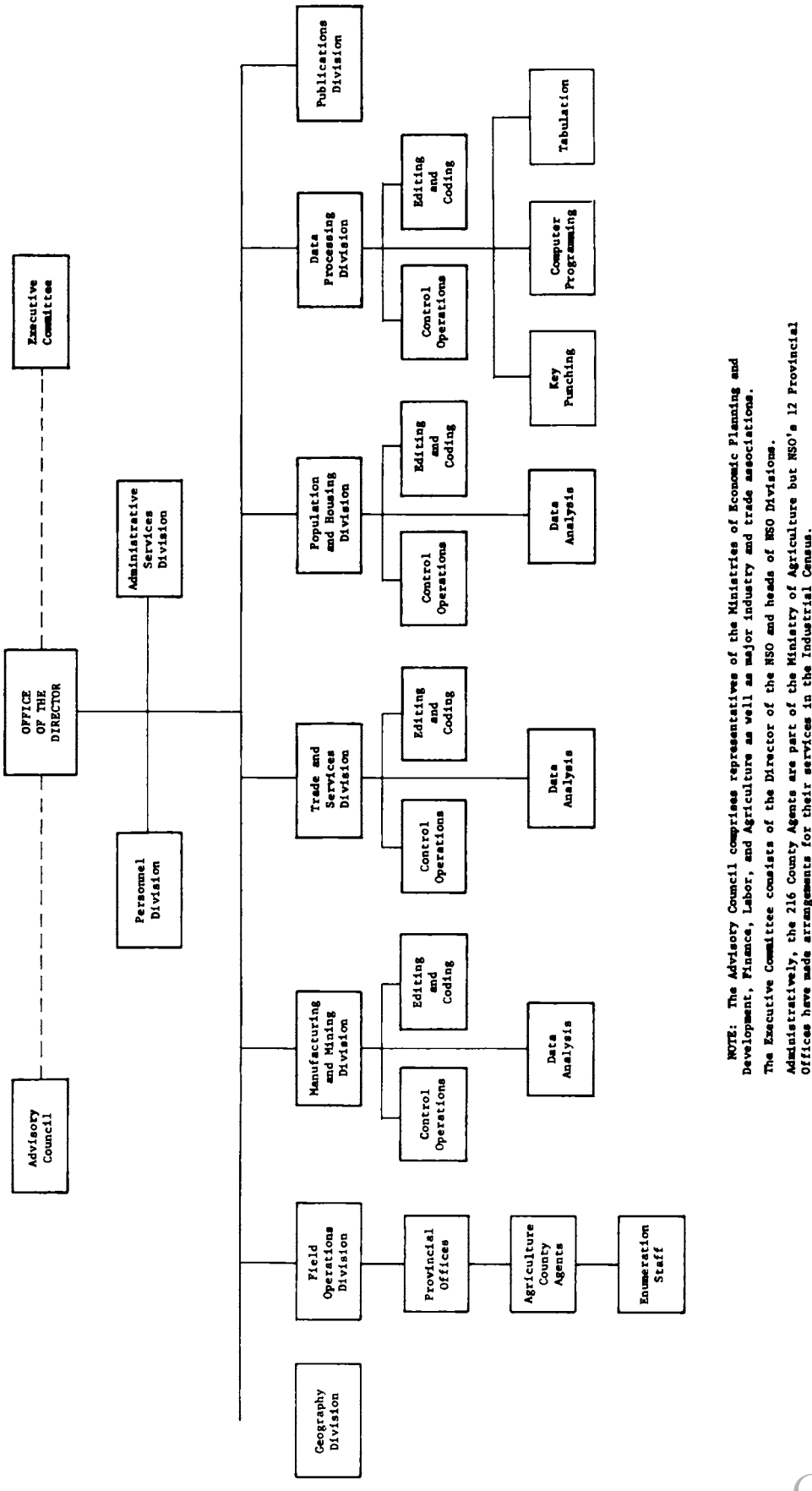

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Exhibit I-10-1. DATA ITEMS TO BE COLLECTED AND PUBLISHED IN AN INTEGRATED INDUSTRIAL STATISTICS PROGRAM

Item	Censuses	Annual surveys	Quarterly or monthly surveys
Statistical unit:			
Kind of activity (industry)	x	x	x
Type of ownership	x	x	-
Type of legal organization	x[1]	-	-
Employment:			
Persons engaged[2]	x	-	-
Employees[3]	x	x	x
Operatives or workers	x	x	-
Other employees	x	x	-
Man-hours worked[4]	x	x	-
Employee compensation:			
Wages and salaries paid to employees	x	x	x
Paid to operatives	x	x	-
Paid to other employees	x	x	-
Supplementary labor costs (social security, pensions, etc.)	x	x	-
Cost of materials, supplies, fuels, electricity, etc. used:	x	x	-
Cost of materials, parts, components, containers, etc.[5]	x	x	-
Quantity and cost of individual, important materials and supplies	x	[6]	-
Cost of fuels	x	x	-
Quantity and cost of individual, important fuels	x	[6]	-
Cost of purchased electricity	x	x	-
Cost of contract and commission work done by others	x	x	-
Cost of goods shipped in same condition as received[7]	x	x	-
Electricity:			
Quantity and cost of electricity purchased	x	x	-
Quantity of electricity generated	x	x	-
Quantity and value of electricity sold to others	x	x	-
Fixed assets[8]			
Cost of new fixed assets	x	x	-
Buildings and other structures	x	x	-
Transport equipment	x	x	-
Machinery	x	x	-

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Exhibit I-10-1. DATA ITEMS TO BE COLLECTED AND PUBLISHED IN AN INTEGRATED INDUSTRIAL STATISTICS PROGRAM--Continued

Item	Censuses	Annual surveys	Quarterly or monthly surveys
Cost of used fixed assets acquired....	x	x	-
Buildings and other structures....	9	9	-
Transport equipment.....	9	9	-
Machinery.....	9	9	-
Sales of used fixed assets.....	x	x	-
Buildings and other structures....	9	9	-
Transport equipment.....	9	9	-
Machinery.....	9	9	-
Stocks[7]:			
Finished products.....	x	x	-
Work-in-process.....	x	x	-
Materials, supplies, fuels, etc.....	x	x	-
Value of products shipped (or produced) and other receipts:.....	x	x	x
Value of all products shipped (or produced).....	x	x	-
Receipts for work performed for others.....	x	x	-
Value of products sold in same condition[7].....	x	x	-
Quantity and value of individual important products.....	x	6	-

[1]Type of economic organization would also be asked of larger units (on the census long form).

[2]Includes working proprietors and unpaid family workers in addition to employees.

[3]Number of employees as of several specified dates during the inquiry period should be asked of the long form respondents in the census and of all respondents in the annual survey (single form going to a probability sample which includes all large establishments).

[4]The UN Statistical Commission suggested man-days worked as an alternative measure. United Nations Statistical Office. *Recommendations for the 1973 World Programme of Industrial Statistics*, (New York, 1973) Statistical Papers, Series M, No. 54, Part 1.

[5]In the minerals sector, this item is defined as the "cost of supplies."

[6]As a country's industrial statistics program becomes well established, it may wish to consider the addition of this item to its annual program using a reference list for reporting purposes.

[7]This item need not be separately reported where it is of negligible importance, e.g. in the mineral industries.

[8]Fixed assets include all physical assets expected to have a productive life of more than 1 year. Include both fixed assets acquired from others and those produced on own account in the inquiry period. Some countries may find it desirable to separate imported fixed assets from those produced domestically.

[9]Detailed data may be requested by countries in which the acquisition and sale of used fixed assets are statistically significant.

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Exhibit I-10-2. PROPOSED TIME SCHEDULE FOR THE INAUGURATION OF ANNUAL AND MONTHLY (OR QUARTERLY) SURVEYS FOR MANUFACTURING AND MINERAL INDUSTRIES: 1984-93

Subject	Type	1984	1985	1986	1987	1988*	1989	1990	1991	1992	1993*
Manufacturing	Annual	A	A	B_2	B_2	B_2	B_3	B_3	B_3	B_3	B_3
	Monthly	A	A	A	B_1	B_2	B_2	B_2	B_2	B_2	B_2
Mineral industries	Annual	A	A	B_2	B_2	B_2	B_3	B_3	B_3	B_3	B_3
	Monthly	A	A	A	B_1	B_2	B_2	B_2	B_2	B_2	B_2

*The annual survey would be integrated into the benchmark census in the census years of 1988 and 1993.

A --Large establishments only.

B_1--Probability sample (small sample)--yielding national totals only.

B_2--Probability sample (larger sample)--yielding industry group data for the nation and total manufacturing (or mineral industries) for the principal geographic units (e.g., provinces, states).

B_3--Probability sample (still larger sample)--yielding industry group data for regions within the country and for the larger of the provinces, states, or other major geographic areas.

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Exhibit II-1-1. PROVISIONS OF THE 1970 ACT APPLICABLE TO INDUSTRIAL CENSUSES AND SURVEYS

1. DEFINITIONS

As used in this Act, unless the context requires another meaning, or unless it is otherwise provided: "Office" means the National Statistical Office, "Ministry" means the Ministry of Economic Planning and Development, and "Minister" refers to the head of that Ministry.

2. NATIONAL STATISTICAL OFFICE

The Office is transferred from the Ministry of Finance to the Ministry of Economic Planning and Development, and is henceforth under the jurisdiction of the latter Ministry.

3. FUNCTIONS OF THE MINISTER; DELEGATION

The Minister of Economic Planning and Development shall perform the functions and duties imposed upon him by this Act, or he may delegate any of them to such officers, employees, or Offices of the Ministry as he designates, subject to the limitations provided in this Act.

4. QUESTIONNAIRES; NUMBER, FORM, AND SCOPE OF INQUIRIES

The Minister shall prepare questionnaires, and shall determine the inquiries, and the number, form, and subdivisions thereof, for the statistics, surveys, and censuses provided for in this Act. The Minister shall maintain liaison with other data-gathering agencies in Providencia, both public and private, and, in planning the programs of his Office, shall attempt to minimize any duplication between their objectives and those of other organizations. In determining the content and scope of statistical inquiries, he shall seek the advice and counsel of other government agencies and of interested private organizations and individuals.

5. CONFIDENTIAL INFORMATION

Neither the Minister, nor any other officer or employee of the Ministry, may use the information furnished under the provisions of this Act for any purpose other than the statistical purposes for which it is supplied. They may not make any publication whereby the data furnished by any particular establishment or company can be identified. No one may be permitted to examine any filled-in questionnaires except officers and employees of the National Statistical Office. In particular, employees of the Office of Demographic and Economic Analysis shall not be permitted to see individual questionnaires, even though they are under the same Ministry. (Penalties for violation of this paragraph are set forth in Paragraph 10.)

6. OFFICERS AND EMPLOYEES

The National Statistical Office shall be headed by a Director, to be appointed by the Minister. The Director shall perform such duties as may be imposed upon him by law, regulations, or orders of the Minister. The Director, with the concurrence of the Minister, shall secure the services of such other employees as he deems necessary to carry out the provisions of this Act. In addition to such regular employees, the Director may arrange to secure the services of employees of other government agencies to assist the Office in the conduct of field enumeration.

Before assuming their duties, all employees shall swear under oath to abide by the provisions of Paragraph 5.

7. CENSUSES OF MANUFACTURERS, MINERAL INDUSTRIES, AND OTHER BUSINESS

The Office shall take, compile and publish censuses of manufacturers, of mineral industries, and of other businesses, including the distributive tasks and public utilities. The terms "manufactures," "industries," and "businesses" shall be construed to include establishments owned and operated by private individuals or companies. A census covering manufactures, mineral industries, and the production and distribution of electricity, gas and water shall be taken covering the year 1975 and every tenth year thereafter.

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Exhibit II-1-1. PROVISIONS OF THE 1970 ACT APPLICABLE TO INDUSTRIAL CENSUSES AND SURVEYS--Continued

8. INTERIM CURRENT DATA

The Office may make surveys deemed necessary to furnish annual, monthly and quarterly statistics on the subjects included in the censuses provided for in this Act.

9. USE OF SAMPLING

In carrying out the provisions of this Act, the Office is encouraged to make full use of methods whereby only a sample group of potential respondents is required to furnish replies to particular inquiries.

10. PENALTIES--OFFICERS AND EMPLOYEES

(a) Whoever receives or secures to himself any fee, reward, or other compensation as a consideration for the appointment or continued employment of any person under the provisions of this Act shall be fined not more than *(amount)* or imprisoned not more than five years, or both.

(b) Whoever, being an officer or employee referred to in this Act, having taken the oath of office and having agreed to comply with the Provisions of Paragraph 5 of this Act, publishes or communicates, without the written authority of an officer of the Ministry, any information coming into his possession by reason of his employment, shall be fined not more than *(amount)* or imprisoned not more than two years, or both.

11. PENALTIES--OTHER ORGANIZATIONS AND PERSONS

Whoever, being the owner, official, agent, person in charge, or assistant to the person in charge, of any company, business, institution, establishment, or other organization, neglects or refuses, when requested by the Office, to answer completely and correctly to the best of his knowledge all questions relating to his company or other organization contained on a questionnaire of the Office, shall be fined not more than *(amount)* or imprisoned not more than one year. If he willfully gives a false answer to any such inquiry, he shall be fined not more than *(amount)* or imprisoned not more than three years, or both.

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Exhibit II-2-1. FUNCTION AND DIVISION RESPONSIBILITY OF THE NATIONAL STATISTICAL OFFICE FOR THE 1975 INDUSTRIAL CENSUS

Function	Division with major responsibility
Primary function:	
Advance planning	Manufacturing and Mining (MMD)
Mapping	Geography (GEOG)
Preparing questionnaires and other materials needed in census[1]	Publications (PUB)
Hiring enumerators	Field Operations (FOD)
Distributing materials to field	Field Operations (FOD)
Training of county agents and other enumerators	Field Operations (FOD)
Enumerating	Field Operations (FOD)
Receipt and check-in of returns from field	Field Operations (FOD)
Editing questionnaires[2]	Manufacturing and Mining (MMD)
Punching and tabulating	Data Processing (DPD)
Posting tables	Data Processing (DPD)
Designing and typing tables[1]	Publications (PUB)
Printing[3]	Publications (PUB)
Auxiliary function:	
Budget coordination	Administrative Services (ADMS)
Personnel and payroll	Personnel (PERS)
Progress reports	Administrative Services (ADMS) Control Staff

[1]MMD is responsible for questionnaire and table content.
[2]Although the short forms are edited by DPD, MMD supplied the specifications and is considered to have major responsibility.
[3]Printing is done on contract by private firms, but PUB is responsible for supervising and approving the work.

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Exhibit II-3-1. LARGE-SCALE RURAL MAP

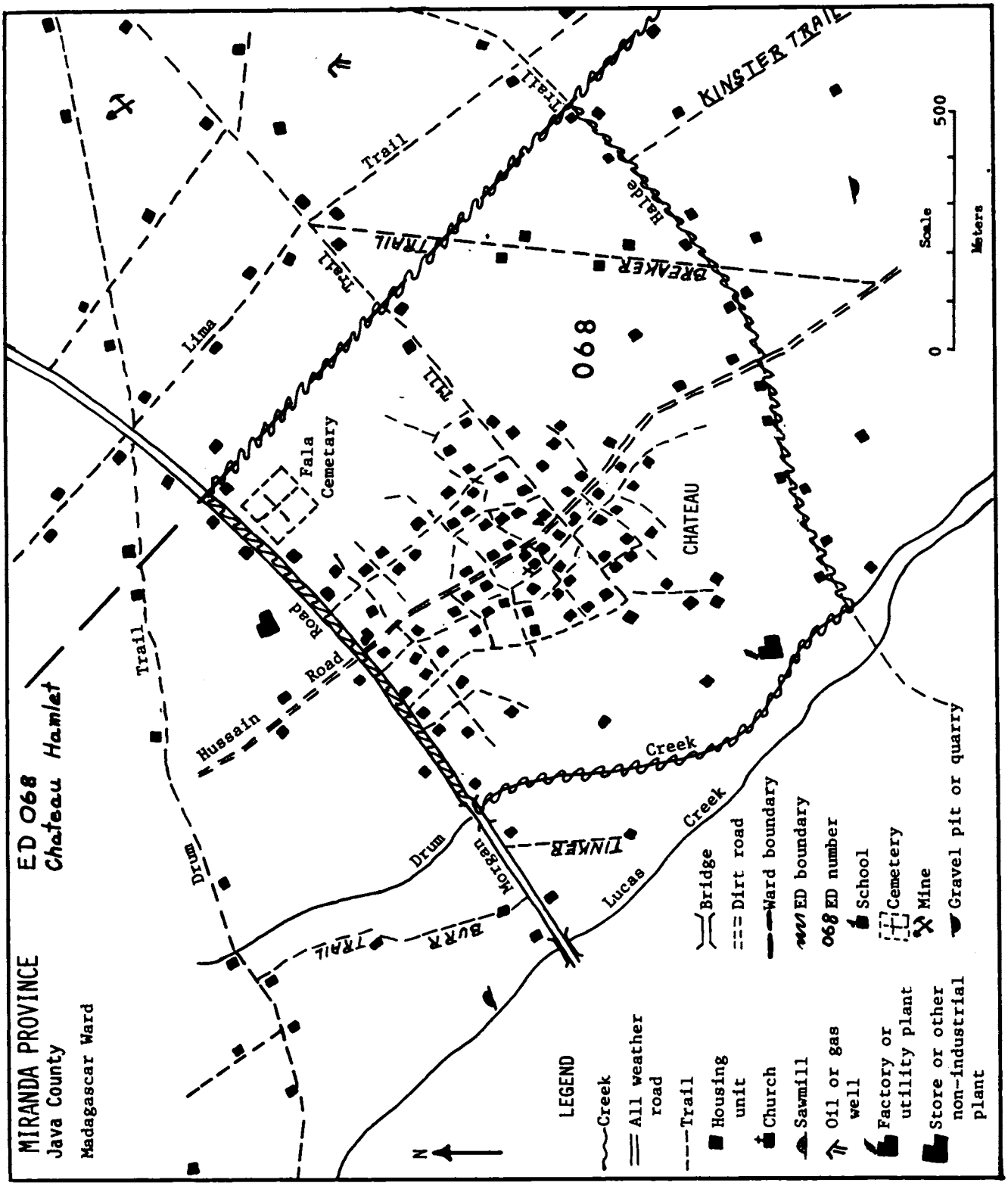

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Exhibit II-3-2. LARGE-SCALE URBAN MAP FOR HOUSEHOLD SAMPLE AREAS

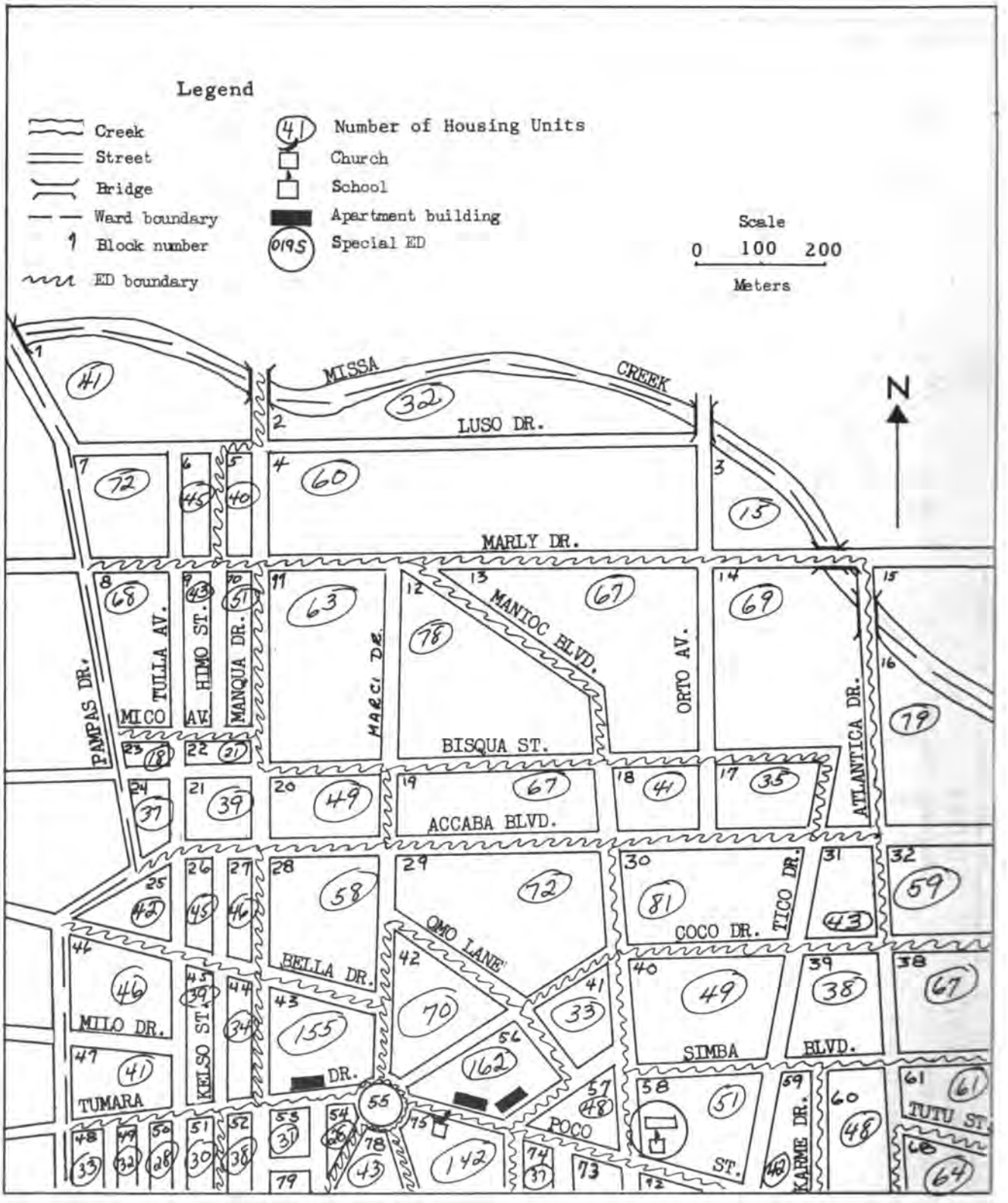

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Exhibit II-3-3. LARGE-SCALE URBAN MAP FOR GENERAL USE

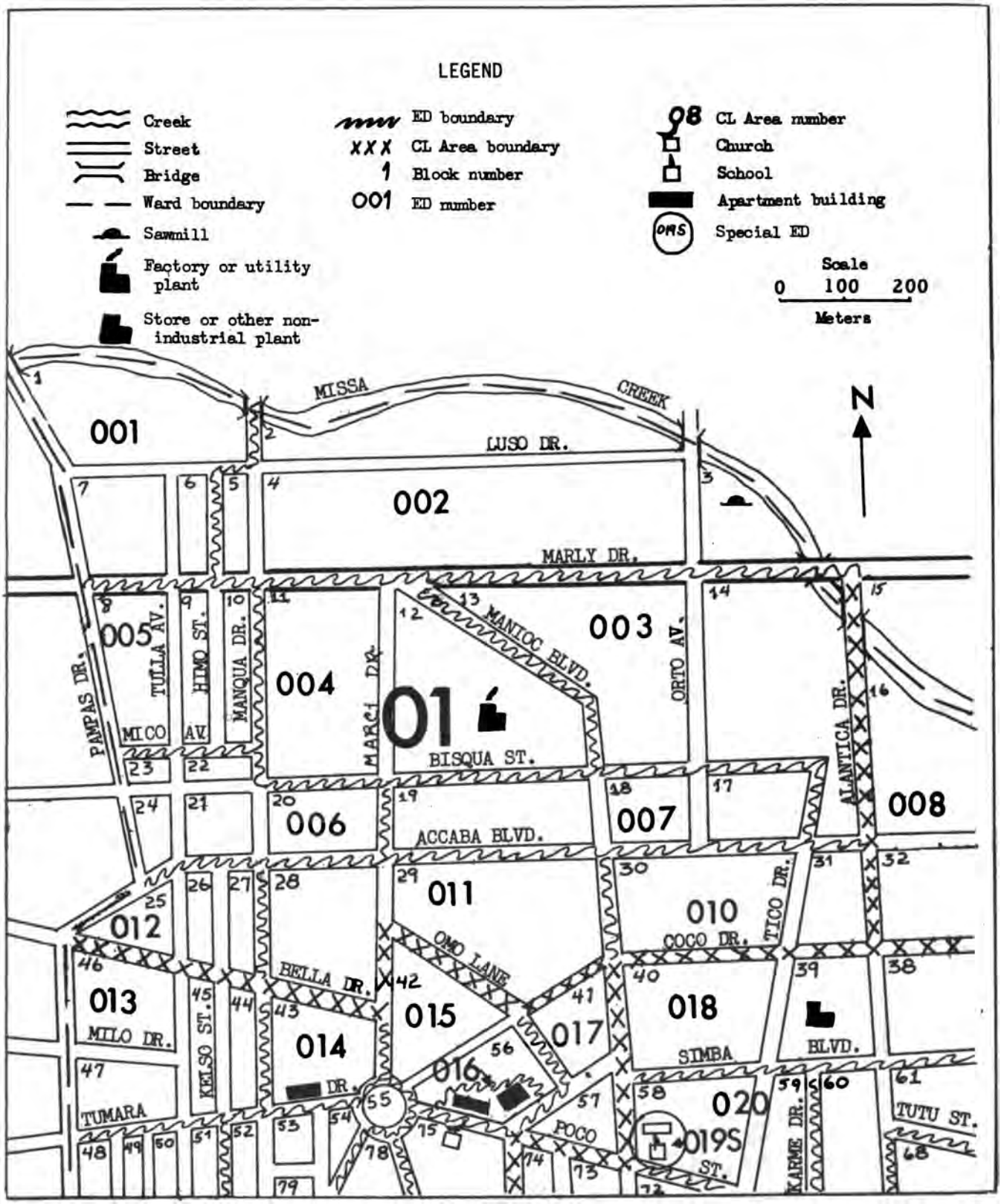

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Exhibit II-3-4. INTERMEDIATE-SCALE MAP FOR GENERAL USE

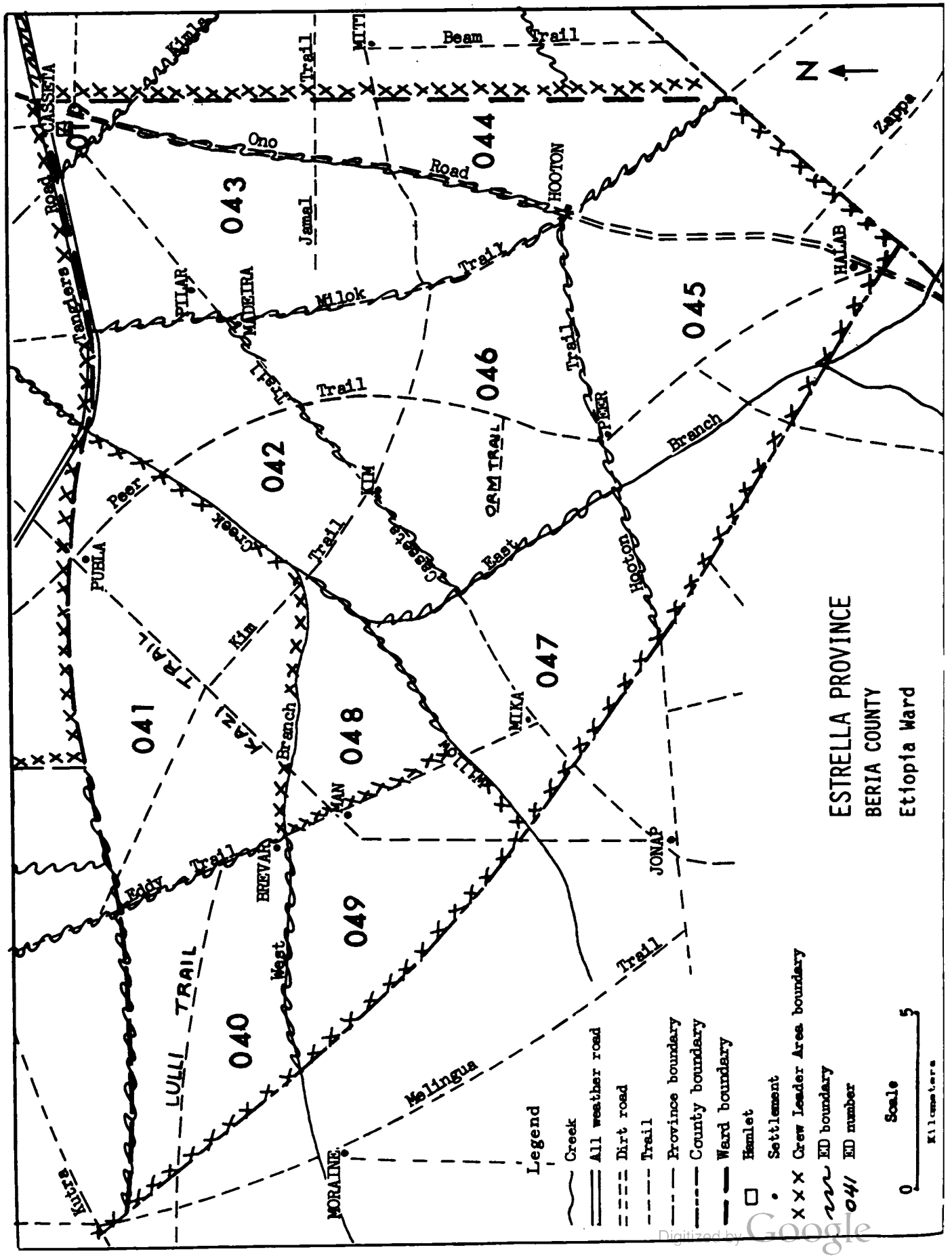

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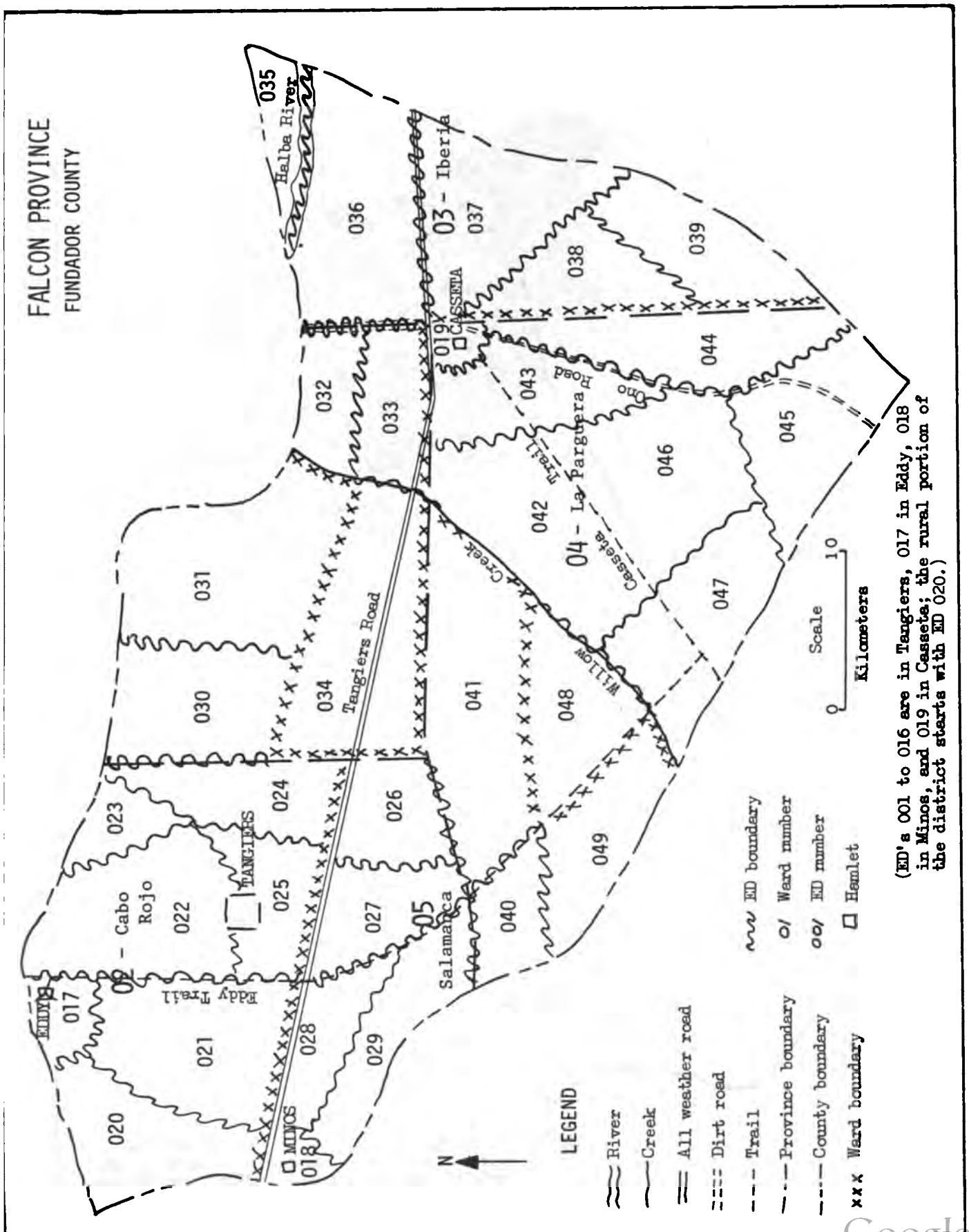
Exhibit II-3-5. SMALL-SCALE COUNTY MAP



(ED's 001 to 016 are in Tangiers, 017 in Eddy, 018 in Minos, and 019 in Casseta; the rural portion of the district starts with ED 020.)

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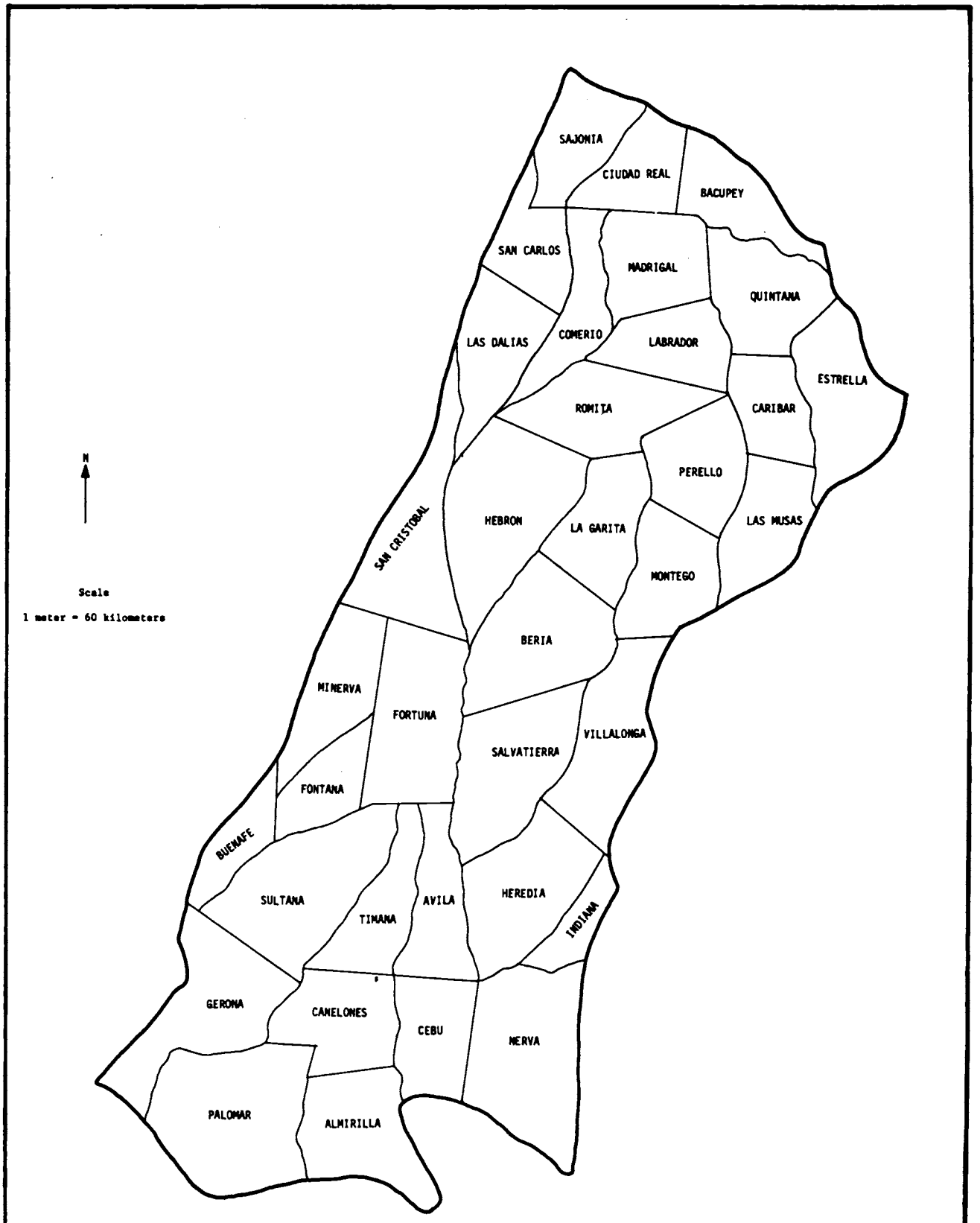
Exhibit II-3-6. SMALL-SCALE PROVINCE MAP: ESTRELLA PROVINCE



NOTE: If the map is to be used as a visual aide for planning and control purposes, it should include natural features, man-made features, and location of all urban areas.

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Exhibit II-3-7. MAP OF COUNTRY

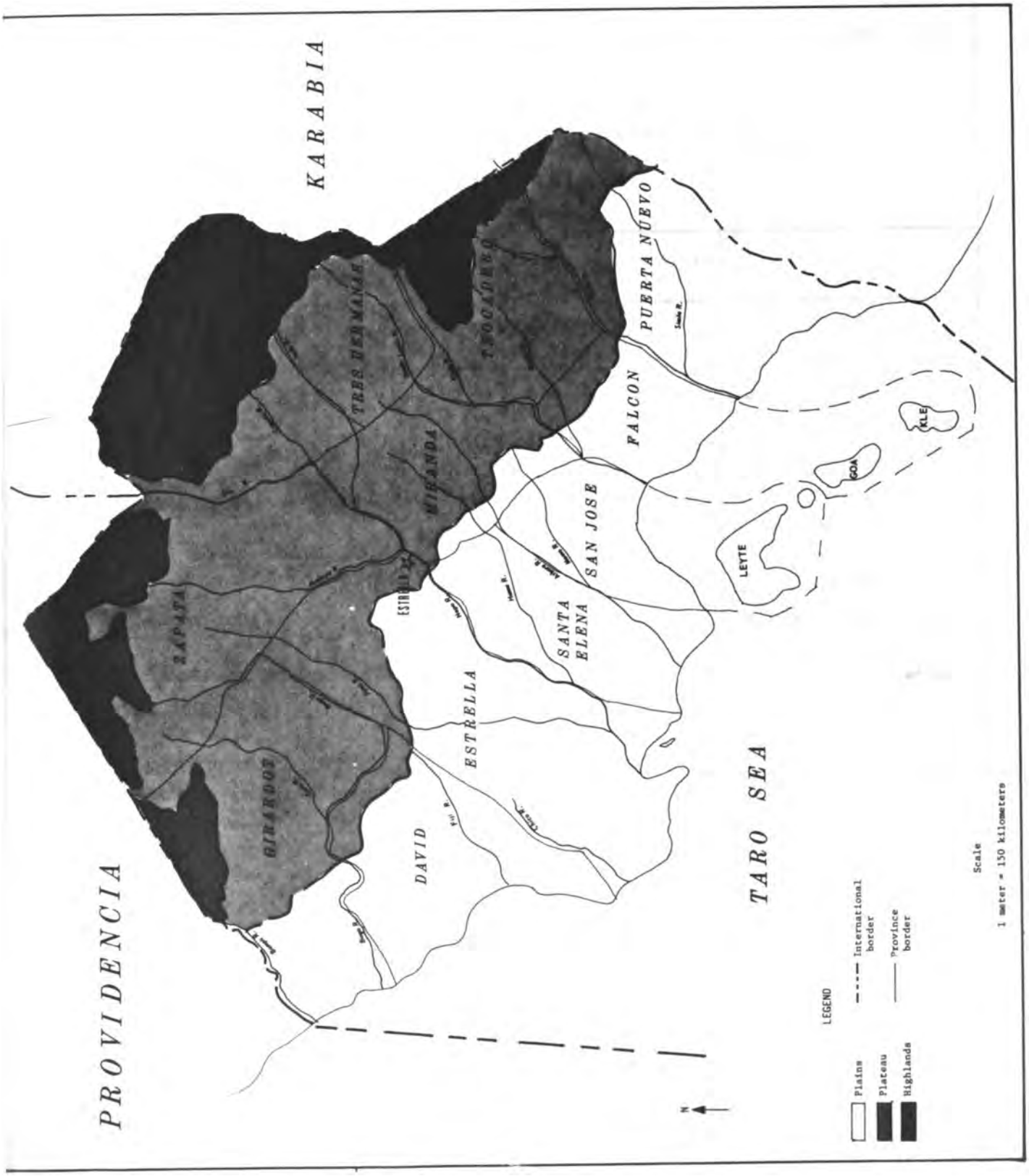

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Exhibit II-4-1. TIME AND COST SCHEDULE FOR ENUMERATION OF SAMPLE AREA HOUSEHOLDS, FORM 120

PROVIDENCIA
FORM 120
(September, 1974)

NATIONAL STATISTICAL OFFICE

Operation number: 3

Date completed: 31 DECEMBER

Prepared by- S. Ahmadi

TIME AND COST SCHEDULE
1975 INDUSTRIAL CENSUS

Description of operation: Cost and man-weeks for interviews--Household sample survey

Item	Estimated total	Week ending-- 8 October	15 October	(etc.)			Actual total
TOTAL SAMPLE AREAS							
Screening interviews.....	30,000	3,600					
In-scope questionnaires.....	1,800	272					
Man-weeks.....	300	36					
Total cost.....	$69,000	$8,095					
Direct cost.....	$60,000	$7,040					
Overhead.....	$9,000	$1,055					
SAMPLE AREA NO. 1							
Screening interviews.....	5,800	700					
In-scope questionnaires.....	116	14					
Man-weeks.....	58	7					
Direct cost.....	$12,000	$1,440					
SAMPLE AREA NO. 2							
(etc.)							

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Exhibit II-4-2. LIST OF OPERATIONAL STEPS FOR THE 1975 INDUSTRIAL CENSUS

Operational step	Division with primary responsibility
I. Advance planning	
Determination of objectives, scope, coverage, timing, and collection and processing methods	Manufacturing and Mining
Review of budget estimates	Director's Office
Use and availability of maps	Geography
Sampling plan for households	Manufacturing and Mining
Content of questionnaires	Manufacturing and Mining
II. Preparation of materials:	
Designing questionnaires	Publications
Printing questionnaires	Publications
Designing internal-use forms, instruction manuals, etc.	Publications
Printing internal-use forms, instruction manuals, etc.	Publications
Preparing and distributing publicity materials	Manufacturing and Mining
Preparing maps	Geography
III. Data collection:	
Enumeration of multi-units, large single-units, gas and electricity plants, and government plants	Field Operations
Enumeration of other regular establishments	Field Operations
Enumeration of sample area households	Field Operations
IV. Data processing:	
Equipment rental	Data Processing
Receipt and check-in of returns from field	Field Operations
Delinquent follow-up after field close-out	Manufacturing and Mining
Editing long forms	Manufacturing and Mining
Editing short forms and household questionnaires	Data Processing
Card punching	Data Processing
Processing preliminary tabulations	Data Processing
Reviewing preliminary tabulations	Manufacturing and Mining
Posting advance summary tables	Data Processing
Processing final tabulations	Data Processing
Reviewing final tabulations	Manufacturing and Mining
*Posting final detailed tables	Data Processing
V. Publication:	
Typing advance summary tables	Publications
Printing advance summary tables	Publications
*Typing final detailed tables	Publications
Printing final detailed tables	Publications

* May be eliminated if final copy is prepared by computer.

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Exhibit II-4-3. SUMMARY OF TIME AND COST ESTIMATES FOR OPERATIONAL STEPS PERFORMED BY COUNTY AGENTS AND NSO EMPLOYEES

Operation	Number of man-weeks	Rate	Cost
Total.....	3,849	...	$1,075,000
LABOR			
Advance planning.....	240	$300	72,000
Preparation of materials.....	200	250	50,000
NSO staff, including training.....	1,030	200	206,000
County agents, including training.	1,500	300	450,000
Data processing and publication...	762	175	134,000
Administration.....	117	...	(1)
NON-LABOR			
Paper and printing.....	...	...	20,000
Equipment rental.....	...	...	25,000
Transportation.....	...	...	67,000
Not specified[2].....	...	...	51,000

[1]Part of overhead costs
[2]Allowance for unexpected costs, amounting to roughly 5 percent.

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Exhibit 11-5-1. ESTIMATED NUMBER OF ESTABLISHMENTS AND VALUE ADDED, BY INDUSTRY AND SIZE: 1975

Subject	All industries	Mining	Manufacturing	Electricity and gas
REGULAR ESTABLISHMENTS				
Total number	39,600	2,000	37,500	100
Percent	100.0	100.0	100.0	100.0
Value added (thousands)	$1,400,000	$200,000	$1,000,000	$ 200,000
Percent	100.0	100.0	100.0	100.0
Value added per establishment	$ 35,350	$100,000	$ 26,670	$2,000,000
With less than 10 persons engaged	24,800	800	24,000	-
Percent of total number	62.6	40.0	64.0	-
Value added (thousands)	$ 222,000	$ 22,000	$ 200,000	-
Percent of total value added	15.9	11.0	20.0	-
Value added per establishment	$ 8,950	$ 27,500	$ 8,330	-
With 10 or more persons engaged	14,800	1,200	13,500	100
Percent of total number	37.3	60.0	36.0	100.0
Value added (thousands)	$1,178,000	$178,000	$ 800,000	$ 200,000
Percent of total value added	84.1	89.0	80.0	100.0
Value added per establishment	$ 79,590	$148,330	$ 59,260	$2,000,000
HOUSEHOLDS WITH MAJOR INDUSTRIAL ACTIVITY				
Number of households[1]	180,000	1,100	178,900	-
Value added (thousands)	$ 121,000	$ 1,000	$ 120,000	-
Value added per household	$ 672	$ 910	$ 670	-

[1]Households reporting income of $500 or more from industrial activity during 1975.

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Exhibit 11-5-2. ESTIMATED NUMBER OF REGULAR ESTABLISHMENTS, BY INDUSTRY, FOR PROVINCES: 1975

Province	All industries	Mining	Manufacturing	Electricity and gas
Providencia.....	39,600	2,000	37,500	100
Catedral.....	3,587	526	3,050	11
David.....	2,614	59	2,550	5
Estrella.....	14,023	-	14,000	23
Falcon.....	1,064	6	1,050	8
Girardot.....	2,863	256	2,600	7
Miranda.....	1,591	87	1,500	4
Puerto Nuevo.....	3,032	27	3,000	5
San Jose.....	1,327	15	1,300	12
Santa Elena.....	2,435	25	2,400	10
Tres Hermanas.....	2,854	247	2,600	7
Trocadero.....	752	50	700	2
Zapata.....	3,458	702	2,750	6

Exhibit 11-5-3. ESTIMATED NUMBER OF REGULAR ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED, BY INDUSTRY, FOR PROVINCES: 1975

Province	All industries	Mining	Manufacturing	Electricity and gas
Providencia.....	14,800	1,200	13,500	100
Catedral.....	1,517	381	1,125	11
David.....	775	40	730	5
Estrella.....	5,063	-	5,040	23
Falcon.....	318	-	310	8
Girardot.....	1,314	180	1,127	7
Miranda.....	620	62	554	4
Puerto Nuevo.....	1,127	15	1,107	5
San Jose.....	470	3	455	12
Santa Elena.....	623	15	598	10
Tres Hermanas.....	1,184	122	1,055	7
Trocadero.....	294	34	258	2
Zapata.....	1,495	348	1,141	6

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Exhibit II-5-4. ESTIMATED NUMBER OF LONG AND SHORT MANUFACTURING FORMS FOR RURAL AREAS, BY PROVINCE: 1975

Province	Long forms		Short forms	
	Total	Rural	Total	Rural
Providencia.....	13,500	3,560	24,000	6,375
Catedral.....	1,125	380	1,925	655
David.....	730	280	1,820	710
Estrella[1].....	5,040	765	8,960	1,345
Falcon.....	310	100	740	245
Girardot.....	1,127	345	1,473	440
Miranda.....	554	180	946	310
Puerto Nuevo.....	1,107	400	1,893	680
San Jose.....	455	140	845	255
Santa Elena.....	598	200	1,802	595
Tres Hermanas.....	1,055	335	1,545	495
Trocadero.....	258	95	442	165
Zapata.....	1,141	340	1,609	480

[1]Contains the capital city of the same name.

Exhibit II-5-5. ESTIMATES OF TRAVEL AND INTERVIEWS PER WEEK

(For mining and manufacturing; excludes electricity and gas)

Item	Total	Man-weeks required for interviews	Average per man-week	
			Kilometers traveled	Interviews completed
All establishments.....	69,500	2,441	...	...
Regular establishments.....	39,500	2,141	...	...
Rural areas:				
Mining--long form questionnaires.....	1,200	100	400	12
Mining--short form questionnaires.....	800	44	600	18
Manufacturing--long form questionnaires.....	3,560	593	300	6
Manufacturing--short form questionnaires.....	6,375	319	500	20
Urban areas:				
Long form questionnaires.....	9,940	497	100	20
Short form questionnaires.....	17,625	588	200	30
Households in household industry sample.....	30,000	300	...	...
Screening interviews.....	30,000	300	300	100

NOTE: The estimates assume a 6-day week. The number of interviews completed and estimates of travel time include allowances for check interviews, re-visits to solve editing problems, and any other personal contact with respondents.

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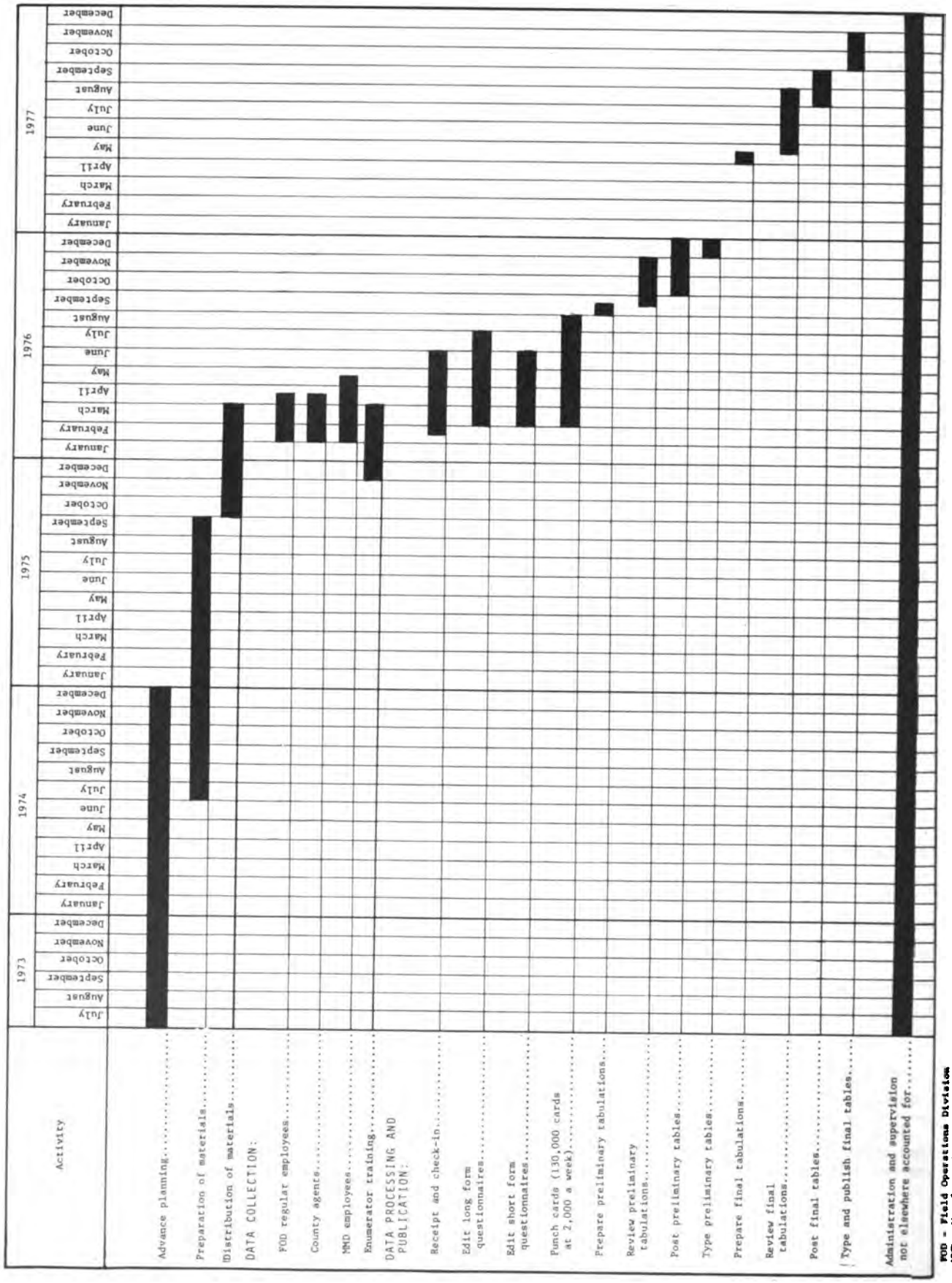
Exhibit II-5-6. CALENDAR OF ACTIVITIES FOR OPERATIONAL STEPS, EXCLUDING HOUSEHOLD SAMPLE SURVEYS



FOD - Field Operations Division
MMD - Manufacturing and Mining Division
*Household sample survey is covered in separate chart, not illustrated.

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Exhibit II-5-7. MAN-WEEKS AND PERSONNEL REQUIRED FOR OPERATIONAL STEPS, BY OPERATION

Operation	Number of man-weeks	Number of equivalent full-time employees
Advance planning	240	3
Preparation of materials	200	3
DATA COLLECTION:		
FOD regular employees	1,000	100
County agents	1,500	[1]144
MMD employees	30	2
DATA PROCESSING AND PUBLICATION:		
Receipt and check-in	30	2
Edit long form questionnaires	250	12
Edit short form and household questionnaires	150	9
Punch cards (130,000 cards at 2,000 a week)	65	5
Prepare preliminary tabulations	4	2
Review preliminary tabulations	40	7
*Post preliminary tables	40	7
*Type preliminary tables	15	3
Prepare final tabulations	8	4
Review final tabulations	80	7
*Post final tables	45	5
*Type final tables	35	4
Administration and supervision not elsewhere accounted for	117	0.5

FOD - Field Operations Division
MMD - Manufacturing and Mining Division
[1]For data collection, 216 county agents, employees of the Ministry of Agriculture, devoted about two-thirds of their time to the industrial census during the data collection phase. The equivalent number of full-time persons is 144, as shown.
*May be eliminated if print-ready tables are printed by computer.

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Exhibit II-5-8. MAN-WEEKS REQUIRED FOR OPERATIONAL STEPS, BY QUARTER

Quarter	Total	Planning and other advance work	Data-collection		Data processing and publication	Administrative
			NSO employees	County agents		
Man-weeks.....	3,849	440	1,030	1,500	762	117
1973						
Third.....	47	40	-	-	-	7
Fourth.....	46	40	-	-	-	6
1974						
First.....	47	40	-	-	-	7
Second.....	46	40	-	-	-	6
Third.....	87	80	-	-	-	7
Fourth.....	86	80	-	-	-	6
1975						
First.....	47	40	-	-	-	7
Second.....	46	40	-	-	-	6
Third.....	47	40	-	-	-	7
Fourth.....	6	-	-	-	-	6
1976						
First.....	1,928	-	824	1,000	97	7
Second.....	738	-	166	240	326	6
Third.....	96	-	-	-	89	7
Fourth.....	388	-	40	260	82	6
1977						
First.....	7	-	-	-	-	7
Second.....	62	-	-	-	56	6
Third.....	84	-	-	-	77	7
Fourth.....	41	-	-	-	35	6

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Exhibit II-6-1. **ESTABLISHMENT CONTROL RECORD, FORM 123**

PROVIDENCIA FORM 123 (MAY 1974) NATIONAL STATISTICAL OFFICE ESTABLISHMENT CONTROL RECORD 1975 INDUSTRIAL CENSUS	a. Province c. Ward — ED no. e. Enumerator	b. County d. County agent f. Reviewer	FOR OFFICE USE ONLY g. Completed questionnaires h. Out-of-scope i. Skip-list j. Refusals k. Control record No. l. Total entries m. Date forwarded to central office

Serial number (1)	Name of establishment (2)	Location (3)	On skip-list? *(If YES, end.)* (4)	Number of persons engaged (5)	Type of form (6)	Industrial activity (7)	Dates of interviews (8)	Names of persons interviewed (9)	Date completed questionnaire obtained (10)	Date of field office review (11)	Remarks (12)

Copies 1 and 2--Forward to central office with completed questionnaires. Copy 3--Retain in field office.

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Exhibit II-6-2. **HOUSEHOLD CONTROL RECORD, FORM 123H**

PROVIDENCIA
FORM 123H
(May 1974)

NATIONAL STATISTICAL OFFICE
HOUSEHOLD INDUSTRIES SURVEY

HOUSEHOLD CONTROL RECORD

1975 INDUSTRIAL CENSUS

a. Province		b. County	
c. Ward	d. ED	e. County agent office	
f. Enumerator		g. Reviewer	

FOR OFFICE USE ONLY	
h. Forms ECP-102	i. Out-of-scope
j. Refusals	k. Control record number
l. Total entries	m. Date to control officer

Serial number (1)	Address (2)	Name of head (3)	Name of person interviewed (4)	Date(s) of inter-view(s) (5)	Type of unit (6)	Manufacturing activity: Nature (7)	Manufacturing activity: Value* (8)	Source of income (9)	Remarks (10)

*If $500 or more, fill form ECP-102.

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Exhibit III-1-1. PRODUCT REFERENCE LIST FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED

(To be used in completing entries for Value of Shipments and Receipts in the questionnaire for the Census of Manufactures)

The Product Reference List includes examples of individual products for most of the product classes. Each of the major group listings includes most of the products manufactured by establishments engaged in the specified major line of activity. If you are unable to identify the major group or classify the product immediately, check other major group listings which might include the product. In your search for the appropriate product class description, it may be useful to consider the end use of the product, materials entering into the product, and the manufacturing process employed.

Code*	Major manufacturing group
	Food manufacturing, except beverages
	Beverage industries
	Tobacco manufacturing
	Textile manufacturing
	Footwear, apparel, made-up textile goods
	Wood and cork products, except furniture
	Furniture and fixtures
	Paper and paper products
	Printing and publishing
	Leather, leather and fur products
	Rubber products
	Chemicals and chemical products
	Petroleum and coal products
	Non-metallic mineral products
	Basic metal industries
	Metal products, except machinery
	Machinery, except electrical
	Electrical machinery and equipment
	Transportation equipment
	Miscellaneous manufacturing industries

*Insert the new (1968) ISIC code.
**Insert the appropriate unit of measure.

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Exhibit III-1-1. PRODUCT REFERENCE LIST FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED--Continued

Product reference code*	Product group and description	Unit of measure**
	FOOD MANUFACTURING EXCEPT BEVERAGES	
	SLAUGHTERING, PREPARATION, AND PRESERVING OF MEAT:	
	Fresh meat produced in slaughtering plants (beef, veal, lamb and mutton, pork)	
	Other meat packing (slaughtering) plant products (lard, processed pork, sausage, canned meats, hides, skins and pelts, and other meat packing products)	
	Sausage and other prepared meat products not made in manufacturing plants (processed pork, canned meats, sausages, natural sausage casings, and other processed meat, except lard)	
	Poultry dressing and packing (hens, chickens, other fowl, canned poultry)	
	MANUFACTURE OF DAIRY PRODUCTS:	
	Butter churned in this plant	
	Cheese (except cottage) made from milk in this plant	
	Condensed and evaporated milk products (dry milk products, canned milk shipped in consumer-type packages, bulk evaporated milk and evaporated milk products, including ice cream mix)	
	Ice cream, ices, and other frozen dairy foods	
	Processed cheese and related products made from purchased cheese	
	Cottage cheese (includes bakers', pot and farmers')	
	Fluid milk (bulk, bottled, pasteurized and non-pasteurized, buttermilk, chocolate milk, flavored milk, cream and whipped cream)	
	CANNING AND PRESERVING OF FRUITS AND VEGETABLES:	
	Canned specialties (soups, beans, pork and beans, mincemeat, Chinese food; exclude spaghetti, seafoods, and frozen goods)	
	Canned fruits and vegetables, preserves, jams and jellies (fruits, fruit pie mixes, hominy, mushrooms, fruit juices including bottled, non-fermented cider, vegetable juices, catsup, tomato sauces)	
	Dried and dehydrated fruits and vegetables	
	Pickled fruits, vegetables, sauces and seasonings	

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Exhibit III-1-1. PRODUCT REFERENCE LIST FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED--Continued

Product reference code*	Product group and description	Unit of measure**
	Frozen fruits, fruit juices, vegetables and specialties (juices and ades, soups, dinners, pies, waffles; excludes seafood)	
	CANNING AND PRESERVING OF FISH AND OTHER SEAFOODS:	
	Fresh and frozen packaged fish (salted, filleted, and/or packaged fish and other seafood, soup, stew, chowder, etc.; exclude that processed aboard fishing vessels)	
	Canned and cured seafoods, except frozen	
	MANUFACTURE OF GRAIN MILL PRODUCTS (except prepared animal and fowl feeds):	
	Flour and other grain mill products (wheat flour, rye flour, blended and unblended, self-rising flours, corn meal, hominy feeds, corn grits, wheat bran, prepared flour and flour mixes made in flour mills)	
	Cereal breakfast foods	
	Milled rice and by-products	
	Self-rising and other prepared flour and mixes (not made in flour mills)	
	MANUFACTURE OF BAKERY PRODUCTS:	
	Bread and other bakery products except biscuits, crackers, and pretzels (bread, bread type rolls, sweet yeast goods, doughnuts, pies, pastries, and hand made cookies)	
	Biscuit, crackers, and pretzels (includes other dry bakery products, machine made cookies, and ice cream cones)	
	SUGAR FACTORIES AND REFINERIES:	
	Sugar cane mill products and by-products	
	Refined cane sugar and by-products	
	Refined beet sugar and by-products	

(CONTINUE WITH PRODUCT LIST)

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Exhibit III-1-2. MATERIALS REFERENCE LIST FOR MINING AND MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED

(To be used in completing entries for Principal Materials and Processes Used in Manufacturing in the questionnaire for the Census of Manufactures)

Materials code*	Description	Unit of measure**
	SECTION 0. FOOD	
	LIVE ANIMALS	
	Live animals chiefly for food	
	MEATS	
	Meat--fresh, chilled, frozen	
	Meat--dried, salted, smoked or cooked but not canned	
	Meat canned and meat preparation either canned or not canned	
	DAIRY PRODUCTS, EGGS, AND HONEY:	
	Milk and cream--fresh	
	Milk and cream--evaporated, condensed, or dried	
	Butter	
	Cheese and curd	
	Eggs	
	Natural honey	
	Dairy products not elsewhere classified	
	FISH AND FISH PREPARATIONS:	
	Fish--fresh or simply preserved	
	Fish and fish preparations, canned or not	
	CEREALS AND CEREAL PREPARATIONS:	
	Wheat and spelt (including meslin) unmilled	
	Rice	
	Barley, unmilled	
	Maize (corn), unmilled	
	Cereals, unmilled, other then wheat, rice, barley and maize	
	Meat and flour of wheat and spelt (including meslin)	
	Cereals, milled, except wheat flour	
	Cereal preparations from flour and fecula of fruits and vegetables	

*Insert the new (1968) ISIC code.
**Insert the appropriate unit of measure.

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Exhibit III-1-2. MATERIALS REFERENCE LIST FOR MINING AND MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED--Continued

Materials code*	Description	Unit of measure**
	FRUITS AND VEGETABLES:	
	Fruits and nuts, fresh (not including oil nuts)	
	Dried fruits, including artificially dehydrated	
	Fruits preserved and fruit preparations	
	Vegetables, fresh and dry, roots and tubers, not including artificially dehydrated	
	Vegetables preserved and vegetable preparations	
	SUGAR AND SUGAR PREPARATIONS:	
	Sugar	
	Sugar confectionery and other sugar preparations (except chocolate confectionery)	
	COFFEE, TEA, COCOA, SPICES AND MANUFACTURES THEREOF:	
	Coffee	
	Cocoa	
	Chocolate and chocolate preparations	
	Tea and mate	
	Spices	
	FEEDING STUFF FOR ANIMALS (not including unmilled cereals):	
	Feeding stuff for animals (not including unmilled cereals)	
	MISCELLANEOUS FOOD PREPARATIONS:	
	Margarine and shortening	
	Food preparations not elsewhere classified	
	SECTION 1. BEVERAGES AND TOBACCO	
	BEVERAGES	
	Non-alcoholic beverages	
	Alcoholic beverages	

(CONTINUE WITH MATERIALS LIST)

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Exhibit III-2-1. DATA ITEMS COLLECTED IN THE 1975 PROVIDENCIA INDUSTRIAL CENSUS

Item	Manufacturing		Mineral industries		Electricity industry	Gas industry
	Long Form[1]	Short Form[2]	Long Form[1]	Short Form[2]		
Identification and classification information:						
Name of establishment	X	X	X	X	X	X
Physical location	X	X	X	X	X	X
Economic organization	X	-	X	-	X	X
Form of ownership and legal organization	X	X	X	X	X	X
Period of operation and change in ownership	X	X	X	X	X	X
Employment and earnings:						
Persons engaged and payroll for week ended nearest 15 November 1975	X	X	X	X	X	X
Number of production workers, by quarter	X	-	X	-	X	X
Payrolls during 1975	X	X	X	X	X	X
Supplemental labor cost 1975	X	-	X	-	X	X
Production worker man-days, by quarter	X	-	X	-	X	X
Inventories:						
Total	X	-	-	-	X	X
By stage of fabrication	X	-	-	-	-	-
Acquisition of fixed assets:						
New structures	X	-	X	X	X	X
New machinery and equipment	X	-	X	X	X	X
Used structures	X	-	X	X	X	X
Used machinery and equipment	X	-	X	X	X	X
Cost of materials, etc.:						
Total	X	X	X	X	X	X
Materials, supplies, etc	X	X	X	X	X	X
Specific materials	X	-	X	-	-	-
Products bought and resold	X	-	-	-	-	-
Fuels consumed	X	-	X	-	X	X
Specific fuels consumed	X	-	X	-	X	X
Purchased electricity	X	-	X	-	X	X
Contract work	X	X	X	X	X	X
Payments to labor workers	X	X	-	-	-	-
Electricity:						
Purchased	X	-	X	-	X	X
Generated	X	-	X	-	X	X
Sold	X	-	X	-	X	X
Value of shipments and other receipts:						
Total	X	X	X	X	X	X
Specific products	X	X	X	X	X	X
Receipts for contract work	X	X	X	X	-	-
Receipts for repair and installation	X	-	-	-	-	-
Sales of scrap and refuse	X	-	-	-	-	-
Miscellaneous receipts	X	X	-	-	X	X
Products bought and resold	X	X	-	-	-	-
Electricity and gas inventories:						
Source of electric energy or gas	-	-	-	-	X	X
Disposal of electric energy or gas	-	-	-	-	X	X
Electric generator capacity	-	-	-	-	X	-
Electric transmission and distribution equipment	-	-	-	-	X	-

[1]For establishments with 10 or more persons engaged.
[2]For establishments with less than 10 persons engaged.

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Exhibit III-4-1. CENSUS OF MANUFACTURES, ECP-1 (LONG FORM)

PENALTY FOR FAILURE TO REPORT — **DUE DATE:**

FORM ECP-1 (6-30-75) — NATIONAL STATISTICAL OFFICE PROVIDENCIA

1975 CENSUS OF MANUFACTURES

NOTICE – Response to this inquiry is required by law. By the same law, your report to the National Statistical Office is confidential. It may be seen only by sworn NSO employees and may be used only for statistical purposes.

FOR NSO USE ONLY	Location and identification: Prov. (1-2)	County (3-4)	Register No. (5-8)	Ward (9-11)	Activity (12-15)	F/O (16)	TEP size (17)

Please complete and return this form as soon as possible to: National Statistical Office, Estrella City, Providencia

In correspondence pertaining to this report, please refer to this file number

PLEASE READ ACCOMPANYING INSTRUCTION SHEET AND INSTRUCTIONS WITH EACH ITEM BEFORE COMPLETING

If book figures are not available, carefully prepared estimates are acceptable. Complete every item, entering "0" where applicable. Omit cents when reporting dollar values.

For purposes of this Census, a manufacturing establishment is defined as a single physical location where manufacturing operations are performed (e.g., a factory, mill, or plant).

(Please correct any errors in name or address)

Section I – DESCRIPTION OF ESTABLISHMENT

Item 1 – NAME OF ESTABLISHMENT (factory, plant, or mill) COVERED BY THIS REPORT

Item 2 – PHYSICAL LOCATION OF ESTABLISHMENT
(Be sure your answer relates to the actual PHYSICAL LOCATION of this establishment, which may be different than the mailing address.)

Street and number *(If location cannot be described by street and number, give as much information as possible such as street intersection, name (and number, if any) of road or highway, and distance from nearest city, town or village.)*

City, town, or village

Ward | County | Province

Item 3 – ECONOMIC ORGANIZATION OF THIS ESTABLISHMENT
(Mark (X) one box and enter information as appropriate)

1 ☐ Single establishment – does not own or control another establishment
2 ☐ Head office – owns or controls other establishments
3 ☐ Subsidiary establishment – owned or controlled by another establishment

If box "3" is marked, give name and address of head office

Name of head office
Address *(Street and number)*
Ward | County | Province

Item 4 – FORM OF OWNERSHIP AND LEGAL ORGANIZATION

a. What is the form of ownership of this establishment?
(Mark (X) one box)
1 ☐ Government enterprise
2 ☐ Private enterprise

b. If "Private enterprise" is marked, what is the legal form of organization?
(Mark (X) one box)
1 ☐ Individual proprietor
2 ☐ Partnership
3 ☐ Corporation or joint stock company
4 ☐ Cooperative association (corporate or noncorporate)
5 ☐ Other *(Specify)* _____

Item 5 – PERIOD OF OPERATION DURING 1975 AND CHANGE OF OWNERSHIP (IF ANY)

a. Period of operation during 1975
(Mark (X) one box and enter information as appropriate)
1 ☐ Operated throughout the year
2 ☐ Operated only part of the year *(Enter number of months)* → ☐☐
3 ☐ Establishment was idle throughout the year

b. Change in ownership
Was this establishment purchased or sold by you during 1975?
(If Yes, mark (X) one box and enter information as appropriate. If No – Skip to Item 6.)
1 ☐ Purchased by you during *(Enter month)* →
2 ☐ Sold by you during *(Enter month)* →

NOTE: *If box "1" is marked, give former owner's name and address below. If box "2" is marked, give purchaser's name and address below.*

Name
Address *(Street and number)*
Ward | County | Province

Section II – NUMBER OF PERSONS ENGAGED, LABOR COST, AND MAN-DAYS WORKED

Item 6 – PERSONS ENGAGED AND PAYROLL DURING THE WEEK ENDED NEAREST NOVEMBER 15, 1975

(Enter the number of different persons engaged and payroll during the week ended nearest November 15, 1975. If payroll is for period other than a week, adjust figures to a 1-week basis.)

Type of person engaged (A)	Key (B)	Total number (C)	Key (D)	Number of males (E)	Key (F)	Number of females (G)	Key (H)	Weekly payroll (Omit cents) (I)
a. Working proprietors and active partners	1-1-a		1-1-b		1-1-c			
b. Unpaid family and other unpaid workers	1-2-a		1-2-b		1-2-c			
c. Production workers (operatives)	1-3-a		1-3-b		1-3-c		1-8	$
d. All other employees	1-4-a		1-4-b		1-4-c		1-9	
e. TOTAL *(Sum of a–d)* →	1-5-a		1-5-b		1-5-c		1-0	$

Item 7 – PAYROLLS DURING 1975 — 8-1

Type of employee (A)	Key (B)	Annual payroll 1975 (Omit cents) (C)
a. Production workers (operatives)	1-9	$
b. All other employees	1-10	
c. TOTAL PAYROLL *(Sum of a and b)* →	1-11	$

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1-5-a	1-12	SUM	1-3-a	DIFF	TEP

Item 8 – PRODUCTION WORKERS EMPLOYED, QUARTERLY, 1975 — 8-2

Production workers (operatives) during the pay period ended nearest the 15th.

Pay period (A)	Key (B)	Total number (C)
a. February 1975		
b. May 1975		
c. August 1975		
d. November 1975		
e. TOTAL *(Sum of a–d)* →		
f. AVERAGE NUMBER *(Divide sum on line e by 4)* →	1-12	

Item 9 – SUPPLEMENTAL LABOR COST (1975) NOT INCLUDED IN ITEM 7 — 8-3

Labor cost (A)	Key (B)	Annual cost 1975 (Omit cents) (C)
a. Legally required, including social insurance	2-21	$
b. Payments for voluntary programs	2-22	$

Item 10 – PLANT MAN-DAYS OF PRODUCTION WORKERS, BY QUARTERS, 1975 — 8-4

(For each calendar quarter (or comparable 13-week period) of 1975, include all days actually spent at work, but exclude days spent on vacation, holidays or sick leave.)

Quarterly period (A)	Key (B)	Number of days (C)
a. January through March 1975		
b. April through June 1975		
c. July through September 1975		
d. October through December 1975		
e. TOTAL PRODUCTION WORKER MAN-DAYS *(Sum of a–d)* →	2-23	

Please continue on page 2

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Exhibit III-4-1. CENSUS OF MANUFACTURES, ECP-1 (LONG FORM)--Continued

Page 2

Section III – INVENTORIES AND ACQUISITION OF FIXED ASSETS

Item 11 – INVENTORIES OF THIS ESTABLISHMENT

Type of inventory (A)	Value of inventories for 1975 (Omit cents) (Valuation should be on a comparable basis for both periods) (B)			
	Key (B-1)	January 1 (B-2)	Key (B-3)	December 31 (B-4)
a. Finished products	4–1	$	4–5	$
b. Work-in-process	4–2		4–6	
c. Materials, supplies, fuels, etc.	4–3		4–7	
d. TOTAL INVENTORIES (Sum of a–c) →	4–4	$	4–8	$

Item 12 – ACQUISITION OF NEW AND USED FIXED ASSETS

Type of asset (A)	Key (B)	Cost incurred during 1975 (Omit cents) (C)
a. New structures and new additions to this establishment (exclude land)	2–16	$
b. New machinery and new equipment (include transport equipment)	2–17	
c. Used structures	2–18	
d. Used machinery and used equipment	2–19	
e. TOTAL FIXED ASSETS ACQUIRED (Sum of a–d) →	2–20	$

Section IV – MATERIALS, FUELS, ELECTRICITY, AND CONTRACT WORK; MANUFACTURING PROCESSES

Item 13 – COST OF MATERIALS, FUELS, ELECTRICITY, CONTRACT WORK, ETC., DURING 1975

(If your records do not show actual amounts consumed, this may be computed by adding purchases (or receipts) during the year to opening inventory and subtracting closing inventory. Purchase records instead of consumption records may be used for any major materials, if purchases closely approximate consumption, and for all minor materials and supply items.)

Type of cost (A)	Key (B)	Delivered cost at plant (Omit cents) (C)
a. Materials, parts, components, containers, supplies, etc., consumed (Should be same as Item 16, line 7)	4–9	$
b. Products bought and resold without further manufacture	4–10	
c. Fuels consumed (Same as Item 15f)	4–11	
d. Purchased electricity (Same as Item 14a)	4–12	
e. Cost of repair and maintenance services provided by others on manufacturing plant or machinery	4–13	
f. Cost of manufacturing contract work done for you by others on your materials (Exclude payments to homeworkers)	4–14	
g. Payments to homeworkers	4–15	
h. TOTAL COST (Sum of a–g) →	4–16	$

Item 14 – ELECTRICITY PURCHASED, GENERATED, AND SOLD IN 1975

(Report all electricity purchased, generated, and sold during 1975, in each case reporting the quantity in thousands of kilowatt hours.)

Electricity (A)	Key (B)	Quantity (Thous. kilo. hrs.) (C)	Key (D)	Value (Omit cents) (E)
a. Purchased (Same as Item 13d)	2–11		2–14	$
b. Generated in this establishment, whether for own use or for sale	2–12			
c. Sold or transferred to other establishments	2–13		2–15	$

Item 15 – FUELS CONSUMED IN 1975

Description (A)	Key (B)	Quantity (C)	Key (D)	Delivered cost at plant (Omit cents) (E)
a. Coal (Short ton)	3–1		3–5	$
b. Fuel oil (Barrels [42 gallons])	3–2		3–6	
c. Gas-natural, manufactured and mixed (1,000 cubic feet)	3–3		3–7	
d. Gasoline (1,000 gallons)	3–4		3–8	
e. Other fuels – wood, coke, liquified petroleum gas, etc.			3–9	
f. TOTAL FUELS (Same as Item 13c) →			3–10	$

Item 16 – QUANTITY AND COST OF PRINCIPAL MATERIALS CONSUMED IN 1975

(Enter on line 7 the total cost of materials, parts, components, containers, supplies, etc., consumed during 1975 (same as Item 13a). Then refer to the accompanying Materials Reference List and use it as a guide to determine the appropriate entries in column (B) below. Enter in column (C) the designated material code for the materials category selected from the list and the physical unit of measure as specified on the list in column (D). Then proceed to complete columns (E) and (F) with the quantity and cost of the material used during 1975.)

Line No. (A)	Description of material (B)	Key 5 / 3–1 Material code (C)	Unit of measure (D)	3–2 Quantity used (E)	3–3 Delivered cost at plant (Omit cents) (F)
1					$
2					
3					
4					
5					
6	Other materials, supplies, etc., consumed (Difference between line 7 and the sum of lines 1–5)	950			
7	TOTAL COST OF MATERIALS, PARTS, COMPONENTS, CONTAINERS, SUPPLIES, ETC., CONSUMED (Should be same as Item 13a) →	970			$

Item 17 – MANUFACTURING PROCESSES EMPLOYED IN 1975

(Describe briefly, in the space provided below, the principal processes used in producing the articles made by this establishment. For each process shown, be sure to indicate whenever hand processes are used. (Examples of such descriptions would include: stemming and drying cigar leaf tobacco (hand); weaving wool yarn for carpets; upholstering wood household furniture (hand); bottling carbonated beverages; knitting cotton yarn into gloves and sweaters (hand).)

FORM ECP-1 (8-30-75)

Please continue on page 3

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Exhibit III-4-1. CENSUS OF MANUFACTURES, ECP-1 (LONG FORM)--Continued

Page 3 — 1975 CENSUS OF MANUFACTURES – Continued

Section V – SHIPMENTS AND RECEIPTS

Item 18 – PRODUCTS, CONTRACT WORK, AND MISCELLANEOUS RECEIPTS OF THIS ESTABLISHMENT

(Enter below, on line 15, the value of shipments and receipts of this establishment in 1975 from products manufactured, services, and other receipts. Refer to the accompanying Product Reference List to obtain the product code numbers to be entered in column (C) and the appropriate unit of measure (if any) for column (D). The list also serves as a guide to your description, in column (B), of the products manufactured in this establishment in 1975. Use a separate line for each product manufactured and enter in columns (E) and (F) the corresponding quantity and value of such products. The value figures shown in column (F) should represent the factory price f.o.b. the manufacturing plant, net of discounts and allowances, and excluding sales and excise taxes as well as transportation charges to the purchaser or user. Receipts for contract work and miscellaneous receipts (except resales) should be reported, separately from the value of products manufactured, on lines 10–13. Report resales (products bought and resold without further manufacture or processing in this establishment) on line 14. Report transfers of products to other establishments of your company at estimated market value. Include products made elsewhere for this establishment on a contract basis from materials supplied by this establishment.)

Line No. (A)		Description (B)	Key 6 / 6–1 Product code (C)	6–2 Shipments and interplant transfers: Unit of measure (D)	Quantity (E)	6–3 Value f.o.b. mill or plant (Omit cents) (F)
1	a. PRODUCTS MADE IN THIS ESTABLISHMENT (Use a separate line for each product. If you make more than 8 products, show the 8 principal ones and group the others on line 9.)					$
2						
3						
4						
5						
6						
7						
8						
9		All other products *(Specify kind(s))*	92000			
		FOR NSO USE ONLY	93000			
10	b. CONTRACT WORK	Receipts for manufacturing work done for others on their materials *(Describe products worked on and kind of work done)*	94000			
11	c. MISCELLANEOUS RECEIPTS	Receipts for repair and installation work done for others	96500			
12		Sales of scrap and refuse	96700			
13		Other miscellaneous receipts *(Exclude the value of electricity sold or transferred, which will be included in item 14c)*	96900			
14	d. RESALES	Sales of products bought and resold without further manufacture, processing, or assembly in this establishment	98000			
15	e. TOTAL VALUE OF SHIPMENTS AND RECEIPTS *(Sum of lines 1–14)* ——→		99000			$

Section VI – ACCURACY CHECKS AND CERTIFICATION OF THIS REPORT

Item 19 – CHECKS TO ASSURE A COMPLETE AND ACCURATE REPORT

The National Statistical Office reviews your report for omissions, inconsistencies, and unusual ratios. To save you future correspondence about these problems, please make the following checks before returning your report:

(1) Review the report carefully to see that no items are omitted for the year being covered.
(2) Calculate and enter figures for the four "reasonableness" checks below, and review the results.
(3) Correct your report for any errors you find and explain unusual figures in "Remarks."

For most manufacturing establishments, the figures computed usually fall within the ranges indicated.

"Reasonableness" checks (A)	Calculations required for each check (B)	Figures for survey year (C)	Usual range (D)
a. Average daily wages per production worker	Item 7a (Production workers' wages) ÷ item 10e (Total man-days)	$	$15–80
b. Days worked per year per production worker	Item 10e (Total man-days) ÷ item 8f, column (C) (Average number of production workers)	Days	120–360
c. Salaries and wages per dollar of shipments	Item 7c (Total payroll) ÷ item 18e (Total value of shipments)	¢	05¢–95¢
d. Materials cost per dollar of shipments	Item 13h (Total materials cost) ÷ item 18e (Total value of shipments)	¢	05¢–95¢

e. Is the total for Value of Shipments (item 18e) greater than the sum for Payroll (item 7c) plus total Cost of materials, etc. (item 13h)? ..... ☐ YES ☐ NO *(Explain in "Remarks")*

Remarks

Item 20 CONTACT	Name of person to contact regarding this report	Address	Telephone number
Item 21 CERTIFICATION	This report is substantially accurate and covers the period – From / To	Signature of authorized official; Title	Date

Form ECP-1 (6-30-75)

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Exhibit III-4-1. CENSUS OF MANUFACTURES, ESP-1 (LONG FORM)--Continued

INSTRUCTIONS FOR COMPLETING THE 1975 CENSUS OF MANUFACTURES FORM

GENERAL INSTRUCTIONS

For purposes of the Census, a manufacturing establishment is defined as a single physical location where manufacturing operations are performed (e.g., a factory, mill, or plant). Thus a separate report is required for different physical locations even though the establishments may be engaged in the same line of manufacturing. A report is required for each location which your company operated in 1975.

Please note that establishments engaged in the following activities are also considered to be manufacturing for the purposes of this Census: Poultry dressing; milk pasteurizing and bottling; seafood, fresh, packaged, or frozen; apparel jobbing and contracting; logging camps and logging; sawmills; printing; publishing -- book, magazine, periodical, etc.; manufacturing and delivering ready-mixed concrete; machine shops, including those operating on a job order basis; job casting, stamping, machining; plating, galvanizing, polishing materials owned by others, etc.; ship and boat repairing.

In completing this report, a limited amount of prorating or estimating is acceptable if book records are not readily available. Include all the activities conducted within the establishment: e.g., manufacturing, fabricating, processing, and assembling; maintenance of plant and equipment; receiving, shipping, warehousing, storage; research; recordkeeping; health, safety, cafeteria, and other services.

Each report should cover the calendar year 1975. However, a report is required even if the establishment operated only part of the year. If your book records are not on a calendar year basis, carefully prepared estimates will be acceptable. If reporting on a calendar year basis will require considerable additional costs, and your fiscal year covers at least 9 months of the calendar year 1975 (i.e., ends between September 30, 1975 and March 31, 1976) you may report on a fiscal year basis. However, all employment, payroll, and man-day figures should relate to the calendar year rather than the fiscal year.

In the certification, enter the exact dates of the period covered by the report. If the ownership changed during the year, complete the report only for that part of 1975 which your company owned and operated the establishment. Report in item 5 the appropriate information on changes in ownership or operations.

SPECIFIC ITEMS

▶ **Items 1-5.** SEE INSTRUCTIONS ON FORM.

Items 6 and 8. PERSONS ENGAGED (Exclude homeworkers)

Working proprietors and active partners -- All individual proprietors and partners who are actively engaged in the work of the establishment. Managers and directors working for pay should be reported with "All other employees."

Unpaid family and other unpaid workers -- Members of the family and other persons (living in the household of any of the proprietors) working at least one-third of the normal working time without regular pay for the work done.

Production workers (operatives) -- Workers (up through the working foreman level) engaged in fabricating, processing, assembling, inspection, receiving, storage, handling, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial, watchmen services, product development, auxiliary production for plant's own use (e.g., power plant), record keeping, and other services closely associated with these production operations. Exclude supervisory employees above working foreman level.

All other employees -- Administrative, technical, clerical, and all other paid employees, except operatives. Examples are salaried managers and directors, research workers, clerks, typists, bookkeepers, administrative supervisors, salesmen, etc.

▶ **Item 7. PAYROLLS**

Include all payments, whether in cash or in kind, made by the employer in connection with work done, to production workers (operatives), and to all other employees (see definition above). Exclude payments made to homeworkers, which should be included in item 13g. Include all salaries, wages, commissions, bonuses, cost-of-living allowances, paid vacation and paid sick leave, employee contributions to social insurance and taxes, and the value of payments in kind, such as goods, lodging, food, and clothing. Do not include contributions to social insurance paid by the employer, nor pension payments.

▶ **Item 8. SUPPLEMENTAL LABOR COST NOT INCLUDED IN PAYROLLS**

Legally required (including social insurance) -- Report payments for programs required under National (Providencia) or provincial legislation such as social insurance, unemployment compensation, workmen's compensation.

Payments for voluntary programs -- Include all programs not specifically required by legislation whether initiated by the employer or established as a result of a labor contract. For programs financed jointly by employer and employee contributions, include only the employer payments. Include employer payments for (a) insurance premiums on hospital and medical plans; (b) life insurance premiums; and (c) premiums on supplementary accident and sickness insurance. In reporting payments for insurance, report net payments, i.e., gross payments less any offsetting dividends, refunds or other reduction in premiums.

Include also payments or allocations: (a) on all pension plans regardless of method of administration, (b) on supplemental unemployment compensation plans, (c) on welfare plans, (d) on stock purchase plans, and (e) on deferred profit-sharing plans.

Exclude expenditures not of the type listed above such as losses on company operated cafeterias and snack bars, cost of in-plant medical services, cost of free parking lots, discounts on employee purchases, cost of uniforms and other work clothing supplied to employees, and similar expenditures.

▶ **Item 10.** SEE INSTRUCTIONS ON FORM.

▶ **Item 11. INVENTORIES OF THIS ESTABLISHMENT**

Inventories should be reported at approximate current costs, if feasible; otherwise at book values. It is important that inventories be reported on a comparable basis at the beginning and end of the year.

▶ **Item 12. ACQUISITION OF FIXED ASSETS DURING YEAR (Exclude land)**

Include all cost actually incurred during 1975 chargeable to the fixed assets (capital) accounts and of the type for which depreciation or amortization accounts are ordinarily maintained. (These are physical assets expected to have a productive life of more than one year.)

▶ **Item 12a. NEW STRUCTURES AND NEW ADDITIONS TO THIS ESTABLISHMENT (Exclude land)**

Report total cost during the year for new construction, major alterations, capitalized repairs, and improvement of buildings (whether purchased from others or done by your own labor force). Include all new elevators, cranes, heating and ventilating equipment essentially a part of the buildings, other fixed structures (such as blast furnaces, brick kilns, fractionating towers, shipways, and similar types of structures), and site improvements (such as roads, docks, tracks, parking lots, fences, utilities).

▶ **Item 12b. NEW MACHINERY AND NEW EQUIPMENT (Include transport equipment)**

Report total cost at this establishment for new production machinery and equipment and other new machinery and equipment (whether purchased from others or made by your own employees). Include replacements as well as additions to capacity. Include all new motors, lathes, punch presses and similar machinery and equipment for use in production, as well as all new office machines and fixtures, furniture, cafeteria and dressing room furnishings, automobiles and trucks, and other similar equipment. Report value of capitalized improvement and repairs to machinery and equipment. Include all newly imported machinery and equipment whether or not they were used before being imported.

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▶ **Item 12c. USED STRUCTURES**

Report total expenditures at this establishment for old or existing structures acquired from others.

▶ **Item 12d. USED MACHINERY AND EQUIPMENT**

Report second-hand equipment acquired from others. Include at approximate market value machinery or equipment transferred from other plants of your company.

▶ **Item 13. COST OF MATERIALS, FUELS, ELECTRICITY, ETC.**

Report total cost of the materials, parts, components, etc., actually consumed or put into production during the year.

Cost is delivered cost -- i.e., the amount paid or payable after discounts and including freight and other direct charges incurred by the establishment in acquiring the materials.

Include all materials, etc., received for consumption; i.e., purchases from other companies, transfers from other establishments of your own company, withdrawals from inventories. Report materials, etc., received from other establishments of your company at estimated market value.

If the establishment produces items subsequently consumed in further production, report cost of original materials consumed only.

▶ **Item 13a. COST OF MATERIALS, PARTS, COMPONENTS, CONTAINERS, ETC., CONSUMED**

The delivered cost figures should cover all raw materials, containers, scrap, supplies, etc., which were: (1) put into production, (2) used as operating supplies, (3) used in repair and maintenance. Item 13a should be consistent with the data in item 16.

Include all raw materials, such as sugar cane, yarn, cloth; all parts and components, such as buttons, zippers; all containers, such as sacks, cartons, cans; and all supplies, such as needles, lubricants, nails, etc. For materials, parts, etc., transferred from other establishments of this company, report the approximate commercial value as received.

Include also cost of materials owned by you but consumed by other companies to make products for your establishment under contract. (The value of these products should be reported in item 18.) Amounts paid to other companies for such contract work should be reported on line 13f and should include freight in and out.

Exclude materials, supplies, machinery, and equipment which were used in the construction of new structures or additions to your plant, or new machinery and equipment, and which are chargeable to fixed assets accounts. Exclude products purchased and resold without further manufacture or processing or assembly; their cost should be included in item 13b.

▶ **Item 13b. COST OF PRODUCTS BOUGHT AND RESOLD**

Report the cost of all products bought and resold in the same condition as when purchased and not made part of another product manufactured by this establishment. (Total sales value of all products resold is to be reported in item 18 on the line for resales.)

▶ **Item 13c. COST OF FUELS CONSUMED**

Report the total amount actually paid or payable during the year for all fuels consumed for heat, power, transportation, or the generation of electricity. Do not include the estimated cost of fuels, such as sawdust or blast furnace gas, produced as a by-product of your manufacturing activities.

▶ **Item 13d. COST OF PURCHASED ELECTRICITY**

Report the total amount actually paid or payable for electric energy purchased during the year from other companies, or received from other establishments of your company. Exclude the value of electricity generated and used at this establishment.

▶ **Item 13e.** SEE FORM.

▶ **Item 13f. COST OF MANUFACTURING CONTRACT WORK DONE FOR YOU BY OTHERS ON YOUR MATERIALS (Exclude payments to homeworkers)**

If any contract work was done by others on materials furnished by your establishment, report the total payments made during the year for such work, including freight out and in. Exclude the cost of materials worked on, which should be included in item 13a.

▶ **Item 13g. PAYMENTS TO HOMEWORKERS**

Report payments to persons living in households performing manufacturing work on your materials.

▶ **Item 14. ELECTRICITY PURCHASED, GENERATED, AND SOLD**

Items 14a and 14c are self-explanatory. Electricity generated in this establishment (item 14b) should be a gross quantity (for own use and for sale) less generating station use.

▶ **Item 15. FUELS CONSUMED**

See instructions for items 13 and 13c. Do not include: (1) fuels produced and consumed in this establishment or (2) fuels purchased as raw materials to be reported under items 13a and 16, or (3) fuels converted to other fuel forms.

In item 15a include all forms of coal (anthracite, bituminous, and lignite).

In item 15b include all grades of fuel oil (distillate and residual), diesel type fuel oil, gas-enrichment oil, etc.

▶ **Items 16-21.** SEE INSTRUCTIONS ON FORM.

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Exhibit III-4-2. CENSUS OF MANUFACTURES, ECP-101 (SHORT FORM)

PENALTY FOR FAILURE TO REPORT **DUE DATE:**

Form **ECP-101** NATIONAL STATISTICAL OFFICE PROVIDENCIA

1975 CENSUS OF MANUFACTURES

NOTICE – Response to this inquiry is required by law. By the same law, your report to the National Statistical Office is confidential. It may be seen only by sworn NSO employees and may be used only for statistical purposes.

FOR NSO USE ONLY	Location and identification: Prov.	County	Register No.	Ward	Activity	F/O	TEP size
	1 2	3 4	5 6 7 8 9	10 11	12 13 14 15	16	17

Please complete and return this form as soon as possible to: National Statistical Office, Estrella City, Providencia

In correspondence pertaining to this report, please refer to this File number

(Please correct any errors in name or address)

GENERAL INSTRUCTIONS

If book figures are not available, carefully prepared estimates are acceptable. Complete every item, entering "0" where applicable. Omit cents when reporting dollar values.

For purposes of this Census, a manufacturing establishment is defined as a single physical location where manufacturing operations are performed (e.g., a factory, mill, or plant).

Section I – DESCRIPTION OF ESTABLISHMENT

Item 1 – NAME OF ESTABLISHMENT (factory, plant, or mill) COVERED BY THIS REPORT

Item 2 – PHYSICAL LOCATION OF ESTABLISHMENT
(Be sure your answer relates to the actual PHYSICAL LOCATION of this establishment, which may be different than the mailing address.)

Street and number *(If location cannot be described by street and number, give as much information as possible such as street intersection, name (and number, if any) of road or highway, and distance from nearest city, town, or village.)*

City, town or village

Ward	County	Province

Item 3 – Not applicable to this form.

Item 4 – FORM OF OWNERSHIP AND LEGAL ORGANIZATION

a. What is the form of ownership of this establishment? *(Mark (X) one box)*

1 ☐ Government enterprise
2 ☐ Private enterprise

b. If "Private enterprise" is marked, what is the legal form of organization? *(Mark (X) one box)*

1 ☐ Individual proprietor
2 ☐ Partnership
3 ☐ Corporation or joint stock company
4 ☐ Cooperative association (corporate or noncorporate)
5 ☐ Other *(Specify)* _____

Item 5 – PERIOD OF OPERATION DURING 1975 AND CHANGE OF OWNERSHIP (IF ANY)

a. Period of operation during 1975
(Mark (X) one box and enter information as appropriate)

1 ☐ Operated throughout the year
2 ☐ Operated only part of the year → *(Enter number of months)*
3 ☐ Establishment was idle throughout the year

b. Change in ownership

Was this establishment purchased or sold by you during 1975?
(If Yes, mark (X) one box and enter information as appropriate. If No – Skip to Item 6.)

1 ☐ Purchased by you during *(Enter month)* →
2 ☐ Sold by you during *(Enter month)* →

NOTE *If box "1" is marked, give former owner's name and address below. If box "2" is marked, give purchaser's name and address below.*

Name

Address *(Street and number)*

Ward	County	Province

Section II – NUMBER OF PERSONS ENGAGED AND PAYROLLS

INSTRUCTIONS FOR ITEMS 6 AND 7

PERSONS ENGAGED (exclude homeworkers)

Working proprietors and active partners – Persons who manage or participate in the management of the establishment. Managers and directors working for pay should be reported with "All other employees."

Unpaid family and other unpaid workers – Members of the family and other persons working at least one-third of the normal working time without regular pay for the work done.

Production workers (operatives) – Workers (up through the working foreman level) engaged in fabricating, processing, assembling, inspection, receiving, storage, handling, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial, watchman services, product development, auxiliary production for plant's own use (e.g., power plant), record keeping, and other services closely associated with these production operations. Exclude supervisory employees above working foreman level.

All other employees – Administrative, technical, clerical, and all other paid employees, except operatives. Examples are salaried managers and directors, research workers, clerks, typists, bookkeepers, administrative supervisors, salesmen, etc.

PAYROLLS

Include all payments, whether in cash or in kind, made by the employer in connection with work done, to production workers (operatives), and to all other employees (see definitions above). **Exclude** payments made to homeworkers, which should be reported in item 13c. Include all salaries, wages, commissions, bonuses, cost-of-living allowances, paid vacation and paid sick leave, employee contribution to social insurance and taxes, and the value of payments in kind, such as goods, lodging, food, and clothing. Do not include contributions to social insurance paid by the employer, nor pension payments.

Item 6 – PERSONS ENGAGED AND PAYROLL DURING THE WEEK ENDED NEAREST NOVEMBER 15, 1975

(Enter the number of different persons engaged and payroll during the week ended nearest November 15, 1975. If payroll is for period other than a week, adjust figures to a 1-week basis.)

Type of person engaged (A)	Key (B)	Total number (C)	Key (D)	Number of males (E)	Key (F)	Number of females (G)	Key (H)	Weekly payroll (Omit cents) (I)
a. Working proprietors and active partners	9–1		9–2		9–3			
b. Unpaid family and other unpaid workers	9–4		9–5		9–6			
c. Production workers (operatives)	9–7		9–8		9–9		9–10	$
d. All other employees	9–11		9–12		9–13		9–14	
e. TOTAL (Sum of a–d) →	9–15		9–16		9–17		9–18	$

Item 7 – PAYROLLS DURING 1975 6–1

Type of employee (A)	Key (B)	Weekly payroll (Omit cents) (C)
a. Production workers (operatives)	9–19	$
b. All other employees	9–20	
c. TOTAL PAYROLL (Sum of a and b) →	9–21	$

Item 8 – Not applicable to this form.

Item 9 – Not applicable to this form.

Item 10 – Not applicable to this form.

Please continue on page 2

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Exhibit III-4-2. CENSUS OF MANUFACTURES, ECP-101 (SHORT FORM)--Continued

Page 2

Section III – Not applicable to this form.

Section IV – MATERIALS, FUELS, ELECTRICITY, AND CONTRACT WORK; MANUFACTURING PROCESSES

Item 13 – COST OF MATERIALS, FUELS, ELECTRICITY, CONTRACT WORK, ETC., DURING 1975 8–9

INSTRUCTIONS

Cost of materials, fuels, etc. – "Cost" refers to the amounts actually paid or payable after discounts, and includes freight and other direct charges incurred in acquiring the items. Report the cost of all items actually consumed or put into production in 1975 whether purchased, withdrawn from inventories, or received from other establishments of this company.

On line a, include all raw materials such as sugar cane, yarn, cloth; all parts and components, such as buttons, zippers, all containers, such as sacks, cartons, cans; and all supplies, such as needles, lubricants, nails, etc. For materials, parts, etc., transferred from other establishments of this company, report the approximate commercial value as received.

If your records do not show actual amounts consumed, this may be computed by adding purchases (or receipts) during the year to opening inventory and subtracting closing inventory. Purchase records instead of consumption records may be used for any major material, if purchases closely approximate consumption. The same is true for all minor materials and supply items.

Type of cost (A)	Key (B)	Delivered cost at plant (Omit cents) (C)
a. Materials, containers, supplies, fuels, and electricity consumed *(Include products bought and resold without further manufacture)*	9–22	$
b. Cost of work done for you by others on your materials *(Exclude payments to homeworkers)*	9–23	
c. Payments to homeworkers	9–24	
d. TOTAL COST *(Sum of a–c)* →	9–25	$

Item 14 – Not applicable to this form.

Item 15 – Not applicable to this form.

Item 16 – Not applicable to this form.

Item 17 – MANUFACTURING PROCESSES EMPLOYED IN 1975

(Describe briefly, in the space provided below, the principal processes used in producing the articles made by this establishment. For each process shown, be sure to indicate whenever hand processes are used. (Examples of such descriptions would include: steaming and drying cigar leaf tobacco (hand); weaving wool yarn for carpets; upholstering wood household furniture (hand); bottling carbonated beverages; knitting cotton yarn into gloves and sweaters (hand).)

Section V – SHIPMENTS AND RECEIPTS

Item 18 – VALUE OF SHIPMENTS AND RECEIPTS OF THIS ESTABLISHMENT DURING 1975 8–11 8–12

(Enter below in the space provided on line 9, the total value of shipments and receipts of this establishment in 1975 from products manufactured, services, and other receipts. Use a separate line for each product manufactured and enter in column (D) the corresponding value of such products. The value figure should represent the factory price f.o.b. the manufacturing plant net of discounts and allowances, and excluding sales and excise taxes as well as transportation charges to the purchaser. Receipts for contract work and miscellaneous receipts (except resales) should be reported separately from the value of products manufactured on lines 6 and 7. Report resales (products bought and resold without further manufacture or processing in this establishment) on line 8.)

Line No. (A)		Description (B)	Key 7–1 Product code (C)	7–2 Value of shipments f.o.b. mill or plant (Omit cents) (D)
1	a. PRODUCTS MADE IN THIS ESTABLISHMENT *(Use a separate line for each product. If you make more than 4 products, show separately the 4 principal ones and group all others on line 5.)*			$
2				
3				
4				
5		All other products *(Specify kind)*	92000	
		FOR NSO USE ONLY	93000	
6	b. CONTRACT WORK	Receipts for manufacturing work done for others on their materials *(Describe products worked on and kind of work done)*	94000	
7	c. MISCELLANEOUS RECEIPTS	Receipts for repair and installation work done for others, sales of scrap and refuse, and other miscellaneous receipts	96000	
8	d. RESALES	Sales of products bought and resold without further manufacture, processing, or assembly in this establishment	98000	
9	e. TOTAL VALUE OF SHIPMENTS AND RECEIPTS *(Sum of lines 1–8)* →		99000	$

Item 19 – Not applicable to this form.

Item 20 CONTACT	Name of person to contact regarding this report	Address	Telephone number
Item 21 CERTIFICATION	This report is substantially accurate and covers the period –	Signature of authorized official	
	From / To	Title	Date

FORM ECP-101 (6-30-75)

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Exhibit III-4-3. CENSUS OF MINERAL INDUSTRIES, ECP-2 (LONG FORM)

PENALTY FOR FAILURE TO REPORT — **DUE DATE:**

FORM ECP-2 — NATIONAL STATISTICAL OFFICE, PROVIDENCIA

1975 CENSUS OF MINERAL INDUSTRIES

NOTICE – Response to this inquiry is required by law. By the same law, your report to the National Statistical Office is confidential. It may be seen only by sworn NSO employees and may be used only for statistical purposes.

FOR NSO USE ONLY	Location and identification: Prov. (1–2)	County (3–4)	Register No. (5–9)	Ward (10–11)	Activity (12–15)	F/O (16)	TEP size (17)

Please complete and return this form as soon as possible to: National Statistical Office, Estrella City, Providencia

In correspondence pertaining to this report, please refer to this file number.

PLEASE READ ACCOMPANYING INSTRUCTION SHEET AND INSTRUCTIONS WITH EACH ITEM BEFORE COMPLETING

If book figures are not available, carefully prepared estimates are acceptable. Complete every item, entering "0" where applicable. Omit cents when reporting dollar values.

For purposes of this Census, a mineral establishment is defined as a single physical location where mineral operations are conducted, e.g., a mine, group of oil or gas wells, preparation plant, or natural gas liquids plant.

An oil or gas field mineral establishment covers all oil and gas field activities in one Province operated by the reporting company.

(Please correct any errors in name or address)

Section I – DESCRIPTION OF ESTABLISHMENT

Item 1 – NAME OF ESTABLISHMENT (or operating company)
(In the case of oil and gas operations and mineral contract services, give name of operating company.)

Item 2 – PHYSICAL LOCATION OF ESTABLISHMENT (or operation)
(Be sure your answer relates to the actual PHYSICAL LOCATION of this establishment, which may be different from the mailing address.)

Street and number *(If location cannot be described by street and number, give as much information as possible such as street intersection, name (and number, if any) of road or highway, and distance from nearest city, town or village.)*

City, town or village

Ward | County | Province

Oil and gas and mining services companies should list Province in which properties are located or services performed in 1975.

Item 3 – ECONOMIC ORGANIZATION OF THIS ESTABLISHMENT
(Mark (X) one box and enter information as appropriate)

1 ☐ Single establishment – does not own or control another establishment
2 ☐ Head office – owns or controls other establishments
3 ☐ Subsidiary establishment – owned or controlled by another establishment

If box "3" is marked, give name and address of head office: Name of head office; Address *(Street and number)*; Ward | County | Province

Item 4 – FORM OF OWNERSHIP AND LEGAL ORGANIZATION

a. What is the form of ownership of this establishment?
(Mark (X) one box)
1 ☐ Government enterprise
2 ☐ Private enterprise

b. If "Private enterprise" is marked, what is the legal form of organization?
(Mark (X) one box)
1 ☐ Individual proprietor
2 ☐ Partnership
3 ☐ Corporation or joint stock company
4 ☐ Cooperative association (corporate or noncorporate)
5 ☐ Other *(Specify)* _____

Item 5 – PERIOD OF OPERATION DURING 1975 AND CHANGE OF OWNERSHIP (IF ANY)

a. Period of operation during 1975
(Mark (X) one box and enter information as appropriate)
1 ☐ Operated throughout the year
2 ☐ Operated only part of the year *(Enter number of months)* → ☐☐
☐ No minerals produced during 1975 *(Mark (X) one reason)*
3 ☐ Idle 4 ☐ Exhausted 5 ☐ Development and exploration only

b. Change in ownership
Was this establishment purchased or sold by you during 1975?
(If Yes, mark (X) one box and enter information as appropriate. If No – Skip to Item 6.)
1 ☐ Purchased by you during *(Enter month)* → ☐☐
2 ☐ Sold by you during *(Enter month)* → ☐☐

NOTE: *If box "1" is marked, give former owner's name and address below. If box "2" is marked, give purchaser's name and address below.*

Name
Address *(Street and number)*
Ward | County | Province

Section II – NUMBER OF PERSONS ENGAGED, LABOR COST, AND MAN-DAYS WORKED

Item 6 – PERSONS ENGAGED AND PAYROLL DURING THE WEEK ENDED NEAREST NOVEMBER 15, 1975
(Enter the number of different persons engaged and payroll during the week ended nearest November 15, 1975. If payroll is for period other than a week, adjust figures to a 7-week basis.)

Type of person engaged (A)	Key (B)	Number of persons engaged (C)	Key (D)	Weekly payroll (Omit cents) (E)
a. Working proprietors and active partners	1–1			
b. Unpaid family and other unpaid workers	1–2			
c. Production, development and exploration workers	1–3		1–6	$
d. All other employees	1–4		1–7	
e. TOTAL *(Sum of a–d)* →	1–5		1–8	$

Item 7 – PAYROLLS DURING 1975 — 6–1

Type of employee (A)	Key (B)	Annual payroll 1975 (Omit cents) (C)
a. Production, development and exploration workers	1–8	$
b. All other employees	1–10	
c. TOTAL PAYROLL *(Sum of a and b)* →	1–11	$

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1–5	1–12	SUM	1–3	DIFF	TEP

Item 8 – PRODUCTION, DEVELOPMENT AND EXPLORATION WORKERS EMPLOYED, QUARTERLY, 1975 — 6–2

Production, development and exploration workers during the pay period ended nearest the 15th.

Pay period (A)	Key (B)	Total number (C)	Key (D)	Number of males (E)	Key (F)	Number of females (G)
a. February 1975						
b. May 1975						
c. August 1975						
d. November 1975						
e. TOTAL *(Sum of lines a–d)* →						
f. AVERAGE NUMBER *(Divide sum on line e by 4)* →	1–12		1–13		1–14	

Item 9 – SUPPLEMENTAL LABOR COST (1975) NOT INCLUDED IN ITEM 7 — 6–3

Labor cost (A)	Key (B)	Annual cost 1975 (Omit cents) (C)
a. Legally required, including social insurance	1–15	$
b. Payments for voluntary programs	1–16	$

Item 10 – MAN-DAYS OF PRODUCTION, DEVELOPMENT AND EXPLORATION WORKERS BY QUARTERS 1975 — 6–4

(For each calendar quarter (or comparable 13-week period) of 1975, include all days actually spent at work, but exclude days spent on vacation, holidays or sick leave.)

Quarterly period (A)	Key (B)	Number of days (C)
a. January through March 1975		
b. April through June 1975		
c. July through September 1975		
d. October through December 1975		
e. TOTAL PRODUCTION, ETC., WORKER MAN-DAYS *(Sum of a–d)* →	1–17	

Please continue on page 2

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Exhibit III-4-3. CENSUS OF MINERAL INDUSTRIES, ECP-2 (LONG FORM)--Continued

Page 2

Section III – INVENTORIES AND ACQUISITION OF FIXED ASSETS

Item 11 – Not applicable to this form.

Item 12 – ACQUISITION OF NEW AND USED FIXED ASSETS 5-4

Type of asset (A)	Key (B)	Cost incurred during 1975 (Omit cents) (C)
a. New structures and additions to this establishment (including development and exploration of mineral property) – exclude land	2-16	$
b. New machinery and new equipment (include transport equipment)	2-17	
c. Used structures	2-18	
d. Used machinery and used equipment	2-19	
e. TOTAL FIXED ASSETS ACQUIRED *(Sum of a–d)* →	2-20	$

Section IV – SUPPLIES, FUELS, ELECTRICITY, CONTRACT WORK AND MACHINERY; TYPE OF OPERATION

Item 13 – COST OF PURCHASED SUPPLIES, FUELS, ELECTRICITY, CONTRACT WORK AND MACHINERY IN 1975 5-7

(Include all such items (i.e., supplies, machinery, fuels, etc.) charged to both current and capital accounts. (Costs charged to capital accounts should also be included in Item 12.) Report the cost of all items actually used or processed in 1975, whether purchased, withdrawn from inventories, or received from other establishments of this company. If your records do not show actual amounts used or processed, this may be computed by adding purchases (or receipts) during the year to opening inventory and subtracting closing inventory. Purchase records instead of consumption records may be used for any major item, if purchases closely approximate consumption, and for all minor items.)

Type of cost (A)	Key (B)	Delivered cost (Omit cents) (C)
a. Purchased supplies used and minerals received for preparation *(Should be same as item 16, line 7)*	4-9	$
b. Purchased fuels used *(Report total delivered cost) (Same as item 15f)*	4-11	
c. Purchased electricity *(Same as item 14a)*	4-12	
d. Cost of repair and maintenance services provided by others	4-13	
e. Contract work done for you by others	4-14	
f. TOTAL COST, EXCLUDING PURCHASED MACHINERY *(Sum of a–e)* →	4-16	$
g. Purchased machinery installed for your own use (include all new and used machinery, equipment and parts not included above)	4-17	$

Item 14 – ELECTRICITY PURCHASED, GENERATED AND SOLD IN 1975 5-8

(Report all electricity purchased, generated and sold during 1975, in each case reporting the value in dollars and the quantity in thousands of kilowatt hours.)

Description (A)	Key (B)	Quantity (Thous. kilo. hrs.) (C)	Key (D)	Value (Omit cents) (E)
a. Electricity purchased *(Same as item 13c)*	2-11		2-14	$
b. Electricity generated in this establishment, whether for own use or for sale	2-12			
c. Electricity sold or transferred to other establishments	2-13		2-15	$

Item 15 – PURCHASED FUELS CONSUMED IN 1975 5-9

Description (A)	Key (B)	Quantity (C)	Key (D)	Delivered cost at plant (Omit cents) (E)
a. Coal *(Short ton)*	3-1		3-5	$
b. Fuel oil *(Barrels (42 gallons))*	3-2		3-6	
c. Gas-natural, manufactured and mixed *(1,000 cubic feet)*	3-3		3-7	
d. Gasoline *(1,000 gallons)*	3-4		3-8	
e. Other fuels – wood, coke, liquified petroleum gas, etc			3-9	
f. TOTAL FUELS *(Same as item 13b)* →			3-10	$

Item 16 – PRINCIPAL MINERALS RECEIVED FOR TREATMENT AND SUPPLIES USED IN 1975 5-10

(Enter on line 7 the total cost of minerals received for preparation and supplies used in 1975 (same as item 13a). Then refer to the accompanying Materials Reference List and use it as a guide to determine appropriate entries under column (B) of the principal minerals received for treatment and supplies used by this establishment. Enter in column (C), lines 1 to 5, the corresponding code numbers assigned in the Reference List to each item you describe in column (B). Complete entries for columns (D)–(G). Do not include minerals purchased and resold by you without further preparation or treatment. Estimate value of ores, concentrates, etc., received for treatment, milling, or other preparation on custom or toll basis.)

Line No. (A)	Description (B) Key 5	5-1 Material code (C)	Unit of measure (Specify) (D)	5-2 Received from others, including ores and minerals received for treatment on custom or toll basis, Quantity (E)	5-3 Delivered cost (Omit cents) (F)	5-4 Produced at this mine (Quantity) (G)
1					$	
2						
3						
4						
5						
6	Other minerals and supplies consumed *(Difference between line 7 and the sum of lines 1–5)*	950				
7	TOTAL COST OF MINERALS RECEIVED FOR PREPARATION AND SUPPLIES USED IN 1975 *(Should be same as item 13a)* →	970			$	

FORM ECP-2 (6-30-75)

Please continue on page 3

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Exhibit III-4-3. CENSUS OF MINERAL INDUSTRIES, ECP-2 (LONG FORM)--Continued

Page 3 — 1975 CENSUS OF MINERAL INDUSTRIES – Continued

Section IV – SUPPLIES, FUELS, ELECTRICITY, CONTRACT WORK AND MACHINERY; TYPE OF OPERATION – Continued

Item 17 – TYPE OF OPERATION IN 1975 *(Mark (X) all that apply)*

a. MINING METHODS
- 1 ☐ Open-pit mine or quarry, strip mine, or surface placer deposit
- 2 ☐ Underground mine

b. MILLING OR PREPARATION METHOD USED
- 3 ☐ No preparation (include hand-picking)
- 4 ☐ Drying
- 5 ☐ Flotation
- 6 ☐ Air separation
- 7 ☐ Calcining
- 8 ☐ Crushing, grinding, or pulverizing
- 9 ☐ Screening
- 10 ☐ Washing
- 11 ☐ Other *(Specify, i.e., dimension stone dressing)* _____

c. 12 ☐ Only engaged in exploration, development, or maintenance work in 1975

Section V – PRODUCTION AND RECEIPTS

Item 18 – PRODUCTS AND CONTRACT WORK OF THIS ESTABLISHMENT — 6–11 | 6–12

(Enter below, on line 15, the total value of production, services and other receipts of this establishment during 1975. Account for all activities of this establishment. Refer to the Product Reference List to obtain the product code numbers to be entered in column (C) and the unit of measure for column (D). The list also serves as a guide to your description in column (B) of the minerals produced by this establishment during 1975. Use a separate line for each product and account for all production of this establishment during 1975.

The value figures shown in column (F) should represent the price, f.o.b. at this mine or preparation plant, including royalty, if any. Exclude excise taxes, transportation charges to the purchaser or user, discounts and allowances. For ores valued for more than one metal, classify the ore on the basis of the principal metal contained in terms of total value of recoverable metal contained. Estimates are acceptable wherever exact figures are not available.

Report amounts received or due for work or services performed for other establishments on lines 10–14, and specify type of contract work or other service performed.)

Line No. (A)	Type of product or contract work (B)	Key & 6–1 Product code (C)	6–2 Production and interplant transfers: Unit of measure (Specify) (D)	6–2 Quantity (E)	6–3 Value f.o.b. mine or plant (Omit cents) (F)
1	a. PRODUCTS OF THIS ESTABLISHMENT *(Use a separate line for each product. If you produce more than 8 products, show the 8 principal ones and group the others on line 9.)*				$
2					
3					
4					
5					
6					
7					
8					
9	All other products *(Specify kind)*				
10	b. CONTRACT WORK — Receipts for work done for other establishments (such as hauling, stripping, shaft sinking, pumping and shop work – exclude amounts received for custom work) *(Specify kind of work done and show separately principal kinds)*				
11					
12					
13					
14					
15	c. TOTAL VALUE OF PRODUCTION AND RECEIPTS *(Sum of lines 1–14)* →	99000			$

Section VI – ACCURACY CHECKS AND CERTIFICATION OF THIS REPORT

Item 19 – CHECKS TO ASSURE A COMPLETE AND ACCURATE REPORT

The National Statistical Office reviews each establishment report for omissions, inconsistencies and unusual ratios. Incomplete answers will result in correspondence which is both costly and time consuming, so please be sure to complete every item. Reasonably accurate estimates are acceptable where book records are not readily available.

The following checks have been prepared to save you future correspondence about the "reasonableness" of your report. Please make these "reasonableness" checks before submitting your report and then correct your entries for any errors these checks may bring to light. Explain any unusual figures or ratios on reverse side of this form.

"Reasonableness" checks (A)	Calculations required for each check (B)	Figures for survey year (C)	Usual range (D)
a. Average daily wages per production, etc. worker	Item 7a (Production, etc., workers' wages) ÷ Item 10e (Total man-days)	$	$15–80
b. Days worked per year per production, etc. worker	Item 10e (Total man-days) ÷ Item 8f, column (C) (Average number of production, etc. workers)	Days	120–360
c. Salaries and wages per dollar of production	Item 7c (Total payroll) ÷ Item 18c (Total value of production)	¢	05¢–95¢
d. Average value of production per person engaged	Item 18c (Value of production) ÷ Item 6e, column (C) (Total number engaged)	$	$5,000–100,000

Item 20 CONTACT	Name of person to contact regarding this report	Address	Telephone number
Item 21 CERTIFICATION	This report is substantially accurate and covers the period –	Signature of authorized official	
	From / To	Title	Date

FORM ECP-2 (6-30-78)

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Exhibit III-4-3. CENSUS OF MINERAL INDUSTRIES, ECP-2 (LONG FORM)--Continued

INSTRUCTIONS FOR COMPLETING THE 1975 CENSUS OF MINERAL INDUSTRIES FORM

GENERAL INSTRUCTIONS

For purposes of this Census, a mineral establishment is defined as a single physical location where mineral operations are conducted, e.g., a mine, group of oil or gas wells, or preparation plant. or natural gas liquids plant.

An oil or gas field mineral establishment covers all oil and gas field activities in one Province operated by the reporting company. Offshore exploration, drilling, and production operations adjacent to each Province should be treated as a separate establishment. An offshore well is one which is bottomed at, or producing from, a point which lies seaward from the coastline.

Each establishment which performed mineral contract work for other concerns during any part of 1975 is required to submit a separate report for each Province in which such mineral contract work was done.

In completing this report, a limited amount of prorating or estimating is acceptable if book records are not readily available. Include all the activities conducted by the establishment.

Each report should cover the calendar year 1975. However, a report is required even if the establishment operated only part of the year. If your book records are not on a calendar year basis, carefully prepared estimates will be acceptable. If reporting on a calendar year basis will require considerable additional costs, and your fiscal year covers at least 9 months of the calendar year 1975 (i.e., ends between September 30, 1975 and March 31, 1976) you may report on a fiscal year basis. However, all employment, payroll, and man-day figures should relate to the calendar year rather than the fiscal year.

In the certification, enter the exact dates of the period covered by the report. If the ownership changed during the year, complete the report only for that part of 1975 which your company owned and operated the establishment. Report in item 5 the appropriate information on changes in ownership or operations.

SPECIFIC ITEMS

▶ Items 1–5. SEE INSTRUCTIONS ON FORM.

▶ Items 6 and 8. PERSONS ENGAGED (Exclude homeworkers)

Working proprietors and active partners – All individual proprietors and partners who are actively engaged in the work of the establishment. Managers and directors working for pay should be reported with "All other employees."

Unpaid family and other unpaid workers – Members of the family and other persons (living in the household of any of the proprietors) working at least one-third of the normal working time without regular pay for the work done.

Production, development, and exploration workers – Workers (up through the working formen level) engaged in manual work, using tools, operating loading equipment and other machines, hauling overburden and other materials, loading and hauling products out of mine; inspection, maintenance, repair; watchmen services, auxiliary production for own use (e.g., power plant), record keeping, and other services closely associated with the operations covered by this report. Exclude supervisory employees above working foremen level. Include workers paid on a tonnage basis. Exclude employees of subcontractors.

All other employees – Nonproduction personnel engaged in supervision above working foremen level, advertising, credit, collection, clerical and routine office functions, executive, purchasing, finance; and in legal, personnel (including cafeteria, medical, etc.), professional (engineers, geologists, etc.), and technical work. Include force-account construction employees on your payroll engaged in construction of major additions or alterations of your own facilities who are utilized as a separate work force. Workers engaged in regular maintenance and repair operations should be included with production and development workers. Exclude employees of subcontractors.

▶ Item 7. PAYROLLS

Include all payments, whether in cash or in kind, made by the employer in connection with work done, to production, development, and exploration workers, and to all other employees (see definition above). Include all salaries, wages, commissions, bonuses, cost-of-living allowances, paid vacation and paid sick leave, employee contribution to social insurance and taxes, and the value of payments in kind, such as goods, lodging, food, and clothing. Do not include contributions to social insurance paid by the employer, nor pension payments.

▶ Item 9. SUPPLEMENTAL LABOR COST NOT INCLUDED IN PAYROLLS

Legally required (including social insurance) – Report payments for programs required under National (Providencia) or provincial legislation such as social insurance, unemployment compensation, workmen's compensation.

Payments for voluntary programs – Include all programs not specifically required by legislation whether initiated by the employer or established as a result of a labor contract. For programs financed jointly by employer and employee contributions, include only the employer payments. Include employer payments for (a) insurance premiums on hospital and medical plans; (b) life insurance premiums; and (c) premiums on supplementary accident and sickness insurance. In reporting payments for insurance, report net payments, i.e., gross payments less any offsetting dividends, refunds or other reduction in premiums.

Include also payments or allocations: (a) on all pension plans regardless of method of administration, (b) on supplemental unemployment compensation plans, (c) on welfare plans, (d) on stock purchase plans, and (e) on deferred profit-sharing plans.

Exclude expenditures not of the type listed above such as losses on company operated cafeterias and snack bars, cost of in-plant medical services, cost of free parking lots, discounts on employee purchases, cost of uniforms and other work clothing supplied to employees, and similar expenditures.

▶ Item 10. SEE INSTRUCTIONS ON FORM.

▶ Item 11. NOT APPLICABLE TO THIS FORM.

▶ Item 12. ACQUISITION OF FIXED ASSETS DURING YEAR (Exclude land)

Include all cost actually incurred during 1975 chargeable to the fixed assets (capital) accounts and of the type for which depreciation, depletion, or amortization accounts are ordinarily maintained. (These are physical assets expected to have a productive life of more than one year.)

▶ Item 12a. NEW STRUCTURES AND ADDITIONS

Include expenditures for new construction, major additions, and alterations (including improvements and capitalized repairs). Include mineral development and exploration outlays which were charged to a capital account. Include machinery which is an integral part of a building, such as all new elevators and heating and ventilating equipment. Include site improvements, such as rail and other roads, docks, parking lots, utilities, etc., which represent an integral part of the facilities. Include, where capitalized, expenditures for construction by your own employees. Exclude construction of company houses, general recreation facilities, and rail and other roads outside the facilities.

▶ Item 12b. NEW MACHINERY AND NEW EQUIPMENT (Include transport equipment)

Report total expenditures for this establishment for new machinery and new equipment capitalized during 1975. Include the value of improvements and capitalized repairs to machinery and equipment. Include the value of equipment produced and used at this establishment. Include all new mining, loading, transportation, and similar equipment, as well as new office machines and fixtures, furniture, cafeteria and change-room furnishings; automobiles, trucks, and similar equipment. Include all newly imported machinery and equipment whether or not they were used before being imported.

▶ Item 12c. USED STRUCTURES

Report total expenditures at this establishment for old or existing structures acquired from others.

▶ Item 12d. USED MACHINERY AND EQUIPMENT

Report second-hand equipment acquired from others. Include at approximate market value machinery or equipment transferred from other plants of your company.

▶ Item 13. COST OF PURCHASED SUPPLIES, FUELS, ELECTRICITY, CONTRACT WORK, AND MACHINERY

Report total cost of the supplies, etc., actually consumed or put into production during the year.

Cost is delivered cost – i.e., the amount paid or payable after discounts and including freight and other direct charges incurred by the establishment in acquiring the materials.

Include all supplies, etc. received for consumption; i.e., purchases from other companies, transfers from other establishments of your own company, withdrawals from inventories. Report supplies, etc., received from other establishments of your company at estimated market value.

▶ Item 13a. PURCHASED SUPPLIES USED AND MINERALS RECEIVED FOR PREPARATION.

Include all supplies such as steel mill shapes and forms, roof bolts, lubricants, explosive materials, and blasting accessories.

▶ Item 13b. PURCHASED FUELS USED

Report the total amount actually paid or payable during the year for all purchased fuels consumed for heat, power, transportation, or the generation of electricity.

▶ Item 13c. PURCHASED ELECTRICITY

Report the total amount actually paid or payable for electric energy purchased during the year from other companies, or received from other establishments of your company. Exclude the value of electricity generated and used at this establishment.

▶ Item 13d. SEE FORM.

▶ Item 13e. CONTRACT WORK DONE FOR YOU BY OTHERS

If any contract work was done by others on minerals furnished by your establishment, report the total payments made during the year for such work, including freight out and in.

▶ Item 13f. SEE FORM.

▶ Item 13g. SEE FORM.

▶ Item 14. ELECTRICITY PURCHASED, GENERATED, AND SOLD

Items 14a and 14c are self-explanatory. Electricity generated in this establishment (item 14b) should be a gross quantity (for own use and for sale) less generating station use.

▶ Item 15. FUELS CONSUMED

See instructions for items 13 and 13b. Do not include fuels produced and consumed in this establishment.

In item 15a, include all forms of coal (anthracite, bituminous, and lignite).

In item 15b, include all grades of fuel oil (distillate and residual), diesel type fuel oil, gas-enrichment oil, etc.

▶ Items 16–21. SEE INSTRUCTIONS ON FORM.

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Exhibit III-4-4. CENSUS OF MINERAL INDUSTRIES, ECP-201 (SHORT FORM)

PENALTY FOR FAILURE TO REPORT **DUE DATE:**

FORM ECP-201 (10-20-75) — NATIONAL STATISTICAL OFFICE PROVIDENCIA

1975 CENSUS OF MINERAL INDUSTRIES

NOTICE – Response to this inquiry is required by law. By the same law, your report to the National Statistical Office is confidential. It may be seen only by sworn NSO employees and may be used only for statistical purposes.

FOR NSO USE ONLY	Location and identification											Activity				P/O	TEP also
	Prov.		County		Register No.					Ward							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Please complete and return this form as soon as possible to: National Statistical Office, Estrella City, Providencia

In correspondence pertaining to this report, please refer to this file number.

(Please correct any errors in name or address)

GENERAL INSTRUCTIONS

If book figures are not available, carefully prepared estimates are acceptable. Complete every item, entering "0" where applicable. Omit cents when reporting dollar values.

For purposes of this Census, a mineral establishment is defined as a single physical location where mineral operations are conducted; e.g., a mine, group of oil or gas wells, preparation plant, or natural gas liquids plant.

An oil or gas field mineral establishment covers all oil and gas field activities in one Province operated by the reporting company.

Section I – DESCRIPTION OF ESTABLISHMENT

Item 1 – NAME OF ESTABLISHMENT (or operating company)
(In the case of oil and gas operations and mineral contract services, give name of operating company.)

Item 2 – PHYSICAL LOCATION OF ESTABLISHMENT (or operation)
(Be sure your answer relates to the actual PHYSICAL LOCATION of this establishment, which may be different from the mailing address.)

Street and number *(If location cannot be described by street and number, give as much information as possible such as street intersection, name (and number, if any) of road or highway, and distance from nearest city, town, or village.)*

City, town or village

Ward | County | Province

Oil and gas mining services companies should list Province in which properties are located or services performed in 1975.

Item 3 – Not applicable to this form.

Item 4 – FORM OF OWNERSHIP AND LEGAL ORGANIZATION

a. What is the form of ownership of this establishment? *(Mark (X) one box)*
- 1 ☐ Government enterprise
- 2 ☐ Private enterprise

b. If "Private enterprise" is marked, what is the legal form of organization? *(Mark (X) one box)*
- 1 ☐ Individual proprietor
- 2 ☐ Partnership
- 3 ☐ Corporation or joint stock company
- 4 ☐ Cooperative association (corporate or noncorporate)
- 5 ☐ Other *(Specify)* _____

Item 5 – PERIOD OF OPERATION DURING 1975 AND CHANGE OF OWNERSHIP (IF ANY)

a. Period of operation during 1975
(Mark (X) one box and enter information as appropriate)
- 1 ☐ Operated throughout the year
- 2 ☐ Operated only part of the year *(Enter number of months)* ⟶ ☐
- ☐ No minerals produced during 1975 *(Mark (X) one reason)*
  - 3 ☐ Idle
  - 4 ☐ Exhausted
  - 5 ☐ Development and exploration only

b. Change in ownership
Was this establishment purchased or sold by you during 1975?
(If Yes, mark (X) one box and enter information as appropriate. If No – Skip to Item 6.)
- 1 ☐ Purchased by you during *(Enter month)* ⟶ ☐
- 2 ☐ Sold by you during *(Enter month)* ⟶ ☐

NOTE *If box "1" is marked, give former owner's name and address below. If box "2" is marked, give purchaser's name and address below.*

Name

Address *(Street and number)*

Ward | County | Province

Section II – NUMBER OF PERSONS ENGAGED AND PAYROLLS

INSTRUCTIONS FOR ITEMS 6 AND 7

PERSONS ENGAGED (exclude homeworkers)

Working proprietors and active partners – Persons who manage or participate in the management of the establishment. Managers and directors working for pay should be reported with "All other employees."

Unpaid family and other unpaid workers – Members of the family and other persons working at least one-third of the normal working time without regular pay for the work done.

Production, development and exploration workers – Workers (up through the working foreman level) engaged in manual work, using tools, operating loading equipment and other machines, hauling overburden and other materials, loading and hauling products out of mine, inspection, maintenance, repair, janitorial, watchman services, auxiliary production for plant's own use (e.g., power plant), record keeping, and other services closely associated with operations covered by this report. Exclude supervisory employees above working foreman level.

All other employees – Administrative, technical, clerical and all other paid employees, except operatives. Examples are salaried managers and directors, research workers, clerks, typists, bookkeepers, administrative supervisors, salesmen, etc.

PAYROLLS

Include all payments, whether in cash or in kind, made by the employer in connection with work done, to production, development, and exploration workers, and to all other employees (see definitions above). Include all salaries, wages, commissions, bonuses, cost-of-living allowances, paid vacation and paid sick leave, employee contribution to social insurance and taxes, and the value of payments in kind, such as goods, lodging, food, and clothing. Do not include contributions to social insurance paid by the employer, nor pension payments.

Item 6 – PERSONS ENGAGED AND PAYROLL DURING THE WEEK ENDED NEAREST NOVEMBER 15, 1975
(Enter the number of different persons engaged and payroll during the week ended nearest November 15, 1975. If payroll is for period other than a week, adjust figures to a 1-week basis.)

Type of person engaged (A)	Key (B)	Number of persons engaged (C)	Key (D)	Weekly payroll (Omit cents) (E)
a. Working proprietors and active partners	9–1			
b. Unpaid family and other unpaid workers	9–2			
c. Production, development and exploration workers	9–3		9–9	$
d. All other employees	9–4		9–7	
e. TOTAL *(Sum of a – d)* ⟶	9–5		9–8	$

Item 7 – PAYROLLS DURING 1975

Type of employee (A)	Key (B)	Annual payroll 1975 (Omit cents) (C)
a. Production, development and exploration workers	9–9	$
b. All other employees	9–10	
c. TOTAL PAYROLL *(Sum of a and b)* ⟶	9–11	$

Item 8 – Not applicable to this form.

Item 9 – Not applicable to this form.

Item 10 – Not applicable to this form.

Please continue on page 2

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Exhibit III-4-4. CENSUS OF MINERAL INDUSTRIES, ECP-201 (SHORT FORM)--Continued

Page 2

Section III – INVENTORIES AND ACQUISITION OF FIXED ASSETS

Item 11 – Not applicable to this form.

Item 12 – ACQUISITION OF NEW AND USED FIXED ASSETS 8–6

(Include all costs actually incurred during 1975 chargeable to the fixed assets (capital) accounts and of the type for which depreciation, depletion or amortization accounts are ordinarily maintained. (These are physical assets expected to have a productive life of more than one year.) Include in item 12a mineral development and exploration outlays during 1975 which were charged to a capital account.)

Type of asset (A)	Key (B)	Cost incurred during 1975 (Omit cents) (C)
a. New structures and additions to this establishment (including development and exploration of mineral property) – exclude land	8–12	$
b. New machinery and new equipment (include transport equipment)	8–13	
c. Used structures	8–14	
d. Used machinery and used equipment	8–15	
e. TOTAL FIXED ASSETS ACQUIRED *(Sum of a – d)*	8–16	$

Section IV – SUPPLIES, FUELS, ELECTRICITY, CONTRACT WORK AND MACHINERY; TYPE OF OPERATION

Item 13 – COST OF PURCHASED SUPPLIES, FUELS, ELECTRICITY, CONTRACT WORK, AND MACHINERY IN 1975 8–7

Type of cost (A)	Key (B)	Delivered cost (Omit cents) (C)
a. Purchased supplies used; minerals received for preparation; purchased fuels and electricity consumed	8–17	$
b. Contract work done for you by others	8–18	
c. TOTAL COST, EXCLUDING PURCHASED MACHINERY *(Sum of a and b)*	8–19	$
d. Purchased machinery installed for your own use (include all new and used machinery, equipment and parts not included above)	8–20	$

Item 14 – Not applicable to this form.

Item 15 – Not applicable to this form.

Item 16 – Not applicable to this form.

Item 17 – TYPE OF OPERATION IN 1975 *(Mark (X) all that apply)*

a. MINING METHODS
- 1 ☐ Open-pit mine or quarry, strip mine, or surface placer deposit
- 2 ☐ Underground mine

b. MILLING OR PREPARATION METHOD USED
- 3 ☐ No preparation (include hand-picking)
- 4 ☐ Drying
- 5 ☐ Flotation
- 6 ☐ Air separation
- 7 ☐ Calcining
- 8 ☐ Crushing, grinding, or pulverizing
- 9 ☐ Screening
- 10 ☐ Washing
- 11 ☐ Other *(Specify, i.e., dimension stone dressing)* _____

c. 12 ☐ Only engaged in exploration, development, or maintenance work in 1975

Section V – PRODUCTION AND RECEIPTS

Item 18 – PRODUCTS AND CONTRACT WORK OF THIS ESTABLISHMENT 8–11 8–12

(Enter below in the space provided on line 9, the total value of production, services and other receipts of this establishment during 1975. Use a separate line for each product and account for all production of this establishment during 1975. The value figures shown in column (F) should represent the price, f.o.b., this mine or preparation plant, including royalty, if any. Exclude excise taxes, transportation charges to the purchaser or user, discounts and allowances. For ores valued for more than one metal, classify the ore on the basis of the principal metal contained in terms of total value of recoverable metal contained. Estimates are acceptable wherever exact figures are not available.)

Line No. (A)	Type of product or contract work (B)	Key 6	8–1 Product code (C)	8–2 Production and interplant transfers: Unit of measure (Specify) (D)	Quantity (E)	8–3 Value f.o.b. mine or plant (Omit cents) (F)
1	a. PRODUCTS OF THIS ESTABLISHMENT *(Use a separate line for each product. If you produce more than 4 products, show the 4 principal ones and group the others on line 5.)*					$
2						
3						
4						
5	All other products *(Specify kind)*					
6	b. CONTRACT WORK — Receipts for work done for other establishments (such as hauling, stripping, shaft sinking, pumping and shop work – exclude amounts received for custom work) *(Specify kind of work done and show separately principal kinds)*					
7						
8						
9	c. TOTAL VALUE OF PRODUCTION AND RECEIPTS *(Sum of lines 1 – 8)*		99000			$

Item 19 – Not applicable to this form.

Item 20 CONTACT	Name of person to contact regarding this report		Address	Telephone number
Item 21 CERTIFICATION	This report is substantially accurate and covers the period –		Signature of authorized official	
	From	To	Title	Date

FORM ECP-201 (8-30-75)

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Exhibit III-4-5. CENSUS OF PRODUCTION AND DISTRIBUTION OF ELECTRICITY AND GAS, ECP-3

PENALTY FOR FAILURE TO REPORT **DUE DATE:**

Form ECP-3 (6-30-75) NATIONAL STATISTICAL OFFICE PROVIDENCIA

NOTICE – Response to this inquiry is required by law. By the same law, your report to the National Statistical Office is confidential. It may be seen only by sworn NSO employees and may be used only for statistical purposes.

1975 CENSUS OF PRODUCTION AND DISTRIBUTION OF ELECTRICITY AND GAS

FOR NSO USE ONLY	Location and identification: Prov. (1 2)	County (3 4)	Register No. (5 6 7 8 9)	Ward (10 11)	Activity (12 13 14 15)	F/O (16)	TEP size (17)

Please complete and return this form as soon as possible to: National Statistical Office, Estrella City, Providencia

In correspondence pertaining to this report, please refer to this file number /

(Please correct any errors in name or address)

GENERAL INSTRUCTIONS

If book figures are not available, carefully prepared estimates are acceptable. Complete every item, entering "0" where applicable. Omit cents when reporting dollar values.

For purposes of this Census, an establishment is the electricity and gas industry is defined as a reporting unit that includes the producing plant and its associated distribution system, including transformer stations.

Section I – DESCRIPTION OF ESTABLISHMENT (REPORTING UNIT)

Item 1 – NAME OF ESTABLISHMENT (reporting unit) COVERED BY THIS REPORT

Item 2 – PHYSICAL LOCATION OF ESTABLISHMENT (or operation)
(Be sure your answer relates to the actual PHYSICAL LOCATION of this reporting unit, which may be different from the mailing address.)

Street and number *(If location cannot be described by street and number, give as much information as possible such as street intersection, name (and number, if any) of road or highway, and distance from nearest city, town or village.)*

City, town or village

Ward | County | Province

Oil and gas and mining services companies should list Province in which properties are located or services performed in 1975.

Item 3 – ECONOMIC ORGANIZATION OF THIS ESTABLISHMENT
(Mark (X) one box and enter information as appropriate)

1 ☐ Single reporting unit – does not own or control another establishment

2 ☐ Head office – owns or controls other establishments

3 ☐ Subsidiary reporting unit – owned or controlled by another establishment

If box "3" is marked, give name and address of head office

Name of head office

Address *(Street and number)*

Ward | County | Province

Item 4 – FORM OF OWNERSHIP AND LEGAL ORGANIZATION

a. What is the form of ownership of this reporting unit?
(Mark (X) one box)

1 ☐ Government enterprise

2 ☐ Private enterprise

b. If "Private enterprise" is marked, what is the legal form or organization?
(Mark (X) one box)

1 ☐ Individual proprietor

2 ☐ Partnership

3 ☐ Corporation or joint stock company

4 ☐ Cooperative association (corporate or noncorporate)

5 ☐ Other *(Specify)* _____

Item 5 – PERIOD OF OPERATION DURING 1975 AND CHANGE OF OWNERSHIP (IF ANY)

a. Period of operation during 1975
(Mark (X) one box and enter information as appropriate)

1 ☐ Operated throughout the year

2 ☐ Operated only part of the year *(Enter number of months)* →

3 ☐ Reporting unit was idle throughout the year

b. Change in ownership
Was this reporting unit purchased or sold by you during 1975?
(If Yes, mark (X) one box and enter information as appropriate. If No – Skip to Item 6.)

1 ☐ Purchased by you during *(Enter month)* →

2 ☐ Sold by you during *(Enter month)* →

NOTE: *If box "1" is marked, give former owner's name and address below. If box "2" is marked, give purchaser's name and address below.*

Name

Address *(Street and number)*

Ward | County | Province

Section II – NUMBER OF PERSONS ENGAGED, LABOR COST, AND MAN-DAYS WORKED

• INSTRUCTIONS FOR ITEMS 6 AND 7 •

PERSONS ENGAGED

Working proprietors and active partners – All individual proprietors and partners who are actively engaged in the work of the reporting unit. Managers and directors working for pay should be reported with "All other employees."

Production workers (operatives) – Workers (up through the working foreman level) directly engaged in the generation or production, and distribution of electricity and gas; also maintenance, repair, inspection, janitorial, watchman services, auxiliary production for plant's own use, record keeping and other services closely associated with these production and distribution functions. Include own employees engaged in construction work. Exclude supervisory employees above the working foreman level.

All other employees – Administrative, technical, clerical and all other paid employees, except operatives. Examples are salaried managers and directors, research workers, clerks, typists, bookkeepers, administrative supervisors, salesmen, etc.

PAYROLLS

Include all payments, whether in cash or in kind, made by the employer in connection with work done, to production workers and to all other employees (see definitions above). Include all salaries, wages, commissions, bonuses, cost-of-living allowances, paid vacation and paid sick leave, employee contribution to social insurance and taxes, and the value of payments in kind, such as goods, lodging, food, and clothing. Do not include contributions to social insurance paid by the employer, nor pension payments.

Item 6 – PERSONS ENGAGED AND PAYROLL DURING THE WEEK ENDED NEAREST NOVEMBER 15, 1975

(Enter the number of different persons engaged and payroll during the week ended nearest November 15, 1975. If payroll is for period other than a week, adjust figures to a 1-week basis.)

Type of person engaged (A)	Key (B)	Number of persons engaged (C)	Key (D)	Weekly payroll *(Omit cents)* (E)
a. Working proprietors and active partners	1–1			
b. Unpaid family and other unpaid workers	1–2			
c. Production workers (operatives)	1–3		1–6	$
d. All other employees	1–4		1–7	
e. TOTAL *(Sum of a–d)* →	1–5		1–8	$

Item 7 – PAYROLLS DURING 1975

Type of employee (A)	Key (B)	Annual payroll 1975 *(Omit cents)* (C)
a. Production workers (operatives)	1–9	$
b. All other employees	1–10	
c. TOTAL PAYROLL *(Sum of a and b)* →	1–11	$

Please continue on page 2

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Exhibit III-4-5. CENSUS OF PRODUCTION AND DISTRIBUTION OF ELECTRICITY AND GAS, ECP-3--Continued

Page 2

Section II – NUMBER OF PERSONS ENGAGED, LABOR COST, AND MAN-DAYS WORKED – Continued

Item 8 – PRODUCTION WORKERS EMPLOYED, QUARTERLY, 1975

Production workers (operatives) during the pay period ended nearest the 15th.

Pay period (A)	Key (B)	Total number (C)	Key (D)	Number of males (E)	Key (F)	Number of females (G)
a. February 1975						
b. May 1975						
c. August 1975						
d. November 1975						
e. TOTAL (Sum of lines a–d) →						
f. AVERAGE NUMBER (Divide sum on line e by 4) →	1–12		1–13		1–14	

Item 9 – SUPPLEMENTAL LABOR COST (1975) NOT INCLUDED IN ITEM 7

Labor cost (A)	Key (B)	Annual cost 1975 (Omit cents) (C)
a. Legally required, including social insurance	2–21	$
b. Payments for voluntary programs	2–22	$

Item 10 – PLANT MAN-DAYS OF PRODUCTION WORKERS, BY QUARTERS, 1975

(For each calendar quarter (or comparable 13-week period) of 1975, include all days actually spent at work, but exclude days spent on vacation, holidays or sick leave.)

Quarterly (A)	Key (B)	Number of days (C)
a. January through March 1975		
b. April through June 1975		
c. July through September 1975		
d. October through December 1975		
e. TOTAL PRODUCTION WORKER MAN-DAYS (Sum of a–d) →	2–23	

FOR NSO USE ONLY

1–5	1–12	SUM	1–3	DIFF	YEP

Section III – INVENTORIES AND ACQUISITION OF FIXED ASSETS

• INSTRUCTIONS FOR ITEMS 11 ARD 12 •

Inventories – Report all inventories of this establishment at the beginning and end of 1975. Inventories should be reported at approximate current costs, if feasible; otherwise, at book values.

Acquisition of New and Used Fixed Assets (exclude land) – Include all costs actually incurred during 1975 chargeable to the fixed asset (capital) accounts and of the type for which depreciation or amortization accounts are ordinarily maintained. These are physical assets expected to have a productive life of more than one year. Report all outlays for such assets whether they were purchased from others or the work was done by your own employees.

Item 11 – INVENTORIES OF THIS ESTABLISHMENT

Date (A)	Key (B)	Value of inventories for 1975 (Omit cents) (Valuation should be on a comparable basis for both periods) (C)
a. January 1, 1975	4–4	$
b. December 31, 1975	4–8	$

Item 12 – ACQUISITION OF NEW AND USED FIXED ASSETS

Type of asset (A)	Key (B)	Cost incurred during 1975 (Omit cents) (C)
a. New structures and new additions to this establishment (exclude land)	2–16	$
b. New machinery and new equipment (include transport equipment)	2–17	
c. Used structures	2–18	
d. Used machinery and used equipment	2–19	
e. TOTAL FIXED ASSETS ACQUIRED (Sum of a–d) →	2–20	$

Section IV – MATERIALS, FUELS, ELECTRICITY, AND CONTRACT WORK

• INSTRUCTIONS FOR ITEM 13 •

Cost of materials, fuels, etc. – "Cost" refers to the amounts actually paid or payable after discounts, and includes freight and other direct charges incurred in acquiring the items.

Report the cost of all items actually consumed in 1975, whether purchased, withdrawn from inventories, or received from other establishments of this company.

If your records do not show actual amounts consumed, this may be computed by adding purchases (or receipts) during the year to opening inventory and subtracting closing inventory. Purchase records instead of consumption records may be used for any major materials, if purchases closely approximate consumption, and for all minor materials and supply items.

Item 13 – COST OF MATERIALS, FUELS, ELECTRICITY, CONTRACT WORK, ETC., DURING 1975

Type of cost (A)	Key (B)	Delivered cost at plant (Omit cents) (C)
a. Supplies, materials, etc., consumed	4–9	$
b. Fuels consumed (Same as item 15f)	4–11	
c. Purchased electricity (Same as item 14a)	4–12	
d. Cost of repair and maintenance services provided by others on plant or equipment	4–13	
e. TOTAL COST (Sum of a–d) →	4–16	$

Item 14 – ELECTRICITY PURCHASED, GENERATED, AND SOLD IN 1975 (To be reported only by Gas Producers)

(Report all electricity purchased, generated, and sold during 1975 in each case reporting the quantity in thousands of kilowatt hours.

Electricity (A)	Key (B)	Quantity (Thous. kilo. hrs.) (C)	Key (D)	Value (Omit cents) (E)
a. Purchased (Same as item 13c)	2–11		2–14	$
b. Generated in this establishment, whether for own use or for sale	2–12			
c. Sold or transferred to other establishments	2–13		2–15	$

Item 15 – FUELS CONSUMED IN 1975

Description (A)	Key (B)	Quantity (C)	Key (D)	Delivered cost at plant (Omit cents) (E)
a. Coal (Short ton)	3–1		3–5	$
b. Fuel oil (Barrels [42 gallons])	3–2		3–6	
c. Gas-natural, manufactured and mixed (1,000 cubic feet)	3–3		3–7	
d. Gasoline (1,000 gallons)	3–4		3–8	
e. Other fuels – wood, coke, liquified petroleum gas, etc.			3–9	
f. TOTAL FUELS (Same as item 13b) →			3–10	$

Item 16 – Not applicable to this form.

Item 17 – Not applicable to this form.

FORM ECP 3 (6-30-75)

Please continue on page 3

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Exhibit III-4-5. CENSUS OF PRODUCTION AND DISTRIBUTION OF ELECTRICITY AND GAS, ECP-3--Continued

Page 3 — 1975 CENSUS OF PRODUCTION AND DISTRIBUTION OF ELECTRICITY AND GAS – Continued

Section V – RECEIPTS FOR PRODUCTS AND SERVICES

Item 18 – ELECTRIC ENERGY, GAS, AND ALL OTHER PRODUCTS AND SERVICES — 8-11 — 8-12

Type of product and services (A)	Key (B)	Value, excluding excise taxes (Omit cents) (C)
a. Electric energy – sold or transferred	9-1	$
b. Gas (manufactured, natural, or mixed) – sold or transferred	9-2	
c. All other products and services (Enter all receipts from contract work performed by this establishment, and miscellaneous receipts)	9-3	
d. TOTAL RECEIPTS (Sum of a–c)	9-4	$

Section VI – SOURCES AND DISPOSAL OF ELECTRIC ENERGY AND GAS

Item 19 – SOURCES OF ELECTRIC ENERGY — 8-13

Source (A)		Key (B)	Quantity (Thous. kilo. hrs.) (C)
a. GENERATED AT ESTABLISHMENT	(1) Hydraulic plants	10-1	
	(2) Steam plants	10-2	
	(3) Internal combustion plants	10-3	
	(4) TOTAL ELECTRIC ENERGY GENERATED AT ESTABLISHMENT (Sum of (1)–(3))	10-4	
b. Purchased (or received)		10-5	
c. TOTAL ELECTRIC ENERGY FOR DISPOSAL (Sum of a(4) and b)		10-6	

Item 20 – DISPOSAL OF ELECTRIC ENERGY — 8-14

(Enter quantity and value at point of delivery or receipt by consumer. Add estimated value for free services rendered. Exclude excise taxes. Number of bills or meters may be used for number of customers.)

Type of consumer (A)		Key (B)	Number of customers (C)	Key (D)	Quantity (Thous. kilo. hrs.) (E)	Key (F)	Delivered value, excluding excise taxes (Omit cents) (G)
a. ULTIMATE CONSUMER	(1) Public lighting	11-1		12-1		13-1	$
	(2) Other public uses	11-2		12-2		13-2	
	(3) Domestic (residential)	11-3		12-3		13-3	
	(4) Mining and manufacturing	11-4		12-4		13-4	
	(5) Commercial and other	11-5		12-5		13-5	
b. Distributors (or resellers)		11-6		12-6		13-6	
c. ELECTRIC ENERGY – SOLD OR TRANSFERRED (Sum of a(1)–(5) and b) (Same as Item 18a)		11-7		12-7		13-7	$
d. Electric energy – consumed by establishment (Include losses)				12-8			
e. TOTAL DISPOSAL OF ELECTRIC ENERGY (Sum of c and d) (Same as Item 19c)				12-9			

Item 21 – SOURCES OF GAS — 8-15

Source (A)	Key (B)	Quantity (1,000 cubic feet) (C)
a. Manufactured at establishment	14-1	
b. Purchased (or received)	14-2	
c. TOTAL GAS FOR DISPOSAL (Sum of a and b)	14-3	

Item 22 – DISPOSAL OF GAS — 8-16

(Enter quantity and value at point of delivery or receipt by consumer. Add estimated value for free services rendered. Exclude excise taxes. Number of bills or meters may be used for number of customers.)

Type of consumer (A)		Key (B)	Number of customers (C)	Key (D)	Quantity (1,000 cubic feet) (E)	Key (F)	Delivered value, excluding excise taxes (Omit cents) (G)
a. ULTIMATE CONSUMER	(1) Public lighting	15-1		16-1		17-1	$
	(2) Other public uses	15-2		16-2		17-2	
	(3) Domestic (residential)	15-3		16-3		17-3	
	(4) Mining and manufacturing	15-4		16-4		17-4	
	(5) Commercial and other	15-5		16-5		17-5	
b. Distributors (or resellers)		15-6		16-6		17-6	
c. GAS – SOLD OR TRANSFERRED (Sum of a(1)–(5) and b) (Same as Item 18b)		15-7		16-7		17-7	$
d. Gas – consumed by establishment (Include losses)				16-8			
e. TOTAL DISPOSAL OF GAS (Sum of c and d) (Same as Item 21c)				16-9			

FORM ECP-3 (6-30-75)

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Exhibit III-4-5. CENSUS OF PRODUCTION AND DISTRIBUTION OF ELECTRICITY AND GAS, ECP-3--Continued

Page 4

Section VII – LOCATION OF POWER PLANTS, GENERATOR CAPACITY AND OTHER EQUIPMENT (To be reported by Electricity Producers)

Item 23A – PHYSICAL LOCATION OF PLANTS AND GENERATOR CAPACITY 8–17

Line No. (A)	Physical location of power plants: Province (B)	Physical location of power plants: County (C)	Key (D)	Capacity of electric generators (Name plate ratings): Alternating current (AC): Theus. kilo. voltamperes (E)	Alternating current (AC): Equivalent theus. kilowatts (F)	Direct current (DC) (Thous. kilowatts) (G)	Total theus. of kilowatts (AC and DC) (Sum of (F) and (G)) (H)
1			18–1				
2			18–2				
3			18–3				
4			18–4				
5			18–5				
6			18–6				
7			18–7				
8	TOTAL (Sum of lines 1–7) →		18–8				

Item 23B – EQUIPMENT FOR TRANSMISSION AND DISTRIBUTION OF ELECTRICITY, AS OF DECEMBER 31, 1975 8–18

	System (A)		Unit of measure (B)	Key (C)	Quantity (D)
a. TRANSMISSION	(1) Transformer capacity		Thousand kilo voltamperes	19–1	
	(2) Transmission lines	(a) Structure	Kilometers	19–2	
		(b) Circuit	Kilometers	19–3	
b. DISTRIBUTION	(1) Stations		Number	19–4	
	(2) Transformer capacity		Thousand kilo voltamperes	19–5	
	(3) Distribution lines	(a) Structure	Kilometers	19–6	
		(b) Circuit	Kilometers	19–7	

Section VIII – REMARKS AND CERTIFICATION OF THIS REPORT

Remarks

Item 24 CONTACT	Name of person to contact regarding this report		Address	Telephone number
Item 25 CERTIFICATION	This report is substantially accurate and covers the period –		Signature of authorized official	
	From	To	Title	Date

FORM ECP-3 10-20-75

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Exhibit III-4-6. CENSUS OF HOUSEHOLD INDUSTRIES, ECP-102

PENALTY FOR FAILURE TO REPORT **DUE DATE:**

FORM **ECP-102** (6-30-75) NATIONAL STATISTICAL OFFICE PROVIDENCIA

1975 CENSUS OF HOUSEHOLD INDUSTRIES

NOTICE – Response to this inquiry is required by law. By the same law, your report to the National Statistical Office is confidential. It may be seen only by sworn NSO employees and may be used only for statistical purposes.

Household units are within the scope of the Industrial Census if their activity involves the production of goods for sale or exchange. It is recognized that your answers to the inquiries on this card will be approximate. Where records are not available, your judgment as to the probable figure will be satisfactory for the statistical purposes of the Census.

Item 1 – LOCATION OF HOUSEHOLD UNIT *(If location cannot be described by street and number, give as much information as possible, such as street intersection, name (and number, if any) of road or highway, and distance from nearest city, town, or village)*

Street and number *(or other description)*

City, town or village

Ward | County

Province

CONTINUE ON REVERSE SIDE ⟶

REVERSE SIDE

Item 2 – PERSONS ENGAGED IN THE PRODUCTION OF GOODS AND SERVICES DURING 1975

(Include persons engaged in working on materials supplied to you as well as on materials purchased by you; the activity may consist of producing a finished product, part, or component, or only performing an operation such as sewing a garment, cutting and shaping a wood frame, or machining a metal part.)

Type of work (A)	Number of persons working on these premises					
	Key (B)	Total (C)	Key (D)	Male (E)	Key (F)	Female (G)
a. Full time	20–1		20–3		20–5	
b. Part time	20–2		20–4		20–6	

Item 3 – AMOUNT OF MONEY RECEIVED FOR GOODS PRODUCED AND SERVICES PERFORMED DURING 1975

(Report the approximate dollar receipts for the production of goods and services performed in this household during 1975.) (Omit cents.)

Key 20–7 $

Item 4 – DESCRIPTION OF GOODS MADE AND SERVICES PERFORMED IN THIS HOUSEHOLD DURING 1975

(Describe briefly; for example, knitting sweaters, sewing buttons and/or trim on coats, upholstering furniture, etc.)

Name of person providing information

Date

FORM ECP-102 (6-30-75)

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Exhibit III-5-1. PRELIMINARY REPORT 1: TABLE FORMATS FOR THE 1975 CENSUS OF MANUFACTURES

TABLE 1. SELECTED STATISTICS FOR MANUFACTURING ESTABLISHMENTS BY MAJOR INDUSTRY GROUPS AND INDUSTRIES, FOR PROVIDENCIA: 1975 AND 1963

CODE	MAJOR INDUSTRY GROUPS AND INDUSTRIES	1975							1963	
		NUMBER OF ESTABLISHMENTS		NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES	VALUE OF--		VALUE ADDED	NUMBER OF PERSONS ENGAGED[1]	VALUE ADDED
		TOTAL	WITH 10 OR MORE PERSONS ENGAGED			INPUT	GROSS OUTPUT			
					(THOUSAND DOLLARS)	(THOUSAND DOLLARS)	(THOUSAND DOLLARS)	(THOUSAND DOLLARS)		(THOUSAND DOLLARS)
	ALL MANUFACTURING ESTABLISHMENTS.....									
31	FOOD, BEVERAGES, AND TOBACCO.....									
32	TEXTILE, WEARING APPAREL, AND LEATHER.....									
33	WOOD AND WOOD PRODUCTS (INCLUDING FURNITURE).....									
34	PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING...									
35	CHEMICALS AND CHEMICAL, PETROLEUM, COAL, RUBBER, AND PLASTIC PRODUCTS.....									
36	NON-METALLIC MINERAL PRODUCTS (EXCEPT PRODUCTS OF PETROLEUM AND COAL).....									
37	BASIC METAL.....									
38	FABRICATED METAL PRODUCTS, MACHINERY, AND EQUIPMENT.....									
39	OTHER.....									
311-312	FOOD.....									
3111	SLAUGHTERING, PREPARING AND PRESERVING MEAT.....									
3112	DAIRY PRODUCTS.....									
3113	CANNING AND PRESERVING OF FRUITS AND VEGETABLES..									
	(etc.)									
313	BEVERAGES.....									
3131	DISTILLING, RECTIFYING, AND BLENDING SPIRITS.....									
3132	WINE.....									
3133	MALT LIQUORS AND MALT.....									
3134	SOFT DRINKS AND CARBONATED WATERS.....									
314	TOBACCO PRODUCTS.....									
	(Continue with industries)									

[1]DURING WEEK ENDING NEAREST 15 NOVEMBER.

TABLE 2. SELECTED STATISTICS FOR MANUFACTURING ESTABLISHMENTS BY MAJOR INDUSTRY GROUPS, FOR PROVINCES: 1975 AND 1963

CODE	MAJOR INDUSTRY GROUPS BY PROVINCE	1975							1963	
		NUMBER OF ESTABLISHMENTS		NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES	VALUE OF--		VALUE ADDED	NUMBER OF PERSONS ENGAGED[1]	VALUE ADDED
		TOTAL	WITH 10 OR MORE PERSONS ENGAGED			INPUT	GROSS OUTPUT			
					(THOUSAND DOLLARS)	(THOUSAND DOLLARS)	(THOUSAND DOLLARS)	(THOUSAND DOLLARS)		(THOUSAND DOLLARS)
	PROVIDENCIA.....									
31	FOOD, BEVERAGES, AND TOBACCO.....									
32	TEXTILE, WEARING APPAREL, AND LEATHER.....									
33	WOOD AND WOOD PRODUCTS (INCLUDING FURNITURE)....									
34	PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING..									
35	CHEMICALS AND CHEMICAL, PETROLEUM, COAL, RUBBER, AND PLASTIC PRODUCTS.....									
36	NON-METALLIC MINERAL PRODUCTS.....									
37	BASIC METAL.....									
38	FABRICATED METAL PRODUCTS, MACHINERY AND EQUIPMENT.....									
39	OTHER.....									
	CATEDRAL									
31	FOOD, BEVERAGES, AND TOBACCO.....									
32	TEXTILE, WEARING APPAREL, AND LEATHER.....									
33	WOOD AND WOOD PRODUCTS (INCLUDING FURNITURE)....									
34	PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING..									
35	CHEMICALS AND CHEMICAL, PETROLEUM, COAL, RUBBER AND PLASTIC PRODUCTS.....									
36	NON-METALLIC PRODUCTS.....									
37	BASIC METAL.....									
38	FABRICATED METAL PRODUCTS, MACHINERY AND EQUIPMENT.....									
39	OTHER.....									
	(Continue with industry by province)									

[1]DURING WEEK ENDING NEAREST 15 NOVEMBER.

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Exhibit III-5-2. PRELIMINARY REPORT II: TABLE FORMAT FOR THE 1975 CENSUS OF MINERAL ESTABLISHMENTS

SELECTED STATISTICS FOR MINERAL ESTABLISHMENTS BY MAJOR INDUSTRY GROUPS, FOR PROVINCES: 1975 AND 1963

CODE	MAJOR INDUSTRY GROUPS AND INDUSTRIES	1975								1963	
		NUMBER OF ESTABLISHMENTS		NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES	GROSS ADDITIONS TO FIXED ASSETS[2]	VALUE OF--		VALUE ADDED	NUMBER OF PERSONS ENGAGED[1]	VALUE ADDED
		TOTAL	WITH 10 OR MORE PERSONS ENGAGED		(THOUSAND DOLLARS)	(THOUSAND DOLLARS)	INPUT (THOUSAND DOLLARS)	GROSS OUTPUT (THOUSAND DOLLARS)	(THOUSAND DOLLARS)		(THOUSAND DOLLARS)
21	PROVIDENCIA.....										
21	COAL MINING.....										
22	CRUDE PETROLEUM AND NATURAL GAS.....										
23	METAL ORE MINING.....										
2301	IRON ORE MINING.....										
2302	NON-FERROUS METAL ORE.....										
29	OTHER MINING.....										
2901	STONE QUARRYING, CLAY AND SAND PITS..										
2902	CHEMICAL AND FERTILIZER.....										
2903	SALT.....										
2909	NOT ELSEWHERE CLASSIFIED.....										
	CATEDRAL.....										
21	COAL MINING.....										
22	CRUDE PETROLEUM AND NATURAL GAS.....										
23	METAL ORE MINING.....										
2301	IRON ORE MINING.....										
2302	NON-FERROUS METAL ORE.....										
29	OTHER MINING.....										
2901	STONE QUARRYING, CLAY AND SAND PITS..										
2902	CHEMICAL AND FERTILIZER.....										
2903	SALT.....										
2909	NOT ELSEWHERE CLASSIFIED.....										
	DAVID.....										
21	COAL MINING.....										
22	CRUDE PETROLEUM AND NATURAL GAS.....										
23	METAL ORE MINING.....										
2301	IRON ORE MINING.....										
2302	NON-FERROUS METAL ORE.....										
29	OTHER MINING.....										
2901	STONE QUARRYING, CLAY AND SAND PITS..										
2902	CHEMICAL AND FERTILIZER.....										
2903	SALT.....										
2909	NOT ELSEWHERE CLASSIFIED.....										
	(Continue with industry by province)										

[1] DURING WEEK ENDING NEAREST 15 NOVEMBER.
[2] INCLUDES THE DEVELOPMENT AND EXPLORATION OF MINERAL PROPERTY.

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Exhibit III-5-3. PRELIMINARY REPORT III: TABLE FORMATS FOR THE 1975 CENSUSES OF ELECTRICITY AND GAS INDUSTRIES

TABLE 1. SELECTED STATISTICS FOR ESTABLISHMENTS IN THE ELECTRICITY INDUSTRY, FOR PROVINCES: 1975 AND 1963

PROVINCE	1975						1963	
	NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES (THOUSAND DOLLARS)	GROSS ADDITIONS TO FIXED ASSETS (THOUSAND DOLLARS)	VALUE OF-- INPUT (THOUSAND DOLLARS)	VALUE OF-- GROSS OUTPUT (THOUSAND DOLLARS)	VALUE ADDED (THOUSAND DOLLARS)	NUMBER OF PERSONS ENGAGED	VALUE ADDED (THOUSAND DOLLARS)
PROVIDENCIA.....								
CATEDRAL.....								
DAVID.....								
ESTRELLA.....								
FALCON.....								
GIRARDOT.....								
MIRANDA.....								
PUERTO NUEVO.....								
SAN JOSE.....								
SANTA ELENA.....								
TRES HERMANAS.....								
TROCADERO.....								
ZAPATA.....								

[1] DURING WEEK ENDING NEAREST 15 NOVEMBER.

TABLE 2. SELECTED STATISTICS FOR ESTABLISHMENTS IN THE GAS INDUSTRY, FOR PROVINCES: 1975

PROVINCE	NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES (THOUSAND DOLLARS)	GROSS ADDITIONS TO FIXED ASSETS (THOUSAND DOLLARS)	VALUE OF-- INPUT (THOUSAND DOLLARS)	VALUE OF-- GROSS OUTPUT (THOUSAND DOLLARS)	VALUE ADDED (THOUSAND DOLLARS)
PROVIDENCIA.....						
CATEDRAL.....						
DAVID.....						
ESTRELLA.....						
FALCON.....						
GIRARDOT.....						
MIRANDA.....						
PUERTO NUEVO.....						
SAN JOSE.....						
SANTA ELENA.....						
TRES HERMANAS.....						
TROCADERO.....						
ZAPATA.....						

[1] DURING WEEK ENDING NEAREST 15 NOVEMBER.

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Exhibit III-5-4. FINAL REPORT 1: TABLE FORMATS FOR THE 1975 CENSUS OF MANUFACTURES

TABLE 1. SELECTED STATISTICS FOR MANUFACTURING ESTABLISHMENTS BY MAJOR INDUSTRY GROUPS AND INDUSTRIES, FOR PROVIDENCIA: 1975 AND 1963

CODE	MAJOR INDUSTRY GROUPS AND INDUSTRIES	1975							1963	
		NUMBER OF ESTABLISHMENTS		NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES	VALUE OF--		VALUE ADDED	NUMBER OF PERSONS ENGAGED[1]	VALUE ADDED
		TOTAL	WITH 10 OR MORE PERSONS ENGAGED			INPUT	GROSS OUTPUT			
					(THOUSAND DOLLARS)	(THOUSAND DOLLARS)	(THOUSAND DOLLARS)	(THOUSAND DOLLARS)		(THOUSAND DOLLARS)
	ALL MANUFACTURING ESTABLISHMENTS.....									
31	FOOD, BEVERAGES, AND TOBACCO.....									
32	TEXTILE, WEARING APPAREL, AND LEATHER.....									
33	WOOD AND WOOD PRODUCTS (INCLUDING FURNITURE).....									
34	PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING....									
35	CHEMICALS AND CHEMICAL, PETROLEUM, COAL, RUBBER, AND PLASTIC PRODUCTS.....									
36	NON-METALLIC MINERAL PRODUCTS (EXCEPT PRODUCTS OF PETROLEUM AND COAL).....									
37	BASIC METAL.....									
38	FABRICATED METAL PRODUCTS, MACHINERY, AND EQUIPMENT.....									
39	OTHER.....									
311-312	FOOD.....									
3111	SLAUGHTERING, PREPARING AND PRESERVING MEAT.....									
3112	DAIRY PRODUCTS.....									
3113	CANNING AND PRESERVING OF FRUITS AND VEGETABLES...									
	(etc.)									
313	BEVERAGES.....									
3131	DISTILLING, RECTIFYING, AND BLENDING SPIRITS.....									
3132	WINE.....									
3133	MALT LIQUORS AND MALT.....									
3134	SOFT DRINKS AND CARBONATED WATERS.....									
314	TOBACCO PRODUCTS.....									
	(Continue with industries)									

[1]DURING WEEK ENDING NEAREST 15 NOVEMBER.

TABLE 2. PERSONS ENGAGED AND WEEKLY AND ANNUAL PAYROLLS FOR MANUFACTURING ESTABLISHMENTS BY MAJOR INDUSTRY GROUPS AND INDUSTRIES, FOR PROVIDENCIA: 1975

CODE	MAJOR INDUSTRY GROUPS AND INDUSTRIES	NUMBER OF PERSONS ENGAGED[1]					WEEKLY PAYROLL (THOUSAND DOLLARS)		ANNUAL PAYROLL (THOUSAND DOLLARS)	
		TOTAL	OWNERS AND ACTIVE PARTNERS	FAMILY AND OTHER UNPAID WORKERS	PRODUCTION WORKERS	OTHER	PRODUCTION WORKERS	OTHER	PRODUCTION WORKERS	OTHER
	ALL MANUFACTURING ESTABLISHMENTS.....									
31	FOOD, BEVERAGES, AND TOBACCO.....									
32	TEXTILE, WEARING APPAREL, AND LEATHER.....									
33	WOOD AND WOOD PRODUCTS (INCLUDING FURNITURE).....									
34	PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING....									
35	CHEMICALS AND CHEMICAL, PETROLEUM, COAL, RUBBER, AND PLASTIC PRODUCTS.....									
36	NON-METALLIC MINERAL PRODUCTS (EXCEPT PRODUCTS OF PETROLEUM AND COAL).....									
37	BASIC METAL.....									
38	FABRICATED METAL PRODUCTS, MACHINERY, AND EQUIPMENT.....									
39	OTHER.....									
311-312	FOOD.....									
	(Continue as in table 1)									

[1]DURING WEEK ENDING NEAREST 15 NOVEMBER.

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Exhibit III-5-4. FINAL REPORT 1: TABLE FORMATS FOR THE 1975 CENSUS OF MANUFACTURES--Continued

TABLE 3. EMPLOYEES, SALARIES AND WAGES PAID, SUPPLEMENTARY LABOR COSTS, AND MAN-DAYS WORKED FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED BY MAJOR INDUSTRY GROUPS AND INDUSTRIES, FOR PROVIDENCIA: 1975

CODE	MAJOR INDUSTRY GROUPS AND INDUSTRIES	NUMBER OF EMPLOYEES			WAGES AND SALARIES PAID AND SUPPLEMENTARY LABOR COSTS (THOUSAND DOLLARS)					MAN-DAYS WORKED BY PRODUCTION WORKERS
		TOTAL	PRODUCTION WORKERS[1]	OTHER[2]	TOTAL	PRODUCTION WORKERS	SALARIES PAID TO OTHER EMPLOYEES	SUPPLEMENTARY LABOR COSTS		
								LEGALLY REQUIRED	VOLUNTARY PROGRAMS	
	ALL MANUFACTURING ESTABLISHMENTS.....									
31	FOOD, BEVERAGES, AND TOBACCO.....									
32	TEXTILE, WEARING APPAREL, AND LEATHER.....									
33	WOOD AND WOOD PRODUCTS (INCLUDING FURNITURE).....									
34	PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING....									
35	CHEMICALS AND CHEMICAL, PETROLEUM, COAL, RUBBER, AND PLASTIC PRODUCTS.....									
36	NON-METALLIC MINERAL PRODUCTS (EXCEPT PRODUCTS OF PETROLEUM AND COAL).....									
37	BASIC METAL.....									
	(Continue as in table 1)									

[1]AVERAGE OF FOUR MID-QUARTERLY PAY PERIODS.
[2]NUMBER AS OF WEEK ENDING NEAREST 15 NOVEMBER.

NOTE: THE CONTRIBUTION OF SMALL ESTABLISHMENTS (I.E. THOSE WITH LESS THAN 10 PERSONS ENGAGED) BY INDUSTRY AND PROVINCE IS SHOWN IN TABLE 22.

TABLE 4. ACQUISITIONS OF FIXED ASSETS FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED BY MAJOR GROUPS AND INDUSTRIES, FOR PROVIDENCIA: 1975

CODE	MAJOR INDUSTRY GROUPS AND INDUSTRIES	GROSS ADDITIONS TO FIXED ASSETS (THOUSAND DOLLARS)			ACQUISITION OF NEW FIXED ASSETS INCLUDING THOSE PRODUCED FOR OWN USE (THOUSAND DOLLARS)		ACQUISITION OF USED FIXED ASSETS (THOUSAND DOLLARS)	
		TOTAL	STRUCTURES AND ADDITIONS	MACHINERY AND EQUIPMENT	STRUCTURES AND EQUIPMENT	MACHINERY AND EQUIPMENT	STRUCTURES	MACHINERY AND EQUIPMENT
	ALL MANUFACTURING ESTABLISHMENTS.....							
31	FOOD, BEVERAGES, AND TOBACCO.....							
32	TEXTILE, WEARING APPAREL, AND LEATHER.....							
33	WOOD AND WOOD PRODUCTS (INCLUDING FURNITURE).....							
34	PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING....							
35	CHEMICALS AND CHEMICAL, PETROLEUM, COAL, RUBBER, AND PLASTIC PRODUCTS.....							
36	NON-METALLIC MINERAL PRODUCTS (EXCEPT PRODUCTS OF PETROLEUM AND COAL).....							
37	BASIC METAL.....							
	(Continue as in table 1)							

NOTE: THE CONTRIBUTION OF SMALL ESTABLISHMENTS (I.E. THOSE WITH LESS THAN 10 PERSONS ENGAGED) BY INDUSTRY AND PROVINCE IS SHOWN IN TABLE 22.

TABLE 5. INPUT COSTS FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED BY MAJOR INDUSTRY GROUPS AND INDUSTRIES, FOR PROVIDENCIA: 1975

CODE	MAJOR INDUSTRY GROUPS AND INDUSTRIES	INPUT COSTS DURING THE YEAR (THOUSAND DOLLARS)							
		TOTAL	MATERIALS, PARTS, SUPPLIES, ETC., CONSUMED	FUELS CONSUMED	ELECTRICITY PURCHASED	REPAIRS AND MAINTENANCE SERVICE	CONTRACT WORK[1]	PAYMENT TO HOME-WORKERS	PRODUCTS BROUGHT IN RESOLD OUT CHANGED
	ALL MANUFACTURING ESTABLISHMENTS.....								
31	FOOD, BEVERAGES, AND TOBACCO.....								
32	TEXTILE, WEARING APPAREL, AND LEATHER.....								
33	WOOD AND WOOD PRODUCTS (INCLUDING FURNITURE).....								
34	PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING....								
35	CHEMICALS AND CHEMICAL, PETROLEUM, COAL, RUBBER, AND PLASTIC PRODUCTS.....								
36	NON-METALLIC MINERAL PRODUCTS (EXCEPT PRODUCTS OF PETROLEUM AND COAL).....								
37	BASIC METAL.....								
	(Continue as in table 1)								

[1]EXCEPT PAYMENT TO LABOR WORKERS.

NOTE: THE CONTRIBUTION OF SMALL ESTABLISHMENTS (I.E. THOSE WITH LESS THAN 10 PERSONS ENGAGED) BY INDUSTRY AND PROVINCE IS SHOWN IN TABLE 22.

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TABLE 6. VALUE OF STOCKS FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED BY MAJOR INDUSTRY GROUPS AND INDUSTRIES, FOR PROVIDENCIA: 1975

CODE	MAJOR INDUSTRY GROUPS AND INDUSTRIES	CHANGE IN VALUE OF STOCKS DURING THE YEAR (THOUSAND DOLLARS)				VALUE OF STOCKS AT END OF YEAR (THOUSAND DOLLARS)				VALUE OF STOCKS AT BEGINNING OF YEAR (THOUSAND DOLLARS)			
		TOTAL	MATERIALS, SUPPLIES, FUELS, ETC.	WORK IN PROCESS	FINISHED GOODS	TOTAL	MATERIALS, SUPPLIES, FUELS, ETC.	WORK IN PROCESS	FINISHED GOODS	TOTAL	MATERIALS, SUPPLIES, FUELS, ETC.	WORK IN PROCESS	FINISHED GOODS
	ALL MANUFACTURING ESTABLISHMENTS.....												
31	FOOD, BEVERAGES, AND TOBACCO.....												
32	TEXTILE, WEARING APPAREL, AND LEATHER.....												
33	WOOD AND WOOD PRODUCTS (INCLUDING FURNITURE).....												
34	PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING....												
35	CHEMICALS AND CHEMICAL, PETROLEUM, COAL, RUBBER, AND PLASTIC PRODUCTS.....												
36	NON-METALLIC MINERAL PRODUCTS (EXCEPT PRODUCTS OF PETROLEUM AND COAL).....												
37	BASIC METAL.....												
	(Continue as in table 1)												

NOTE:

THE CONTRIBUTION OF SMALL ESTABLISHMENTS (I.E. THOSE WITH LESS THAN 10 PERSONS ENGAGED) BY INDUSTRY AND PROVINCE IS SHOWN IN TABLE 22.

TABLE 7. PRINCIPAL FUELS CONSUMED FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED BY MAJOR INDUSTRY GROUPS AND INDUSTRIES, FOR PROVIDENCIA: 1975

CODE	MAJOR INDUSTRY GROUPS AND INDUSTRIES	TOTAL VALUE OF FUELS CONSUMED (THOUSAND DOLLARS)	COAL		FUEL OIL		GAS		GASOLINE		ENERGY EQUIVALENT OF FUELS CONSUMED (1,000 KWH)	ELECTRICITY CONSUMED (1,000 KWH)[1]	TOTAL ELECTRIC ENERGY CONSUMED (1,000 KWH)
			METRIC TONS	VALUE (THOUSAND DOLLARS)	1,000 1,000 LITERS	VALUE (THOUSAND DOLLARS)	1,000 CU. METERS	VALUE (THOUSAND DOLLARS)	1,000 LITERS	VALUE (THOUSAND DOLLARS)			
	ALL MANUFACTURING ESTABLISHMENTS.....												
31	FOOD, BEVERAGES, AND TOBACCO.....												
32	TEXTILE, WEARING APPAREL, AND LEATHER.....												
33	WOOD AND WOOD PRODUCTS (INCLUDING FURNITURE).....												
34	PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING.....												
35	CHEMICALS AND CHEMICAL, PETROLEUM, COAL, RUBBER, AND PLASTIC PRODUCTS.....												
36	NON-METALLIC MINERAL PRODUCTS (EXCEPT PRODUCTS OF PETROLEUM AND COAL).....												
37	BASIC METAL.....												
	(Continue as in table 1)												

[1] SEE TABLE 8.

NOTE: THE CONTRIBUTION OF SMALL ESTABLISHMENTS (I.E. THOSE WITH LESS THAN 10 PERSONS ENGAGED) BY INDUSTRY AND PROVINCE IS SHOWN IN TABLE 22.

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Exhibit III-5-4. FINAL REPORT I: TABLE FORMATS FOR THE 1975 CENSUS OF MANUFACTURES--Continued

TABLE 8. ELECTRICITY CONSUMED, PURCHASED, PRODUCED, AND SOLD FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED BY MAJOR INDUSTRY GROUP AND INDUSTRY, FOR PROVIDENCIA: 1975

CODE	MAJOR INDUSTRY GROUP AND INDUSTRY	ELECTRICITY (1,000 KWH)				VALUE OF ELECTRICITY (THOUSAND DOLLARS)	
		CONSUMED	PURCHASED	PRODUCED IN THE ESTABLISHMENT	SOLD	PURCHASED	SOLD
32	ALL MANUFACTURING ESTABLISHMENTS.....						
31	FOOD, BEVERAGES, AND TOBACCO.....						
32	TEXTILE, WEARING APPAREL, AND LEATHER.....						
33	WOOD AND WOOD PRODUCTS (INCLUDING FURNITURE)....						
34	PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING..						
35	CHEMICALS AND CHEMICAL, PETROLEUM, COAL, RUBBER, AND PLASTIC PRODUCTS.....						
36	NON-METALLIC MINERAL PRODUCTS (EXCEPT PRODUCTS OF PETROLEUM AND COAL).....						
37	BASIC METAL.....						

(Continue as in table 1)

NOTE: THE CONTRIBUTION OF SMALL ESTABLISHMENTS (I.E. THOSE WITH LESS THAN 10 PERSONS ENGAGED) BY INDUSTRY AND PROVINCE IS SHOWN IN TABLE 22.

TABLE 9. PRINCIPAL MATERIALS, PARTS, AND COMPONENTS CONSUMED FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED BY INDUSTRY, FOR PROVIDENCIA: 1975

CODE	PRINCIPAL MATERIAL BY INDUSTRY	UNIT OF QUANTITY	QUANTITY	VALUE (THOUSAND DOLLARS)
	3111-SLAUGHTERING, PREPARING, AND PRESERVING MEAT			
	PRINCIPAL MATERIALS, PARTS AND COMPONENTS..	.....	(X)	
31111	CATTLE.....	NUMBER.....		
31112	HOGS.....	...DO.....		
31113	FRESH AND FROZEN BEEF.....	450 KGS.....		
31110	NOT SPECIFIED BY KIND.....	.....	(X)	
	(etc.)			
	3112-MANUFACTURING DAIRY PRODUCTS			
	PRINCIPAL MATERIALS, PARTS AND COMPONENTS..	.....	(X)	
31121	WHOLE MILK.....	HUNDRED WT.		
31122	CREAM.....	...DO.....		
31123	BUTTER.....	450 KGS.....		

(Continue with materials by industry)

(X) NOT APPLICABLE.

NOTE: THE CONTRIBUTION OF SMALL ESTABLISHMENTS (I.E. THOSW WITH LESS THAN 10 PERSONS ENGAGED) BY INDUSTRY AND PROVINCE IS SHOWN IN TABLE 22.

TABLE 10. INDUSTRY BY SELECTED MATERIALS, PARTS, AND COMPONENTS CONSUMED ON A WHEREVER BASIS FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED, FOR PROVIDENCIA: 1975

CODE	INDUSTRY BY SELECTED MATERIAL	UNIT OF QUANTITY	QUANTITY	VALUE (THOUSAND DOLLARS)
	31161-WHEAT FLOUR.....	450 KGS.....		
3113	CANNING AND PRESERVING OF FRUITS AND VEGETABLES...	...DO.....		
3116	GRAIN MILLS.....	...DO.....		
3117	BAKERY GOODS.....	...DO.....		
3121	FOOD PRODUCTS NOT ELSEWHERE CLASSIFIED.....	...DO.....		
3122	PREPARED ANIMAL FEEDS.....	...DO.....		
	31181-SUGAR.....	450 KGS.....		
3113	CANNING AND PRESERVING OF FRUITS AND VEGETABLES...	...DO.....		
3116	GRAIN MILLS.....	...DO.....		
3117	BAKERY PRODUCTS.....	...DO.....		
3119	COCOA, CHOCOLATE AND SUGAR CONFECTIONERY.....	...DO.....		
3121	FOOD PRODUCTS NOT ELSEWHERE CLASSIFIED.....	...DO.....		

(Continue with industry by material)

NOTE: ONLY INCLUDES MATERIALS THAT ARE USED IN SEVERAL INDUSTRIES AND FOR WHICH 90% OR MORE OF TOTAL MANUFACTURING CONSUMPTION HAS BEEN REPORTED AND TABULATED.

NOTE: THE CONTRIBUTION OF SMALL ESTABLISHMENTS (I.E. THOSE WITH LESS THAN 10 PERSONS ENGAGED) BY INDUSTRY AND PROVINCE IS SHOWN IN TABLE 22.

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Exhibit III-5-4. FINAL REPORT I: TABLE FORMATS FOR THE 1975 CENSUS OF MANUFACTURES--Continued

TABLE 11. VALUE OF GROSS OUTPUT FOR ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED BY MAJOR INDUSTRY GROUP AND INDUSTRY, FOR PROVIDENCIA: 1975

CODE	MAJOR INDUSTRY GROUP AND INDUSTRY	VALUE OF GROSS OUTPUT DURING THE YEAR (THOUSAND DOLLARS)				
		TOTAL	PRODUCTS SHIPPED	CONTRACT WORK	GOODS SOLD IN THE SAME CONDITION AS PURCHASED	OTHER RECEIPTS
	ALL MANUFACTURING ESTABLISHMENTS.....					
31	FOOD, BEVERAGES, AND TOBACCO.....					
32	TEXTILE, WEARING APPAREL, AND LEATHER.....					
33	WOOD AND WOOD PRODUCTS (INCLUDING FURNITURE)....					
34	PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING..					
35	CHEMICALS AND CHEMICAL, PETROLEUM, COAL, RUBBER, AND PLASTIC PRODUCTS.....					
36	NON-METALLIC MINERAL PRODUCTS (EXCEPT PRODUCTS OF PETROLEUM AND COAL).....					
37	BASIC METAL.....					
38	FABRICATED METAL PRODUCTS, MACHINERY, AND EQUIPMENT.....					
39	OTHER.....					
311-312	FOOD.....					
3111	SLAUGHTERING, PREPARING, AND PRESERVING MEAT.....					
3112	DAIRY PRODUCTS.....					
3113	CANNING AND PRESERVING OF FRUITS AND VEGETABLES..					

(Continue as in table 1)

NOTE: THE CONTRIBUTION OF SMALL ESTABLISHMENTS (I.E. THOSE WITH LESS THAN 10 PERSONS ENGAGED) BY INDUSTRY AND PROVINCE IS SHOWN IN TABLE 22.

TABLE 12. PRINCIPAL PRODUCTS SHIPPED ON A WHEREVER MADE BASIS FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED BY INDUSTRY, FOR PROVIDENCIA: 1975

CODE	MAJOR INDUSTRY GROUP AND INDUSTRY	UNIT OF QUANTITY	QUANTITY	VALUE (THOUSAND DOLLARS)
	3111-SLAUGHTERING, PREPARING, AND PRESERVING MEAT			
	TOTAL PRINCIPAL PRODUCTS SHIPPED.....	.....		
3111201	BEEF.....	450 KGS.-....		
3111202	VEAL.....	...DO.....		
3111203	SAUSAGE AND SIMILAR PRODUCTS.....	...DO.....		
	3112-MANUFACTURING DAIRY PRODUCTS			
	TOTAL PRINCIPAL PRODUCTS SHIPPED.....	.....		
3112201	CREAMERY BUTTER.....	450 KGS.....		
3112202	CHEESE.....	...DO.....		
3112203	CONDENSED AND EVAPORATED MILK.....	...DO.....		

(Continue with product by industry)

NOTE: ALTHOUGH THE PRODUCTS ARE ARRANGED BY THE 4-DIGIT INDUSTRY TO WHICH THEY ARE PRIMARY, THE QUANTITIES AND VALUES RELATE TO ALL SHIPMENTS OF THE PRODUCT WHETHER BY ESTABLISHMENTS IN THE SPECIFIED 4-DIGIT INDUSTRY OR BY ESTABLISHMENTS IN OTHER INDUSTRIES.

FOR A MEASURE OF THE EXTENT TO WHICH THE SHIPMENT VALUES SHOWN ABOVE ARE ACCOUNTED FOR BY ESTABLISHMENTS CLASSIFIED IN THE DESIGNATED INDUSTRY, SEE THE COVERAGE RATIO IN TABLE 13 OR COMPARE WITH THE TOTAL VALUE OF PRODUCTS SHIPPED IN TABLE 11. THE DEGREE TO WHICH ESTABLISHMENTS IN THE INDUSTRY PRODUCE AND SHIP PRODUCTS CLASSIFIED IN OTHER INDUSTRIES IS SHOWN BY THE SPECIALIZATION RATES IN TABLE 13.

NOTE: THE CONTRIBUTION OF SMALL ESTABLISHMENTS (I.E. THOSE WITH LESS THAN 10 PERSONS ENGAGED) BY INDUSTRY AND PROVINCE IS SHOWN IN TABLE 22.

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Exhibit III-5-4. FINAL REPORT I: TABLE FORMATS FOR THE 1975 CENSUS OF MANUFACTURES--Continued

TABLE 13. VALUE OF GROSS OUTPUT AND INPUT FOR ALL MANUFACTURING ESTABLISHMENTS BY MAJOR INDUSTRY GROUP AND INDUSTRY, FOR PROVIDENCIA: 1975

CODE	MAJOR INDUSTRY GROUP AND INDUSTRY	VALUE OF GROSS OUTPUT DURING YEAR (THOUSAND DOLLARS)					COSTS OF GROSS INPUT DURING YEAR (THOUSAND DOLLARS)				SPECIALIZATION RATIO[2]	COVERAGE RATIO[3]
		TOTAL	PRODUCTS SHIPPED	CONTRACT WORK	OTHER RECEIPTS	RESALES	TOTAL	MATERIALS, FUELS, ETC.[1]	CONTRACT WORK	PAYMENTS TO HOME-WORKERS		
	ALL MANUFACTURING ESTABLISHMENTS.....										(X)	(X)
31	FOOD, BEVERAGES, AND TOBACCO.....										(X)	(X)
32	TEXTILE, WEARING APPAREL, AND LEATHER.....										(X)	(X)
33	WOOD AND WOOD PRODUCTS (INCLUDING FURNITURE)....										(X)	(X)
34	PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING..										(X)	(X)
35	CHEMICALS AND CHEMICAL, PETROLEUM, COAL, RUBBER, AND PLASTIC PRODUCTS.....										(X)	(X)
36	NON-METALLIC MINERAL PRODUCTS (EXCEPT PRODUCTS OF PETROLEUM AND COAL).....										(X)	(X)
37	BASIC METAL.....										(X)	(X)
38	FABRICATED METAL PRODUCTS, MACHINERY, AND EQUIPMENT.....										(X)	(X)
39	OTHER.....										(X)	(X)
311-312	FOOD.....										(X)	(X)
3111	SLAUGHTERING, PREPARING AND PRESERVING MEAT.....											
3112	DAIRY PRODUCTS.....											
3113	CANNING AND PRESERVING OF FRUITS AND VEGETABLES. *(etc.)*											
313	BEVERAGES.....										(X)	(X)

(Continue as in table 1)

(X) NOT APPLICABLE.
[1]COST OF MATERIALS, PARTS, COMPONENTS, SUPPLIES, ETC.; FUELS, PURCHASED ELECTRICITY, MAINTENANCE AND REPAIR SERVICES, AND RESALES.
[2]SPECIALIZATION RATIO IS THE PROPORTION OF PRODUCT SHIPMENTS (BOTH PRIMARY AND SECONDARY) OF THE INDUSTRY REPRESENTED BY PRIMARY PRODUCTS.
[3]COVERAGE RATIO IS THE PROPORTION OF PRIMARY PRODUCTS SHIPPED BY THE ESTABLISHMENTS CLASSIFIED IN THE INDUSTRY TO TOTAL SHIPPED BY ALL ESTABLISHMENTS.

TABLE 14. GENERAL SUMMARY FOR ALL MANUFACTURING ESTABLISHMENTS, BY PROVINCE AND COUNTY: 1975 AND 1963

PROVINCE AND COUNTY	1975							1963	
	NUMBER OF ESTABLISHMENTS		NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES	VALUE OF--		VALUE ADDED	NUMBER OF PERSONS ENGAGED[1]	VALUE ADDED
	TOTAL	WITH 10 OR MORE PERSONS ENGAGED			INPUT	GROSS OUTPUT			
				(THOUSAND DOLLARS)	(THOUSAND DOLLARS)	(THOUSAND DOLLARS)	(THOUSAND DOLLARS)		(THOUSAND DOLLARS)
PROVIDENCIA.....									
CATEDRAL.....									
DAVID.....									
ESTRELLA.....									
FALCON.....									
GIRARDOT.....									
(etc.)									
CATEDRAL									
AMPARO COUNTY.....									
BARUTA COUNTY.....									
CANDELARIA COUNTY.....									
(etc.)									
DAVID									

(Continue with counties)

[1]DURING WEEK ENDING 15 NOVEMBER.

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Exhibit III-5-4. FINAL REPORT I: TABLE FORMATS FOR THE 1975 CENSUS OF MANUFACTURES--Continued

TABLE 15. SELECTED STATISTICS FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED, BY PROVINCE AND COUNTY: 1975

PROVINCE AND COUNTY	NUMBER OF EMPLOYEES			WAGES AND SALARIES PAID AND SUPPLEMENTARY LABOR COSTS (THOUSAND DOLLARS)					GROSS ADDITIONS TO FIXED ASSETS DURING THE YEAR (THOUSAND DOLLARS)		
	TOTAL	PRODUCTION WORKERS[1]	OTHER EMPLOYEES[2]	TOTAL	PRODUCTION WORKERS	SALARIES PAID TO OTHER EMPLOYEES	SUPPLEMENTARY LABOR COSTS		TOTAL	STRUCTURES AND ADDITIONS	MACHINERY AND EQUIPMENT
							LEGALLY REQUIRED	VOLUNTARY PROGRAMS			
PROVIDENCIA.....											
CATEDRAL.....											
DAVID.....											
ESTRELLA.....											
FALCON.....											
GIRARDOT.....											
(etc.)											
CATEDRAL											
AMPARO COUNTY.....											
BARUTA COUNTY.....											
CANDELARIA COUNTY.....											
(etc.)											

[1]AVERAGE OF FOUR MID-QUARTERLY PAY PERIODS.
[2]NUMBER AS OF WEEK ENDING NEAREST 15 NOVEMBER.
NOTE: THE CONTRIBUTION OF SMALL ESTABLISHMENTS (I.E. THOSE WITH LESS THAN 10 PERSONS ENGAGED) BY INDUSTRY AND PROVINCE IS SHOWN IN TABLE 22.

TABLE 16. GENERAL SUMMARY FOR MANUFACTURING ESTABLISHMENTS, BY INDUSTRY GROUP, FOR PROVINCES: 1975

CODE	INDUSTRY GROUP BY PROVINCE	NUMBER OF ESTABLISHMENTS		NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES	VALUE OF--		VALUE ADDED
		TOTAL	WITH 10 OR MORE PERSONS ENGAGED			INPUT (THOUSAND DOLLARS)	GROSS OUTPUT (THOUSAND DOLLARS)	(THOUSAND DOLLARS)
	CATEDRAL.....							
31	FOOD, BEVERAGES, AND TOBACCO.....							
311-312	FOOD.....							
313	BEVERAGES.....							
314	TOBACCO.....							
32	TEXTILE, WEARING APPAREL, AND LEATHER.							
321	TEXTILES.....							
322	WEARING APPAREL (EXCEPT FOOTWEAR).....							
	(etc.),							
	DAVID.....							
31	FOOD, BEVERAGES, AND TOBACCO.....							
311-312	FOOD.....							
313	BEVERAGES.....							
314	TOBACCO.....							
	(Continue with industry groups by province)							

[1]DURING WEEK ENDING NEAREST 15 NOVEMBER.

TABLE 17. SELECTED DETAILED STATISTICS FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED BY MAJOR INDUSTRY GROUP, BY PROVINCE AND COUNTY: 1975

PROVINCE AND COUNTY	NUMBER OF EMPLOYEES			WAGES AND SALARIES PAID AND SUPPLEMENTARY LABOR COSTS (THOUSAND DOLLARS)					GROSS ADDITIONS TO FIXED ASSETS DURING THE YEAR (THOUSAND DOLLARS)		
	TOTAL	PRODUCTION WORKERS[1]	OTHER EMPLOYEES[2]	TOTAL	PRODUCTION WORKERS	SALARIES PAID TO OTHER EMPLOYEES	SUPPLEMENTARY LABOR COSTS		TOTAL	STRUCTURES AND ADDITIONS	MACHINERY AND EQUIPMENT
							LEGALLY REQUIRED	VOLUNTARY PROGRAMS			
(Copy stub as in table 16)											

[1]AVERAGE OF FOUR MID-QUARTERLY PAY PERIODS.
[2]NUMBER AS OF WEEK ENDING NEAREST 15 NOVEMBER.

NOTE: THE CONTRIBUTION OF SMALL ESTABLISHMENTS (I.E. THOSE WITH LESS THAN 10 PERSONS ENGAGED) BY INDUSTRY AND PROVINCE IS SHOWN IN TABLE 22.

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Exhibit III-5-4. FINAL REPORT I: TABLE FORMATS FOR THE 1975 CENSUS OF MANUFACTURES--Continued

TABLE 18. NUMBER OF MANUFACTURING ESTABLISHMENTS BY INDUSTRY GROUP AND SIZE, FOR PROVINCES: 1975

CODE	INDUSTRY GROUP BY PROVINCE	ALL ESTABLISHMENTS	NUMBER OF ESTABLISHMENTS BY SIZE[1]							
			1 TO 4 PERSONS ENGAGED	5 TO 9 PERSONS ENGAGED	10 TO 19 PERSONS ENGAGED	20 TO 49 PERSONS ENGAGED	50 TO 99 PERSONS ENGAGED	100 TO 249 PERSONS ENGAGED	250 TO 499 PERSONS ENGAGED	500 OR MORE PERSONS ENGAGED
	PROVIDENCIA.....									
311-312	FOOD.....									
313	BEVERAGES.....									
314	TOBACCO.....									
321	TEXTILES.....									
322	WEARING APPAREL (EXCEPT FOOTWEAR).....									
323	LEATHER AND PRODUCTS OF LEATHER, LEATHER SUBSTITUTES AND FUR (EXCEPT FOOTWEAR AND WEARING APPAREL).....									
324	FOOTWEAR (EXCEPT VULCANIZED OR MOULDED RUBBER OR PLASTIC FOOTWEAR).....									
	(etc.)									
	CATEDRAL.....									
311-312	FOOD.....									
313	BEVERAGES.....									
314	TOBACCO.....									
	(Continue with industry group by province)									

[1]SIZE BASED ON NUMBER OF PERSONS ENGAGED DURING WEEK ENDING NEAREST 15 NOVEMBER.

TABLE 19. NUMBER OF MANUFACTURING ESTABLISHMENTS BY INDUSTRY GROUP AND SIZE, FOR COUNTIES: 1975

CODE	INDUSTRY BY COUNTY	ALL ESTABLISHMENTS	NUMBER OF ESTABLISHMENTS BY SIZE[1]		
			1 TO 4 PERSONS ENGAGED	5 TO 9 PERSONS ENGAGED	10 OR MORE PERSONS ENGAGED
	CATEDRAL				
	AMPARO COUNTY.....				
31	FOOD, BEVERAGES, AND TOBACCO.....				
32	TEXTILE, WEARING APPAREL AND LEATHER.....				
33	WOOD AND WOOD PRODUCTS (INCLUDING FURNITURE).....				
34	PAPER AND PAPER PRODUCTS; PRINTING AND PUBLISHING.....				
35	CHEMICALS AND CHEMICAL, PETROLEUM, COAL, RUBBER, AND PLASTIC PRODUCTS.....				
36	NON-METALLIC MINERAL PRODUCTS (EXCEPT PRODUCTS OF PETROLEUM AND COAL).....				
37	BASIC METAL.....				
38	FABRICATED METAL PRODUCTS, MACHINERY AND EQUIPMENT....				
39	OTHER.....				
	BARUTA COUNTY.....				
31	FOOD, BEVERAGES, AND TOBACCO.....				
32	TEXTILE, WEARING APPAREL AND LEATHER.....				
	(etc.)				
	DAVID				
	ANZOATEGUI COUNTY.....				
31	FOOD, BEVERAGES, AND TOBACCO.....				
32	TEXTILE, WEARING APPAREL AND LEATHER.....				
	(Continue with industry group by county)				

[1]SIZE BASED ON NUMBER OF PERSONS ENGAGED DURING WEEK ENDING NEAREST 15 NOVEMBER.

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Exhibit III-5-4. FINAL REPORT I: TABLE FORMATS FOR THE 1975 CENSUS OF MANUFACTURES--Continued

TABLE 20. NUMBER OF MANUFACTURING ESTABLISHMENTS BY SIZE, FOR COUNTIES: 1975

PROVINCE AND COUNTY	ALL ESTABLISHMENTS	NUMBER OF ESTABLISHMENTS BY SIZE[1]							
		1 TO 4 PERSONS ENGAGED	5 TO 9 PERSONS ENGAGED	10 TO 19 PERSONS ENGAGED	20 TO 49 PERSONS ENGAGED	50 TO 99 PERSONS ENGAGED	100 TO 249 PERSONS ENGAGED	250 TO 499 PERSONS ENGAGED	500 OR MORE PERSONS ENGAGED
PROVIDENCIA.....									
CATEDRAL.....									
AMPARO COUNTY.....									
BARUTA COUNTY.....									
CANDELARIA COUNTY.....									
EL SOMBRERO COUNTY.....									
FIGUEROA COUNTY.....									
GUARENAS COUNTY.....									
JUAREZ COUNTY.....									
LAREDO COUNTY.....									
(etc.)									
DAVID.....									
(Continue with counties and provinces)									

[1]SIZE BASED ON NUMBER OF PERSONS ENGAGED DURING WEEK ENDING NEAREST 15 NOVEMBER.

TABLE 21. NUMBER OF MANUFACTURING ESTABLISHMENTS BY SIZE, FOR COUNTIES AND WARDS: 1975

COUNTY AND WARD BY PROVINCE	ALL ESTABLISHMENTS	NUMBER OF ESTABLISHMENTS BY SIZE[1]			COUNTY AND WARD BY PROVINCE	ALL ESTABLISHMENTS	NUMBER OF ESTABLISHMENTS BY SIZE[1]		
		1 TO 4 PERSONS ENGAGED	5 TO 9 PERSONS ENGAGED	10 OR MORE PERSONS ENGAGED			1 TO 4 PERSONS ENGAGED	5 TO 9 PERSONS ENGAGED	10 OR MORE PERSONS ENGAGED
CATEDRAL					ZAPATA				
AMPARO COUNTY.....					ALICANTE COUNTY....				
BARBADOS WARD.....					ALAMEDA WARD.....				
BENI WARD.....					BOLIVAR WARD.....				
BUENOS AIRES WARD.....					DAMASCO WARD.....				
CANTORIA WARD.....					EL PALMAR WARD.....				
CAROLINA WARD.....					FLANDES WARD.....				
CASTILLO WARD.....					GENOVA WARD.....				
EL PORTAL WARD.....					JUPITER WARD.....				
(etc.)					*(etc.)*				
BARUTA COUNTY.....					ALMIRANTE COUNTY...				
ATRATO WARD.....					LAS VEGAS WARD.....				
BERMEO WARD.....					LOS ALAMOS WARD.....				
CASABLANCA WARD.....					MANAGUA WARD.....				
(etc.)					*(etc.)*				

(Continue with counties and wards by province)

[1]SIZE BASED ON NUMBER OF PERSONS ENGAGED DURING WEEK ENDING NEAREST 15 NOVEMBER.

TABLE 22. GENERAL SUMMARY FOR MANUFACTURING ESTABLISHMENTS BY SIZE AND BY INDUSTRY GROUPS AND INDUSTRIES FOR PROVIDENCIA AND BY PROVINCE FOR ALL MANUFACTURING: 1975

NUMBER OF PERSONS ENGAGED BY INDUSTRY GROUP	NUMBER OF ESTABLISHMENTS	NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES (THOUSAND DOLLARS)	VALUE OF--		VALUE ADDED (THOUSAND DOLLARS)
				INPUT (THOUSAND DOLLARS)	GROSS OUTPUT (THOUSAND DOLLARS)	
ALL MANUFACTURING ESTABLISHMENTS.....						
ESTABLISHMENTS WITH--						
1 TO 4 PERSONS ENGAGED.....						
5 TO 9 PERSONS ENGAGED.....						
10 TO 19 PERSONS ENGAGED.....						
(etc.)						
31--FOOD, BEVERAGES, AND TOBACCO.....						
ESTABLISHMENTS WITH--						
1 TO 4 PERSONS ENGAGED.....						
5 TO 9 PERSONS ENGAGED.....						
(Continue with persons engaged by industry group)						
(Continue as in Table 1)						

[1]DURING WEEK ENDED NEAREST 15 NOVEMBER.

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TABLE 23. SELECTED DETAILED STATISTICS FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED, BY NUMBER OF PERSONS ENGAGED, FOR PROVIDENCIA: 1975

NUMBER OF PERSONS ENGAGED BY INDUSTRY GROUP	NUMBER OF EMPLOYEES			WAGES AND SALARIES PAID AND SUPPLEMENTARY LABOR COSTS (THOUSAND DOLLARS)					GROSS ADDITIONS TO FIXED ASSETS DURING THE YEAR (THOUSAND DOLLARS)		
	TOTAL	PRODUCTION WORKERS[1]	OTHER[2]	TOTAL	PRODUCTION WORKERS	SALARIES PAID TO OTHER EMPLOYEES	SUPPLEMENTARY LABOR COSTS		TOTAL	STRUCTURES AND ADDITIONS	MACHINERY AND EQUIPMENT
							LEGALLY REQUIRED	VOLUNTARY PROGRAMS			
ALL MANUFACTURING ESTABLISHMENTS..											
ESTABLISHMENTS WITH--											
10 TO 19 PERSONS ENGAGED.....											
20 TO 49 PERSONS ENGAGED.....											
50 TO 99 PERSONS ENGAGED.....											
100 TO 249 PERSONS ENGAGED.....											
250 TO 499 PERSONS ENGAGED.....											
500 OR MORE PERSONS ENGAGED.....											
31--FOOD, BEVERAGES, AND TOBACCO.....											
ESTABLISHMENTS WITH--											
10 TO 19 PERSONS ENGAGED.....											
20 TO 49 PERSONS ENGAGED.....											
50 TO 99 PERSONS ENGAGED.....											
100 TO 249 PERSONS ENGAGED.....											
250 TO 499 PERSONS ENGAGED.....											
500 OR MORE PERSONS ENGAGED.....											
(Continue with persons engaged by industry group)											

[1]AVERAGE OF FOUR MID-QUARTERLY PAY PERIODS.
[2]DURING WEEK ENDING NEAREST 15 NOVEMBER.

NOTE: THE CONTRIBUTION OF SMALL ESTABLISHMENTS (I.E. THOSE WITH LESS THAN 10 PERSONS ENGAGED) BY INDUSTRY AND PROVINCE IS SHOWN IN TABLE 22.

TABLE 24. SELECTED DETAILED STATISTICS FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED, BY LEGAL ORGANIZATION AND TYPE OF OWNERSHIP, FOR PROVIDENCIA: 1975

LEGAL ORGANIZATION AND TYPE OF OWNERSHIP	NUMBER OF EMPLOYEES			WAGES AND SALARIES PAID AND SUPPLEMENTARY LABOR COSTS (THOUSAND DOLLARS)					GROSS ADDITIONS TO FIXED ASSETS DURING THE YEAR (THOUSAND DOLLARS)		
	TOTAL	PRODUCTION WORKERS	OTHER[2]	TOTAL	PRODUCTION WORKERS	SALARIES PAID TO OTHER EMPLOYEES	SUPPLEMENTARY LABOR COSTS		TOTAL	STRUCTURES AND ADDITIONS	MACHINERY AND EQUIPMENT
							LEGALLY REQUIRED	VOLUNTARY PROGRAMS			
ALL MANUFACTURING ESTABLISHMENTS...											
INDIVIDUAL PROPRIETORSHIP.....											
PARTNERSHIP.....											
CORPORATION.....											
GOVERNMENT ENTERPRISE.....											
COOPERATIVE.....											
OTHER.....											

[1]AVERAGE OF FOUR MID-QUARTERLY PAY PERIODS.
[2]DURING WEEK ENDING NEAREST 15 NOVEMBER.

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Exhibit III-5-4. FINAL REPORT I: TABLE FORMATS FOR THE 1975 CENSUS OF MANUFACTURES--Continued

TABLE 25. SELECTED STATISTICS FOR MANUFACTURING ESTABLISHMENTS BY INDUSTRY GROUP, LEGAL ORGANIZATION, AND TYPE OF OWNERSHIP, FOR PROVIDENCIA: 1975

LEGAL ORGANIZATION AND TYPE OF OWNERSHIP BY INDUSTRY GROUP	NUMBER OF ESTABLISH-MENTS	NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES	VALUE OF--		VALUE ADDED
				INPUT (THOUSAND DOLLARS)	GROSS OUTPUT (THOUSAND DOLLARS)	(THOUSAND DOLLARS)
ALL MANUFACTURING ESTABLISHMENTS...						
INDIVIDUAL PROPRIETORSHIP.....						
PARTNERSHIP.....						
CORPORATION.....						
GOVERNMENT ENTERPRISE.....						
COOPERATIVE.....						
OTHER.....						
31--FOOD, BEVERAGES, AND TOBACCO.....						
INDIVIDUAL PROPRIETORSHIP.....						
PARTNERSHIP.....						
CORPORATION.....						
GOVERNMENT ENTERPRISE.....						
COOPERATIVE.....						
OTHER.....						
(Continue with legal organization and type of ownership by industry group)						

[1]NUMBER AS OF WEEK ENDING NEAREST 15 NOVEMBER.

NOTE: THE CONTRIBUTION OF SMALL ESTABLISHMENTS (I.E. THOSE WITH LESS THAN 10 PERSONS ENGAGED) BY INDUSTRY AND PROVINCE IS SHOWN IN TABLE 22.

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Exhibit III-5-5. FINAL REPORT II: TABLE FORMATS FOR THE 1975 CENSUS OF MINERAL INDUSTRIES

TABLE 1. SELECTED STATISTICS FOR MINERAL ESTABLISHMENTS BY MAJOR INDUSTRY GROUP AND INDUSTRY, FOR PROVIDENCIA, 1975 AND 1963

CODE	MAJOR INDUSTRY GROUP AND INDUSTRY	1975								1963	
		NUMBER OF ESTABLISHMENTS		NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES	GROSS ADDITIONS TO FIXED ASSETS[2]	VALUE OF--		VALUE ADDED	NUMBER OF PERSONS ENGAGED[1]	VALUE ADDED
		TOTAL	WITH 10 OR MORE PERSONS ENGAGED		(THOUSAND DOLLARS)	(THOUSAND DOLLARS)	INPUT (THOUSAND DOLLARS)	GROSS OUTPUT (THOUSAND DOLLARS)	(THOUSAND DOLLARS)		(THOUSAND DOLLARS)
	ALL MINERAL ESTABLISHMENTS.....										
21	COAL MINING.....										
22	CRUDE PETROLEUM AND NATURAL GAS.....										
23	METAL ORE.....										
2301	IRON ORE.....										
2302	NON-FERROUS ORE.....										
29	OTHER MINING.....										
2901	STONE QUARRYING, CLAY AND SAND PITS.....										
2902	CHEMICAL AND FERTILIZER MINERAL.....										
2903	SALT.....										
2909	NOT ELSEWHERE CLASSIFIED.....										

[1]WEEK ENDING NEAREST 15 NOVEMBER.
[2]INCLUDES THE DEVELOPMENT AND EXPLORATION OF MINERAL PROPERTY.

TABLE 2. PERSONS ENGAGED, WEEKLY AND ANNUAL PAYROLLS, FOR MINERAL ESTABLISHMENTS, BY MAJOR INDUSTRY GROUP AND INDUSTRY, FOR PROVIDENCIA, 1975

CODE	MAJOR INDUSTRY GROUP AND INDUSTRY	NUMBER OF PERSONS ENGAGED[1]					WEEKLY PAYROLL (THOUSAND DOLLARS)		ANNUAL PAYROLL (THOUSAND DOLLARS)	
		TOTAL	OWNERS AND ACTIVE PARTNERS	FAMILY AND OTHER UNPAID WORKERS	PRODUCTION, DEVELOPMENT, AND EXPLORATION WORKERS	OTHER	PRODUCTION, DEVELOPMENT, AND EXPLORATION WORKERS	OTHER EMPLOYEES	PRODUCTION, DEVELOPMENT, AND EXPLORATION WORKERS	OTHER EMPLOYEES
	ALL MINERAL ESTABLISHMENTS.....									
21	COAL MINING.....									
22	CRUDE PETROLEUM AND NATURAL GAS.....									
23	METAL ORE.....									
2301	IRON ORE.....									
2302	NON-FERROUS ORE.....									
29	OTHER MINING.....									
2901	STONE QUARRYING, CLAY AND SAND PITS.....									
2902	CHEMICAL AND FERTILIZER MINERAL.....									
2903	SALT.....									
2909	NOT ELSEWHERE CLASSIFIED.....									

[1]WEEK ENDING NEAREST 15 NOVEMBER.

TABLE 3. EMPLOYMENT, SALARIES AND WAGES PAID, SUPPLEMENTARY LABOR COSTS AND MAN-DAYS WORKED, FOR MINERAL ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED, BY MAJOR INDUSTRY GROUP AND INDUSTRY, FOR PROVIDENCIA, 1975

CODE	MAJOR INDUSTRY GROUP AND INDUSTRY	NUMBER OF EMPLOYEES			WAGES AND SALARIES PAID AND SUPPLEMENTARY LABOR COSTS (THOUSAND DOLLARS)					MAN-DAYS WORKED BY PRODUCTION, DEVELOPMENT, AND EXPLORATION WORKERS
		TOTAL	PRODUCTION, DEVELOPMENT, AND EXPLORATION WORKERS[1]	OTHER EMPLOYEES[2]	TOTAL	PRODUCTION, DEVELOPMENT, AND EXPLORATION WORKERS	SALARIES PAID TO OTHER EMPLOYEES	SUPPLEMENTARY LABOR COSTS		
								LEGALLY REQUIRED	VOLUNTARY PROGRAMS	
	ALL MINERAL ESTABLISHMENTS.....									
21	COAL MINING.....									
22	CRUDE PETROLEUM AND NATURAL GAS.....									
23	METAL ORE.....									
2301	IRON ORE.....									
2302	NON-FERROUS ORE.....									
29	OTHER MINING.....									

(Continue as in table 1)

[1]AVERAGE OF FOUR MID-QUARTERLY PAY PERIODS.
[2]INCLUDES THE DEVELOPMENT AND EXPLORATION OF MINERAL PROPERTY.

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Exhibit III-5-5. FINAL REPORT II: TABLE FORMATS FOR THE 1975 CENSUS OF MINERAL INDUSTRIES--Continued

TABLE 4. ACQUISITIONS AND SALES OF FIXED ASSETS, FOR MINERAL ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED, BY MAJOR INDUSTRY GROUP AND INDUSTRY, FOR PROVIDENCIA: 1975

CODE	MAJOR INDUSTRY GROUP AND INDUSTRY	GROSS ADDITIONS TO FIXED ASSETS (THOUSAND DOLLARS)			ACQUISITIONS OF NEW FIXED ASSETS (THOUSAND DOLLARS)		ACQUISITION OF USED FIXED ASSETS (THOUSAND DOLLARS)	
		TOTAL	STRUCTURES AND ADDITIONS[1]	MACHINERY AND EQUIPMENT	STRUCTURES AND ADDITIONS[1]	MACHINERY AND EQUIPMENT	STRUCTURES	MACHINERY AND EQUIPMENT
	ALL MINERAL ESTABLISHMENTS.....							
21	COAL MINING.....							
22	CRUDE PETROLEUM AND NATURAL GAS.....							
23	METAL ORE.....							
2301	IRON ORE.....							
2302	NON-FERROUS ORE.....							
29	OTHER MINING.....							
	(Continue as in table 1)							

[1]INCLUDES DEVELOPMENT AND EXPLORATION OF MINERAL PROPERTY.

TABLE 5. INPUT COSTS FOR MINERAL ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED, BY MAJOR INDUSTRY GROUP AND INDUSTRY, FOR PROVIDENCIA: 1975

CODE	MAJOR INDUSTRY GROUP AND INDUSTRY	INPUT COSTS DURING THE YEAR (THOUSAND DOLLARS)						
		TOTAL	MINERALS RECEIVED AND PURCHASED SUPPLIES	FUELS CONSUMED	ELECTRICITY PURCHASED	REPAIRS AND MAINTENANCE SERVICE	CONTRACT WORK	PURCHASED MACHINERY INSTALLED
	ALL MINERAL ESTABLISHMENTS.....							
21	COAL MINING.....							
22	CRUDE PETROLEUM AND NATURAL GAS.....							
23	METAL ORE.....							
2301	IRON ORE.....							
2302	NON-FERROUS ORE.....							
29	OTHER MINING.....							
	(Continue as in table 1)							

TABLE 6. ELECTRICITY CONSUMED, PURCHASED, PRODUCED, AND SOLD, FOR MINERAL ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED, BY MAJOR INDUSTRY GROUP AND INDUSTRY, FOR PROVIDENCIA: 1975

CODE	MAJOR INDUSTRY GROUP AND INDUSTRY	QUANTITY OF ELECTRICITY (1,000 KILOWATT HOURS)				VALUE OF ELECTRICITY (THOUSAND DOLLARS)	
		CONSUMED	PURCHASED	PRODUCED IN THE ESTABLISHMENT	SOLD	PURCHASED	SOLD
	ALL MINERAL ESTABLISHMENTS.....						
21	COAL MINING.....						
22	CRUDE PETROLEUM AND NATURAL GAS.....						
23	METAL ORE.....						
2301	IRON ORE.....						
2302	NON-FERROUS ORE.....						
29	OTHER MINING.....						
	(Continue as in table 1)						

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Exhibit III-5-5. FINAL REPORT II: TABLE FORMATS FOR THE 1975 CENSUS OF MINERAL INDUSTRIES--Continued

TABLE 7. PRINCIPAL FUELS CONSUMED FOR MINERAL ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED, BY MAJOR INDUSTRY GROUP AND INDUSTRY, FOR PROVIDENCIA, 1975

CODE	MAJOR INDUSTRY GROUP AND INDUSTRY	TOTAL VALUE OF FUELS CONSUMED (THOUSAND DOLLARS)	COAL		FUEL OIL		GAS		GASOLINE		OTHER FUELS VALUE (THOUSAND DOLLARS)	ENERGY EQUIVALENT OF FUELS CONSUMED (1,000 KWH) [1]	ELECTRICITY CONSUMED (1,000 KWH)	TOTAL ELECTRIC ENERGY CONSUMED (1,000 KWH)
			METRIC TONS	VALUE (THOUSAND DOLLARS)	1,000 LITERS	VALUE (THOUSAND DOLLARS)	1,000 CU. METERS	VALUE (THOUSAND DOLLARS)	1,000 LITERS	VALUE (THOUSAND DOLLARS)				
	ALL MINERAL ESTABLISHMENTS....													
21	COAL MINING.....													
22	CRUDE PETROLEUM AND NATURAL GAS.....													
23	METAL ORE.....													
2301	IRON ORE.....													
2302	NON-FERROUS ORE.....													
29	OTHER MINING.....													

(Continue as in table 1)

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Exhibit III-5-5. FINAL REPORT II: TABLE FORMATS FOR THE 1975 CENSUS OF MINERAL INDUSTRIES--Continued

TABLE 8. PRINCIPAL MATERIALS RECEIVED FOR TREATMENT AND SUPPLIES CONSUMED FOR MINERAL ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED BY INDUSTRY, FOR PROVIDENCIA: 1975

CODE	PRINCIPAL MATERIALS AND SUPPLIES BY INDUSTRY	UNIT OF QUANTITY	QUANTITY	VALUE (THOUSAND DOLLARS)
	2301-IRON ORE			
	MATERIALS RECEIVED AND SUPPLIES CONSUMED..		(X)	
23011	CRUDE ORES RECEIVED FOR PREPARATION.....	..METRIC TONS.		
37103	STEEL MILL SHAPES AND FORMS.....	.....DO.....		
	(etc.)			
	2302-NON-FERROUS ORE			
	MATERIALS RECEIVED AND SUPPLIES CONSUMED..		(X)	
23021	COPPER ORE RECEIVED FOR PREPARATION.....	..METRIC TONS.		
37103	STEEL MILL SHAPES AND FORMS.....	.....DO.....		
	(etc.)			
	(Continue with materials and supplies by industry)			

TABLE 9. VALUE OF GROSS OUTPUT FOR MINERAL ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED BY MAJOR INDUSTRY GROUP AND INDUSTRY, FOR PROVIDENCIA: 1975

CODE	MAJOR INDUSTRY GROUP AND INDUSTRY	VALUE OF GROSS OUTPUT DURING THE YEAR (THOUSAND DOLLARS)		
		TOTAL	VALUE OF PRODUCTS PRODUCED	VALUE OF CONTRACT WORK
	ALL MINERAL ESTABLISHMENTS.....			
21	COAL MINING.....			
22	CRUDE PETROLEUM AND NATURAL GAS.....			
23	METAL ORE.....			
2301	IRON ORE.....			
2302	NON-FERROUS ORE.....			
29	OTHER MINING.....			
	(Continue as in table 1)			

TABLE 10. PRINCIPAL PRODUCTS SHIPPED FOR MINERAL ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED BY INDUSTRY, FOR PROVIDENCIA: 1975

CODE	PRODUCTS BY INDUSTRY	UNIT OF QUANTITY	QUANTITY	VALUE (THOUSAND DOLLARS)
	21-COAL MINING			
	SHIPMENTS BY PLANTS IN ALL INDUSTRIES.....			
21001	COAL.....			
21002	COKE.....			
21003	BRIQUETTES.....			
	22-CRUDE PETROLEUM AND NATURAL GAS			
	SHIPMENTS BY PLANTS IN ALL INDUSTRIES.....			
22001	PETROLEUM--CRUDE.....			
22002	PETROLEUM--PARTLY REFINED.....			
22003	GAS--NATURAL.....			
22004	GAS--MANUFACTURED.....			
	(etc.)			

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Exhibit III-5-5. FINAL REPORT II: TABLE FORMATS FOR THE 1975 CENSUS OF MINERAL INDUSTRIES--Continued

TABLE 11. VALUE OF GROSS INPUT AND OUTPUT FOR MINERAL ESTABLISHMENTS BY MAJOR INDUSTRY GROUP AND INDUSTRY, FOR PROVIDENCIA: 1975

CODE	INDUSTRY GROUP AND INDUSTRY	VALUE OF GROSS OUTPUT DURING THE YEAR (THOUSAND DOLLARS)			COSTS OF GROSS INPUT DURING THE YEAR (THOUSAND DOLLARS)			
		TOTAL	VALUE OF PRODUCTS PRODUCED	VALUE OF CONTRACT WORK	TOTAL	COST OF MINERALS RECEIVED AND PURCHASED SUPPLIES	COST OF CONTRACT WORK	COST OF PURCHASED MACHINERY INSTALLED
	ALL MINERAL ESTABLISHMENTS.....							
21	COAL MINING.....							
22	CRUDE PETROLEUM AND NATURAL GAS.....							
23	METAL ORE.....							
2301	IRON ORE.....							
2302	NON-FERROUS ORE.....							
29	OTHER MINING.....							
	(Continue as in table 1)							

TABLE 12. GENERAL SUMMARY FOR ALL MINERAL ESTABLISHMENTS, BY PROVINCE AND COUNTY: 1975 AND 1963

PROVINCE AND COUNTY	1975								1963	
	NUMBER OF ESTABLISHMENTS		NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES (THOUSAND DOLLARS)	GROSS ADDITIONS TO FIXED ASSETS[2]	VALUE OF--		VALUE ADDED (THOUSAND DOLLARS)	NUMBER OF PERSONS ENGAGED[1]	VALUE ADDED (THOUSAND DOLLARS)
	TOTAL	WITH 10 OR MORE PERSONS ENGAGED				INPUT (THOUSAND DOLLARS)	GROSS OUTPUT (THOUSAND DOLLARS)			
PROVIDENCIA.....										
CATEDRAL.....										
DAVID.....										
ESTRELLA.....										
FALCON.....										
GIRARDOT.....										
(etc.)										
CATEDRAL										
AMPARO COUNTY.....										
BARUTA COUNTY.....										
CANDELARIA COUNTY.....										
(etc.)										
DAVID										
(Continue with counties by province)										

[1]WEEK ENDING NEAREST 15 NOVEMBER.
[2]INCLUDES THE DEVELOPMENT AND EXPLORATION OF MINERAL PROPERTY.

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Exhibit III-5-5. FINAL REPORT II: TABLE FORMATS FOR THE 1975 CENSUS OF MINERAL INDUSTRIES--Continued

TABLE 13. SELECTED DETAILED STATISTICS FOR MINERAL ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED, BY MAJOR INDUSTRY GROUP, FOR PROVINCES AND COUNTIES: 1975

PROVINCE AND COUNTY	NUMBER OF EMPLOYEES			WAGES AND SALARIES PAID AND SUPPLEMENTARY LABOR COSTS (THOUSAND DOLLARS)					GROSS ADDITIONS TO FIXED ASSETS DURING THE YEAR (THOUSAND DOLLARS)		
	TOTAL	PRODUCTION, DEVELOPMENT, AND EXPLORATION WORKERS[1]	OTHER EMPLOYEES[2]	TOTAL	PRODUCTION, DEVELOPMENT, AND EXPLORATION WORKERS	SALARIES PAID TO OTHER EMPLOYEES	SUPPLEMENTARY LABOR COSTS		TOTAL[3]	STRUCTURES AND ADDITIONS[3]	MACHINERY AND EQUIPMENT
							LEGALLY REQUIRED	VOLUNTARY PROGRAMS			
PROVIDENCIA.....											
CATEDRAL.....											
DAVID.....											
ESTRELLA.....											
FALCON.....											
GIRARDOT.....											
(etc.)											
CATEDRAL											
AMPARO COUNTY.....											
BARUTA COUNTY.....											
CANDELARIA COUNTY.....											
(etc.)											
DAVID											
(Continue with counties by province)											

[1]AVERAGE OF FOUR MID-QUARTERLY PAY PERIODS.
[2]NUMBER AS OF WEEK ENDED NEAREST 15 NOVEMBER.
[3]INCLUDES DEVELOPMENT AND EXPLORATION OF MINERAL PROPERTY.

TABLE 14. NUMBER OF MINERAL ESTABLISHMENTS MY MAJOR INDUSTRY GROUP, BY ESTABLISHMENT SIZE, FOR PROVINCES AND COUNTIES: 1975

(SIZE BASED ON NUMBER OF PERSONS ENGAGED)

CODE	PROVINCE AND INDUSTRY GROUP	ALL ESTABLISHMENTS	NUMBER OF ESTABLISHMENTS BY SIZE							
			1 TO 4 PERSONS	5 TO 9 PERSONS	10 TO 19 PERSONS	20 TO 49 PERSONS	50 TO 99 PERSONS	100 TO 249 PERSONS	250 TO 499 PERSONS	500 OR MORE
	PROVIDENCIA.....									
21	COAL MINING.....									
22	CRUDE PETROLEUM AND NATURAL GAS.....									
23	METAL ORE.....									
2301	IRON ORE.....									
2302	NON-FERROUS ORE.....									
29	OTHER MINING.....									
2901	STONE QUARRYING, CLAY AND SAND PITS..									
2902	CHEMICAL AND FERTILIZER MINERAL.....									
2903	SALT.....									
2909	NOT ELSEWHERE CLASSIFIED.....									
	CATEDRAL.....									
21	COAL MINING.....									
22	CRUDE PETROLEUM AND NATURAL GAS.....									
	(etc.)									
	DAVID.....									
21	COAL MINING.....									
22	CRUDE PETROLEUM AND NATURAL GAS.....									
	(etc.)									
	(Continue with industry by province)									

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Exhibit III-5-5. FINAL REPORT II: TABLE FORMATS FOR THE 1975 CENSUS OF MINERAL INDUSTRIES--Continued

TABLE 15. NUMBER OF MINERAL ESTABLISHMENTS, BY WARD AND BY ESTABLISHMENT SIZE: 1975

(SIZE BASED ON NUMBER OF PERSONS ENGAGED)

PROVINCE, COUNTY, AND WARD	ALL ESTABLISHMENTS	NUMBER OF ESTABLISHMENTS BY SIZE[1] (PERSONS ENGAGED)		
		1 TO 4	5 TO 9	10 OR MORE
CATEDRAL				
AMPARO COUNTY.....				
BARBADOS WARD.....				
BENI WARD.....				
BUENOS AIRES WARD.....				
CANTORIA WARD.....				
(etc.)				
BARUTA COUNTY.....				
ATRATO WARD.....				
BERMEO WARD.....				
CASABLANCA WARD.....				
(etc.)				
DAVID				
ANZOATEGUI COUNTY.....				
BERMUDA WARD.....				
NEPAL WARD.....				
(etc.)				
(Continue with wards and counties for each province)				

[1]NUMBER OF PERSONS ENGAGED DURING WEEK ENDING NEAREST 15 NOVEMBER.

TABLE 16. GENERAL SUMMARY FOR ALL MINERAL ESTABLISHMENTS BY INDUSTRY GROUP AND SIZE OF ESTABLISHMENT, FOR PROVIDENCIA: 1975

NUMBER OF PERSONS ENGAGED BY INDUSTRY GROUP	NUMBER OF ESTABLISHMENTS	NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES (THOUSAND DOLLARS)	GROSS ADDITIONS TO FIXED ASSETS[2] (THOUSAND DOLLARS)	VALUE OF--		VALUE ADDED (THOUSAND DOLLARS)
					INPUT[3] (THOUSAND DOLLARS)	GROSS OUTPUT (THOUSAND DOLLARS)	
ALL MINERAL ESTABLISHMENTS.....							
ESTABLISHMENTS WITH--							
1 TO 4 PERSONS ENGAGED.....							
5 TO 9 PERSONS ENGAGED.....							
10 TO 19 PERSONS ENGAGED.....							
20 TO 49 PERSONS ENGAGED.....							
50 TO 99 PERSONS ENGAGED.....							
100 TO 249 PERSONS ENGAGED.....							
250 TO 499 PERSONS ENGAGED.....							
500 OR MORE PERSONS ENGAGED.....							
21--COAL MINING.....							
ESTABLISHMENTS WITH--							
1 TO 4 PERSONS ENGAGED.....							
5 TO 9 PERSONS ENGAGED.....							
10 TO 19 PERSONS ENGAGED.....							
(etc.)							
(Continue with number of persons engaged by industry group)							

[1]DURING WEEK ENDING NEAREST 15 NOVEMBER.
[2]INCLUDES THE DEVELOPMENT AND EXPLORATION OF MINERAL PROPERTY.
[3]INCLUDES PURCHASED MACHINERY INSTALLED.

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Exhibit III-5-5. FINAL REPORT II: TABLE FORMATS FOR THE 1975 CENSUS OF MINERAL INDUSTRIES--Continued

TABLE 17. SELECTED DETAILED STATISTICS FOR MINERAL ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED, BY SIZE OF ESTABLISHMENT: 1975

SIZE OF ESTABLISHMENT	NUMBER OF EMPLOYEES			WAGES AND SALARIES PAID AND SUPPLEMENTARY LABOR COSTS (THOUSAND DOLLARS)					GROSS ADDITIONS TO FIXED ASSETS DURING THE YEAR (THOUSAND DOLLARS)		
	TOTAL	PRODUCTION, DEVELOPMENT, AND EXPLORATION WORKERS[1]	OTHER EMPLOYEES[2]	TOTAL	PRODUCTION, DEVELOPMENT, AND EXPLORATION WORKERS	SALARIES PAID TO OTHER EMPLOYEES	SUPPLEMENTARY LABOR COSTS		TOTAL[3]	STRUCTURES AND ADDITIONS[3]	MACHINERY AND EQUIPMENT
							LEGALLY REQUIRED	VOLUNTARY PROGRAMS			
ALL MINERAL ESTABLISHMENTS.....											
ESTABLISHMENTS WITH--											
10 TO 19 PERSONS ENGAGED.....											
20 TO 49 PERSONS ENGAGED.....											
50 TO 99 PERSONS ENGAGED.....											
100 TO 249 PERSONS ENGAGED.....											
250 TO 499 PERSONS ENGAGED.....											
500 OR MORE PERSONS ENGAGED.....											

[1]AVERAGE OF FOUR MID-QUARTERLY PAY PERIODS.
[2]NUMBER AS OF WEEK ENDING NEAREST 15 NOVEMBER.
[3]INCLUDES DEVELOPMENT AND EXPLORATION OF MINERAL PROPERTY.

TABLE 18. GENERAL SUMMARY FOR ALL MINERAL ESTABLISHMENTS, BY INDUSTRY DIVISION, LEGAL ORGANIZATION AND TYPE OF OWNERSHIP
(DOLLAR FIGURES IN THOUSANDS)

LEGAL ORGANIZATION AND TYPE OF OWNERSHIP BY INDUSTRY GROUP	NUMBER OF ESTABLISHMENTS	NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES	GROSS ADDITIONS TO FIXED ASSETS[2]	VALUE OF--		VALUE ADDED
					INPUT[3]	GROSS OUTPUT	
ALL MINERAL ESTABLISHMENTS.....							
INDIVIDUAL PROPRIETORSHIP.....							
PARTNERSHIP.....							
CORPORATION.....							
GOVERNMENT ENTERPRISE.....							
COOPERATIVE.....							
OTHER.....							
21--COAL MINING.....							
INDIVIDUAL PROPRIETORSHIP.....							
PARTNERSHIP.....							
CORPORATION.....							
GOVERNMENT ENTERPRISE.....							
COOPERATIVE.....							
OTHER.....							
(Continue with legal organization and type of ownership by industry group)							

[1]DURING WEEK ENDED NEAREST 15 NOVEMBER.
[2]INCLUDES THE DEVELOPMENT AND EXPLORATION OF MINERAL PROPERTY.
[3]INCLUDES PURCHASED MACHINERY INSTALLED.

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Exhibit III-5-5. FINAL REPORT II: TABLE FORMATS FOR THE 1975 CENSUS OF MINERAL INDUSTRIES--Continued

TABLE 19. SELECTED DETAILED STATISTICS FOR MINERAL ESTABLISHMENTS WITH 10 OR MORE PERSONS ENGAGED, BY INDUSTRY DIVISION, LEGAL ORGANIZATION AND TYPE OF OWNERSHIP: 1975

(DOLLAR FIGURES IN THOUSANDS)

LEGAL ORGANIZATION AND TYPE OF OWNERSHIP BY INDUSTRY GROUP	NUMBER OF EMPLOYEES			WAGES AND SALARIES PAID AND SUPPLEMENTARY LABOR COSTS (THOUSAND DOLLARS)					GROSS ADDITIONS TO FIXED ASSETS DURING THE YEAR (THOUSAND DOLLARS)		
	TOTAL	PRODUCTION, DEVELOPMENT, AND EXPLORATION WORKERS[1]	OTHER EMPLOYEES[2]	TOTAL	PRODUCTION, DEVELOPMENT, AND EXPLORATION WORKERS	SALARIES PAID TO OTHER EMPLOYEES	SUPPLEMENTARY LABOR COSTS		TOTAL[3]	STRUCTURES AND ADDITIONS[3]	MACHINE AND EQUIPMENT
							LEGALLY REQUIRED	VOLUNTARY PROGRAMS			
ALL MINERAL ESTABLISHMENTS.....											
INDIVIDUAL PROPRIETORSHIP.....											
PARTNERSHIP.....											
CORPORATION.....											
GOVERNMENT ENTERPRISE.....											
COOPERATIVE.....											
OTHER.....											
21--COAL MINING.....											
INDIVIDUAL PROPRIETORSHIP.....											
PARTNERSHIP.....											
CORPORATION.....											
GOVERNMENT ENTERPRISE.....											
COOPERATIVE.....											
OTHER.....											

(Continue with legal organization and type of ownership by industry group)

[1]AVERAGE OF FOUR MID-QUARTERLY PAY PERIODS.
[2]NUMBER AS OF WEEK ENDING NEAREST 15 NOVEMBER.
[3]INCLUDES DEVELOPMENT AND EXPLORATION OF MINERAL PROPERTY.

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Exhibit III-5-6. FINAL REPORT III: TABLE FORMATS FOR THE 1975 CENSUS OF ELECTRICITY AND GAS INDUSTRIES

TABLE 1. GENERAL SUMMARY FOR ALL ESTABLISHMENTS IN THE ELECTRICITY AND GAS INDUSTRIES

(DOLLAR FIGURES IN THOUSANDS)

ITEM	ELECTRICITY INDUSTRY	GAS INDUSTRY
1975		
NUMBER OF ESTABLISHMENTS		
NUMBER OF PERSONS ENGAGED[1]		
WAGES AND SALARIES		
GROSS ADDITIONS TO FIXED ASSETS		
VALUE OF INPUT		
VALUE OF GROSS OUTPUT		
VALUE ADDED		
1963		
NUMBER OF PERSONS ENGAGED[1]		(X)
VALUE ADDED		(X)

(X) NOT AVAILABLE. THE GAS INDUSTRY WAS NOT COVERED BY THE 1963 ECONOMIC CENSUS.

[1]WEEK ENDING NEAREST 15 NOVEMBER.

NOTE: ELECTRICITY, GAS, AND STEAM ARE COMBINED IN ISIC 410; FOR THE PROVIDENCIA ECONOMIC CENSUS, ELECTRICITY HAS BEEN ASSIGNED CODE NUMBER 411 AND GAS HAS BEEN ASSIGNED CODE NUMBER 412.

TABLE 2. DETAILED STATISTICS ON EMPLOYMENT AND EARNINGS, FIXED ASSETS, AND STOCKS, FOR ALL ESTABLISHMENTS IN THE ELECTRICITY AND GAS INDUSTRIES, 1975

(DOLLAR FIGURES IN THOUSANDS)

ITEM	ELECTRICITY INDUSTRY	GAS INDUSTRY
NUMBER OF PERSONS ENGAGED[1]		
OWNERS AND ACTIVE PARTNERS		
FAMILY AND OTHER UNPAID WORKERS		
PRODUCTION WORKERS		
OTHER EMPLOYEES		
WEEKLY PAYROLL[1]		
PRODUCTION WORKERS		
OTHER EMPLOYEES		
YEARLY PAYROLL		
PRODUCTION WORKERS		
OTHER EMPLOYEES		
AVERAGE NUMBER OF EMPLOYEES FOR THE YEAR		
PRODUCTION WORKERS		
OTHER EMPLOYEES		
WAGES AND SALARIES PAID DURING THE YEAR		
PRODUCTION WORKERS		
OTHER EMPLOYEES		
SUPPLEMENTARY LABOR COSTS		
LEGALLY REQUIRED		
VOLUNTARY PROGRAMS		
MAN-DAYS WORKED BY PRODUCTION WORKERS (THOUSANDS)		
GROSS ADDITIONS TO FIXED ASSETS DURING THE YEAR		
STRUCTURES AND ADDITIONS		
MACHINERY AND EQUIPMENT		
ACQUISITION OF NEW FIXED ASSETS		
NEW STRUCTURES AND ADDITIONS		
NEW MACHINERY AND EQUIPMENT		
ACQUISITION OF USED FIXED ASSETS		
USED STRUCTURES		
USED MACHINERY AND EQUIPMENT		
VALUE OF STOCKS, 1 JANUARY 1975		
VALUE OF STOCKS, 31 DECEMBER 1975		
CHANGE IN VALUE OF STOCKS DURING THE YEAR		

[1]WEEK ENDING NEAREST 15 NOVEMBER.

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Exhibit III-5-6. FINAL REPORT III: TABLE FORMATS FOR THE 1975 CENSUS OF ELECTRICITY AND GAS INDUSTRIES--Continued

TABLE 3. DETAILED STATISTICS ON INPUT COSTS FOR ALL ESTABLISHMENTS IN THE ELECTRICITY AND GAS INDUSTRIES: 1975

ITEM	ELECTRICITY INDUSTRY		GAS INDUSTRY	
	QUANTITY	AMOUNT (THOUSAND DOLLARS)	QUANTITY	AMOUNT (THOUSAND DOLLARS)
SUPPLIES, FUELS, CONTRACT WORK				
TOTAL	(X)		(X)	
SUPPLIES, MATERIALS, ETC.	(X)		(X)	
FUELS	(X)		(X)	
PURCHASED ELECTRICITY	(X)		(X)	
REPAIR AND MAINTENANCE	(X)		(X)	
PRINCIPAL FUELS CONSUMED				
TOTAL	(X)		(X)	
COAL (METRIC TONS)				
FUEL OIL (1,000 LITERS)				
GAS (1,000 CU METERS)				
GASOLINE (1,000 LITERS)				
OTHER FUELS	(X)		(X)	
USE OF ELECTRICITY BY GAS INDUSTRY				
TOTAL	(X)	(X)	(X)	(X)
ELECTRICITY CONSUMED (1,000 KWH)	(X)	(X)		(X)
ELECTRICITY PURCHASED(1,000 KWH)	(X)	(X)		
ELECTRICITY PRODUCED (1,000 KWH)	(X)	(X)		(X)
ELECTRICITY SOLD (1,000 KWH)	(X)	(X)		

(X) NOT APPLICABLE.

TABLE 4. DETAILED STATISTICS ON GROSS OUTPUT FOR ALL ESTABLISHMENTS IN THE ELECTRICITY AND GAS INDUSTRIES: 1975

ITEM	ELECTRICITY INDUSTRY (THOUSAND DOLLARS)	GAS INDUSTRY (THOUSAND DOLLARS)
TOTAL RECEIPTS		
SALES OR INTERPLANT TRANSFER OF ELECTRICITY OR GAS		
ALL OTHER PRODUCTS AND SERVICES		

TABLE 5. SOURCE OF ELECTRIC ENERGY FOR ALL ESTABLISHMENTS IN THE ELECTRICITY INDUSTRY: 1975

ITEM	1,000 KILOWATT HOURS
TOTAL ELECTRIC ENERGY FOR DISPOSAL	
PURCHASED (OR RECEIVED)	
GENERATED AT ESTABLISHMENT	
HYDRAULIC PLANTS	
STEAM PLANTS	
INTERNAL COMBUSTION PLANTS	

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Exhibit III-5-6. FINAL REPORT III: TABLE FORMATS FOR THE 1975 CENSUS OF ELECTRICITY AND GAS INDUSTRIES--Continued

TABLE 6. DISPOSAL OF ELECTRIC ENERGY BY ALL ESTABLISHMENTS IN THE ELECTRICITY INDUSTRY: 1975

TYPE OF CONSUMER	NUMBER OF CUSTOMERS	QUANTITY (1,000 KILOWATT HOURS)	DELIVERED VALUE (THOUSAND DOLLARS)
TOTAL DISPOSAL OF ELECTRIC ENERGY.....			
ULTIMATE CONSUMERS.....			
PUBLIC LIGHTING.....			
OTHER PUBLIC USES.....			
DOMESTIC (RESIDENTIAL).....			
MINING AND MANUFACTURING.....			
COMMERCIAL AND OTHER.....			
DISTRIBUTORS (OR RESELLERS).....			
PRODUCING ESTABLISHMENTS[1].....			(X)

[1]INCLUDING LOSSES.

(X) NOT APPLICABLE.

TABLE 7A. GENERATOR CAPACITY OF ELECTRIC POWER PLANTS, BY PROVINCE: 1975

PROVINCE	CAPACITY OF ELECTRIC GENERATORS (NAME PLATE RATINGS)			
	TOTAL KILOWATTS (AC AND DC)[1]	ALTERNATING CURRENT		DIRECT CURRENT
		1,000 KVA	1,000 EQUI. KW	(1,000 KW)
PROVIDENCIA.....				
CATEDRAL.....				
DAVID.....				
ESTRELLA.....				
FALCON.....				
GIRARDOT.....				
MIRANDA.....				
PUERTO NUEVO.....				
SAN JOSE.....				
SANTA ELENA.....				
TRES HERMANAS.....				
TROCADERO.....				
ZAPATA.....				

[1]AC - ALTERNATING CURRENT; DC - DIRECT CURRENT.

TABLE 7B. EQUIPMENT FOR TRANSMISSION AND DISTRIBUTION OF ELECTRICITY, AS OF 31 DECEMBER 1975, FOR PROVIDENCIA

ITEM	AMOUNT
TRANSMISSION SYSTEM	
TRANSFORMER CAPACITY (1,000 KVA).....	
TRANSMISSION LINES	
STRUCTURE (1,000 KILOMETERS).....	
CIRCUIT (1,000 KILOMETERS).....	
DISTRIBUTION SYSTEM	
NUMBER OF STATIONS.....	
TRANSFORMER CAPACITY (1,000 KVA).....	
TRANSMISSION LINES	
STRUCTURE (1,000 KILOMETERS).....	
CIRCUIT (1,000 KILOMETERS).....	

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Exhibit III-5-6. FINAL REPORT III: TABLE FORMATS FOR THE 1975 CENSUS OF ELECTRICITY AND GAS INDUSTRIES--Continued

TABLE 8. GENERAL SUMMARY FOR ELECTRICITY AND GAS INDUSTRIES, BY PROVINCE: 1975

(DOLLAR FIGURES IN THOUSANDS)

PROVINCE	ELECTRICITY						
	NUMBER OF ESTABLISHMENTS	NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES	GROSS ADDITIONS TO FIXED ASSETS	VALUE OF--		VALUE ADDED
					INPUT	GROSS OUTPUT	
PROVIDENCIA							
CATEDRAL							
DAVID							
ESTRELLA							
FALCON							
GIRARDOT							
MIRANDA							
PUERTO NUEVO							
SAN JOSE							
SANTA ELENA							
TRES HERMANAS							
TROCADERO							
ZAPATA							

PROVINCE	GAS						
	NUMBER OF ESTABLISHMENTS	NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES	GROSS ADDITIONS TO FIXED ASSETS	VALUE OF--		VALUE ADDED
					INPUT	GROSS OUTPUT	
PROVIDENCIA							
CATEDRAL							
DAVID							
ESTRELLA							
FALCON							
GIRARDOT							
MIRANDA							
PUERTO NUEVO							
SAN JOSE							
SANTA ELENA							
TRES HERMANAS							
TROCADERO							
ZAPATA							

[1]WEEK ENDING NEAREST 15 NOVEMBER.

TABLE 9. DISPOSAL OF ELECTRIC ENERGY BY ESTABLISHMENTS IN THE PRINCIPAL PRODUCING PROVINCES: 1975

TYPE OF CONSUMER	NUMBER OF CUSTOMERS	QUANTITY (1,000 KILOWATT HOURS)	DELIVERED VALUE (THOUSAND DOLLARS)
PROVIDENCIA			
TOTAL DISPOSAL OF ELECTRIC ENERGY			
ULTIMATE CONSUMERS			
PUBLIC LIGHTING			
OTHER PUBLIC USES			
DOMESTIC (RESIDENTIAL)			
MINING AND MANUFACTURING			
COMMERCIAL AND OTHER			
DISTRIBUTORS (OR RESELLERS)			
PRODUCING ESTABLISHMENTS[1]		(X)	
CATEDRAL			
(Repeat above stub)			
DAVID			
(Repeat above stub)			
ESTRELLA			
(Repeat above stub)			

[1]INCLUDING LOSSES.

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Exhibit III-5-6. FINAL REPORT III: TABLE FORMATS FOR THE 1975 CENSUS OF ELECTRICITY AND GAS INDUSTRIES--Continued

TABLE 10. NUMBER OF ELECTRICITY ESTABLISHMENTS BY SIZE, FOR PROVINCES, COUNTIES, AND WARDS: 1975

(SIZE BASED ON NUMBER OF PERSONS ENGAGED)

PROVINCE, COUNTY, AND WARD	ALL ESTABLISHMENTS	NUMBER OF ESTABLISHMENTS BY SIZE							
		1 TO 4 PERSONS	5 TO 9 PERSONS	10 TO 19 PERSONS	20 TO 49 PERSONS	50 TO 99 PERSONS	100 TO 249 PERSONS	250 TO 499 PERSONS	500 OR MORE PERSONS
PROVIDENCIA.....									
CATEDRAL.....									
AMPARO COUNTY.....									
BARBADOS WARD.....									
BENI WARD.....									
BUENOS AIRES WARD.....									
(etc.)									
DAVID.....									
ANZOAREGUI COUNTY.....									
BERMUDA WARD.....									
NEPAL WARD.....									
RUMANIA WARD.....									
SANTIAGO WARD.....									
(etc.)									
(Continue with wards and counties for each province)									

TABLE 11. GENERAL SUMMARY FOR ELECTRICITY AND GAS ESTABLISHMENTS, BY SIZE OF ESTABLISHMENT: 1975

(DOLLAR FIGURES IN THOUSANDS)

NUMBER OF PERSONS ENGAGED BY INDUSTRY	NUMBER OF ESTABLISHMENTS	NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES	VALUE OF--		VALUE ADDED
				INPUT	GROSS OUTPUT	
TOTAL.....						
ELECTRICITY.....						
ESTABLISHMENTS WITH--						
1 TO 4 PERSONS ENGAGED.....						
5 TO 9 PERSONS ENGAGED.....						
10 TO 19 PERSONS ENGAGED.....						
20 TO 49 PERSONS ENGAGED.....						
50 TO 99 PERSONS ENGAGED.....						
100 TO 249 PERSONS ENGAGED.....						
250 TO 499 PERSONS ENGAGED.....						
500 OR MORE PERSONS ENGAGED.....						
GAS.....						
(Repeat above stub)						

[1]WEEK ENDING NEAREST 15 NOVEMBER.

TABLE 12. GENERAL SUMMARY FOR ELECTRICITY AND GAS ESTABLISHMENTS, BY LEGAL ORGANIZATION AND TYPE OF OWNERSHIP: 1975

LEGAL ORGANIZATION AND TYPE OF OWNERSHIP	NUMBER OF ESTABLISHMENTS	NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES	VALUE OF--		VALUE ADDED
				INPUT	GROSS OUTPUT	
TOTAL.....						
ELECTRICITY.....						
INDIVIDUAL PROPRIETORSHIP.....						
PARTNERSHIP.....						
CORPORATION.....						
GOVERNMENT ENTERPRISE.....						
COOPERATIVE.....						
OTHER.....						
GAS.....						
(Repeat above stub)						

[1]WEEK ENDING NEAREST 15 NOVEMBER.

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Exhibit III-5-7. FINAL SUMMARY REPORT IV: TABLE FORMATS FOR THE 1975 INDUSTRIAL CENSUS

TABLE 1. GENERAL SUMMARY FOR ALL ESTABLISHMENTS IN MINING, MANUFACTURING, ELECTRICITY, AND GAS, BY MAJOR INDUSTRY GROUP AND INDUSTRY: 1975 AND 1963

CODE	INDUSTRY GROUP	1975							1963	
		NUMBER OF ESTABLISHMENTS		NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES	VALUE OF--		VALUE ADDED	NUMBER OF PERSONS ENGAGED[1,3]	VALUE ADDED
		TOTAL	WITH 10 OR MORE PERSONS ENGAGED		(THOUSAND DOLLARS)	INPUT[2] (THOUSAND DOLLARS)	GROSS OUTPUT (THOUSAND DOLLARS)	(THOUSAND DOLLARS)		(THOUSAND DOLLARS)

All 1-, 2-, and 3- digit ISIC categories for mining, manufacturing, electricity, and gas. For those industries, in the ISIC there are 4 1-digit classifications, 13 2-digit, and 36 3-digit, with electricity and gas treated as 1-digit categories. Show in ISIC order.

[1]WEEK ENDING NEAREST 15 NOVEMBER.
[2]FOR MINING, INCLUDES THE DEVELOPMENT AND EXPLORATION OF MINERAL PROPERTY.
[3]NOT AVAILABLE FOR GAS INDUSTRY.

TABLE 2. GENERAL SUMMARY FOR ALL ESTABLISHMENTS IN MINING, MANUFACTURING, ELECTRICITY, AND GAS, BY PROVINCE AND INDUSTRY DIVISION: 1975 AND 1963

CODE	PROVINCE AND INDUSTRY DIVISION	1975							1963	
		NUMBER OF ESTABLISHMENTS		NUMBER OF PERSONS ENGAGED[1]	WAGES AND SALARIES	VALUE OF--		VALUE ADDED	NUMBER OF PERSONS ENGAGED[1,3]	VALUE ADDED
		TOTAL	WITH 10 OR MORE PERSONS ENGAGED		(THOUSAND DOLLARS)	INPUT[2] (THOUSAND DOLLARS)	GROSS OUTPUT (THOUSAND DOLLARS)	(THOUSAND DOLLARS)		(THOUSAND DOLLARS)
	PROVIDENCIA.....									
	MINING.....									
	MANUFACTURING.....									
	ELECTRICITY.....									
	GAS.....									
	CATEDRAL.....									
	MINING.....									
	MANUFACTURING.....									
	ELECTRICITY.....									
	GAS.....									
	DAVID.....									
	(Continue with provinces and industry divisions)									

[1]WEEK ENDING NEAREST 15 NOVEMBER.
[2]FOR MINING, INCLUDES THE DEVELOPMENT AND EXPLORATION OF MINERAL PROPERTY.
[3]NOT AVAILABLE FOR GAS INDUSTRY.

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Exhibit III-5-8. FINAL REPORT V: TABLE FORMATS FOR THE 1975 CENSUS OF HOUSEHOLD INDUSTRIES

TABLE 1. GENERAL SUMMARY OF HOUSEHOLD INDUSTRIES, BY PROVINCE AND SELECTED COUNTIES: 1975

PROVINCE AND COUNTY	NUMBER OF HOUSEHOLD UNITS	RECEIPTS FOR WORK DONE (THOUSAND DOLLARS)	NUMBER OF HOUSEHOLD WORKERS									SAMPLING ERROR (BASED ON RECEIPTS)
			FULL TIME AND PART TIME			FULL TIME			PART TIME			
			TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	
PROVIDENCIA.....												
CATEDRAL.....												
AMPARO COUNTY.....												
BARUTA COUNTY.....												
CANDELARIA COUNTY.....												
EL SOMBRERO COUNTY.....												
FIGUEROA COUNTY.....												
GUARENAS COUNTY.....												
JUAREZ COUNTY.....												
LAREDO COUNTY.....												
(etc.)												
DAVID.....												
(Continue with counties and provinces)												

TABLE 2. GENERAL SUMMARY FOR SELECTED HOUSEHOLD INDUSTRIES, FOR PROVIDENCIA: 1975

HOUSEHOLD INDUSTRY	NUMBER OF HOUSEHOLD UNITS	RECEIPTS FOR WORK DONE (THOUSAND DOLLARS)	NUMBER OF HOUSEHOLD WORKERS									SAMPLING ERROR (BASED ON RECEIPTS)
			FULL TIME AND PART TIME			FULL TIME			PART TIME			
			TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL	MALE	FEMALE	
The 6 to 12 types of industrial activities in which households are most active (4-digit ISIC, or 3-digit if sampling error requires).												

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Exhibit III-5-9. CONCORDANCE OF MANUFACTURERS AND MINERAL CENSUS TABLES

(Final Report Series)

Manufacturers Table No.	Minerals Table No.
1	1
2	2
3	3
4	4
5	5
6	No Counterpart
7	7
8	6
9	8
10	No Counterpart
11	9
12	10
13	11
14	12
15	13
16	No Counterpart
17	No Counterpart
18,19,20	14
21	15
22	16
23	17
24	19
25	18

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Exhibit III-5-10. RELATIONSHIP BETWEEN TABLES AND FORM INQUIRIES-MANUFACTURERS CENSUS

(Manufacturers Final Report Series)
(Tables 1-13, Inclusive)

Table Number (Manufacturers)	Manufacturers Form Inquiries
1	1,2,6,7,13,18
2	6 and 7
3	6,7,8,9 and 10
4	12
5	12
6	11
7	14 and 15
8	14
9	16
10	16
11	18
12	18
13	13 and 18

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Exhibit III-6-1. STRUCTURAL PARTS OF A FORMAL STATISTICAL TABLE

Heading

Table 1. EMPLOYED PERSONS BY TYPE OF WORKER, AGE, AND SEX

(In thousands of persons 12 years old and over. Excludes institutional population and members of the Armed Forces)

Age and sex	Total	Wage and salary workers		Self-employed workers		Unpaid family workers[1]
		Private	Government	Employers	Own-account workers	
BOTH SEXES						
Total 12 years and over.....	2,528	1,325	217	242	477	267
12 to 19 years.....	602	416	24	1	12	149
20 to 24 years.....	372	224	30	21	61	36
25 to 34 years.....	638	348	64	81	124	21
35 to 44 years.....	462	184	55	78	121	24
45 to 64 years.....	419	146	43	51	150	29
65 and over.....	35	7	1	10	9	8
MALE						
Total 12 years and over.....	2,012	1,107	195	186	331	193
12 to 19 years.....	493	328	22	1	9	133
20 to 24 years.....	277	180	29	15	26	27
25 to 34 years.....	534	303	61	63	98	9
35 to 44 years.....	359	169	45	55	82	8
45 to 64 years.....	322	122	37	43	109	11
65 and over.....	27	5	1	9	7	5
FEMALE						
Total 12 years and over.....	516	218	22	56	146	74
12 to 19 years.....	109	88	2	-	3	16
20 to 24 years.....	95	44	1	6	35	9
25 to 34 years.....	104	45	3	18	26	12
35 to 44 years.....	103	15	10	23	39	16
45 to 64 years.....	97	24	6	8	41	18
65 and over.....	8	2	-	1	2	3

Boxhead

Stub

Field

Footnote → [1]Worked 15 hours or more during reference week in a family enterprise.

TABLE NO. TITLE OF TABLE

(Headnote)

Panel

Stubhead	Column head	Spanner head		Spanner head		Column head
		Column head	Column head	Column head	Column head	
CENTER HEAD						
Total line caption.....	Cell	Cell	Cell	Cell	Cell	Cell
Line caption.....	Cell	Cell	Cell	Cell	Cell	Cell
Line caption.....	Cell	Cell	Cell	Cell	Cell	Cell
Line caption.....	Cell	Cell	Cell	Cell	Cell	Cell
Line caption.....	Cell	Cell	Cell	Cell	Cell	Cell
Line caption.....	Cell	Cell	Cell	Cell	Cell	Cell
Line caption.....	Cell	Cell	Cell	Cell	Cell	Cell
CENTER HEAD (etc.)						

Block

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Exhibit III-6-2. EXAMPLE OF A NARROW TABLE

Table 1. NUMBER OF MINERAL ESTABLISHMENTS BY SIZE AND INDUSTRY GROUP, FOR PROVINCES: 1975

Major industry group	Total	With 10 or more persons engaged	With less than 10 persons engaged
PROVIDENCIA			
Coal mining			
Crude petroleum and natural gas			
Metal ore mining			
Iron ore mining			
Non-ferrous metal ore			
Other mining			
Stone quarrying, clay and sand pits			
Chemical and fertilizer			
Salt			
Not elsewhere classified			
CATEDRAL			
Coal mining			
Crude petroleum and natural gas			
Metal ore mining			
Iron ore mining			
Non-ferrous metal ore			
Other mining			
Stone quarrying, clay and sand pits			
Chemical and fertilizer			
Salt			
Not elsewhere classified			
DAVID			
Coal mining			
Crude petroleum and natural gas			
Metal ore mining			
(continue for all Provinces)			

Exhibit III-6-3. EXAMPLE OF A HALF-MEASURE TABLE

Table 1. SELECTED STATISTICS FOR ESTABLISHMENTS IN THE GAS INDUSTRY, FOR PROVINCES: 1975

Province	Number of establish-ments	Number of persons engaged	Wages and salaries (thousand dollars)	Province	Number of establish-ments	Number of persons engaged	Wages and salaries (thousand dollars)
Providencia				Puerto Nuevo			
Catedral				San Jose			
David				Santa Elena			
Estrella				Tres Hermanas			
Falcon				Trocadero			
Girardot				Zapata			
Miranda							

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Exhibit III-6-4. EXAMPLE OF A BROAD TABLE AND NARROW-DIVIDE TABLE

Table 1. NUMBER OF MINERAL ESTABLISHMENTS BY SIZE AND INDUSTRY GROUP, FOR PROVINCES: 1975

Major industry group	Providencia			Catedral			David			Estrella			Falcon			Girardot			Miranda		
	Total	Number of persons engaged		Total	Number of persons engaged		Total	Number of persons engaged		Total	Number of persons engaged		Total	Number of persons engaged		Total	Number of persons engaged		Total	Number of persons engaged	
		10 or more	Less than 10		10 or more	Less than 10		10 or more	Less than 10		10 or more	Less than 10		10 or more	Less than 10		10 or more	Less than 10		10 or more	Less than 10
Number of establishments																					
Coal mining																					
Crude petroleum and natural gas																					
Metal ore mining																					
Iron ore mining																					
Non-ferrous metal ore																					
Other mining																					
Stone quarrying, clay and sand pits																					
Chemical and fertilizer																					
Salt																					
Not elsewhere classified																					

Major industry group	Puerto Nuevo			San Jose			Santa Elena			Tres Hermanas			Trocadero			Zapata		
	Total	Number of persons engaged		Total	Number of persons engaged		Total	Number of persons engaged		Total	Number of persons engaged		Total	Number of persons engaged		Total	Number of persons engaged	
		10 or more	Less than 10		10 or more	Less than 10		10 or more	Less than 10		10 or more	Less than 10		10 or more	Less than 10		10 or more	Less than 10
Number of establishments																		
Coal mining																		
Crude petroleum and natural gas																		
Metal ore mining																		
Iron ore mining																		
Non-ferrous metal ore																		
Other mining																		
Stone quarrying, clay and sand pits																		
Chemical and fertilizer																		
Salt																		
Not elsewhere classified																		

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Exhibit III-6-5. EXAMPLE OF LEFT AND RIGHT HAND PAGES OF PARALLEL TABLE

Table 1. PRINCIPAL FUELS CONSUMED FOR MANUFACTURING ESTABLISHMENTS WITH 10 OR MORE

Code	Major industry group and industry	Total value of fuels consumed (thousand dollars)	Coal		Fuel oil	
			Metric tons	Value (thousand dollars)	1,000 Liters	Value (thousand dollars)
	All manufacturing establishments.....					
31	Food, beverages, and tobacco.....					
32	Textile, wearing apparel, and leather.....					
33	Wood and wood products (including furniture).....					
34	Paper, paper products, printing and publishing...					
35	Chemicals and chemical, petroleum, coal, rubber, and plastic products.....					
36	Non-metallic mineral products (except products of petroleum and coal).....					
37	Basic matal.....					
38	Fabricated matal products, machinery and equipment.....					
39	Other.....					
311-312	Food.....					
3111	Slaughtering, preparing and preserving meat.....					
3112	Dairy products.....					
3113	Canning and preserving of fruits and vegetables..					
313	Beverages.....					
3131	Distilling, rectifying, and blending spirits.....					
3132	Wine.....					
3133	Malt liquors and malt.....					
3134	Soft drinks and carbonated waters.....					
314	Tobacco products.....					
	(continue with industries)					

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Exhibit III-6-5. EXAMPLE OF LEFT AND RIGHT HAND PAGES OF PARALLEL TABLE--Continued

PERSONS ENGAGED, BY MAJOR INDUSTRY GROUP AND INDUSTRY, FOR PROVIDENCIA: 1975

Gas		Gasoline		Other fuels (value)	Energy equivalent of fuels consumed	Electricity consumed	Total electric energy consumed
1,000 cu. meters	Value (thousand dollars	Liters (1,000)	Value (thousand dollars)	(thousand dollars)	(1,000 Kwh)	(1,000 Kwh)	(1,000 Kwh)

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Exhibit III-6-6. DIMENSIONS IN TYPING SPACES FOR MATERIAL TO BE PRINTED ON PAPER 8 1/2 INCHES BY 11 INCHES

(Image after reduction: 7 inches by 9 1/2 inches)

Amount of reduction	Upright		Broadmeasure	
	Width	Depth in lines	Width	Depth in lines
10 percent.....	94	65	130	47
15 percent.....	98	68	136	49
20 percent.....	105	72	144	52
25 percent.....	112	77	154	56
30 percent.....	120	83	166	60
35 percent.....	130	89	178	65
40 percent.....	140	97	194	70
45 percent.....	152	105	210	76
50 percent.....	168	116	232	84

NOTE: In centimeters, the paper would be approximately 21 1/2 by 28 centimeters, with an image size of approximately 17 1/2 by 24 centimeters.

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Exhibit IV-1-1. WORKLOAD ESTIMATES: AVERAGE NUMBER OF "REGULAR" ESTABLISHMENTS PER COUNTY AND WARD

Province	Number of establishments	Number of--		Average number of establishments	
		Counties	Wards	Per county	Per ward
Providencia.....	39,600	216	1,500	183	26
Catedral.....	3,587	15	112	239	32
David.....	2,614	25	216	105	12
Estrella.....	14,023	36	319	390	44
Outside city.....	8,023	35	302	229	26
City.....	6,000	1	17	6,000	353
Falcon.....	1,064	10	62	106	17
Girardot.....	2,863	22	165	130	17
Miranda.....	1,591	18	90	88	18
Puerto Nuevo.....	3,032	16	70	190	43
San Jose.....	1,327	24	146	55	9
Santa Elena.....	2,435	19	95	128	26
Tres Hermanas.....	2,854	7	44	408	65
Trocadero.....	752	14	112	54	7
Zapata.....	3,458	10	69	346	50

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Exhibit IV-1-2. REQUEST FOR PAYMENT (FIELD WORK), FORM 124

PROVIDENCIA
FORM 124
(MAY 1974)

NATIONAL STATISTICAL OFFICE

REQUEST FOR PAYMENT (FIELD WORK)

1975 Industrial Census

a. Employee (payee) name

b. Employee (payee) title

c. Province	d. County	e. Ward*

f. Period for which payment is requested

From _____ To _____

Item No.	Item	Number	Rate	Amount
1	Establishments enumerated (from Form 123)			
2	Hours worked			
3	Kilometers travelled by automobile			
4	Other expenses (specify below)			
	_____			
	_____			
5	Total amount requested			

CERTIFICATION

I certify that I have completed the work indicated in Item 1, and have worked the number of hours shown in Item 2. I also certify that the kilometer allowance and other expenses claimed in Items 3 and 4 were incurred in the conduct of official business.

Signature of payee	Date
Signature of approving supervisor	Date

RECORD OF PAYMENT (for office use only)

Amount paid	Disbursing officer's name	Date
	Disbursing officer's title	
Received by (signature of payee)		Date

*A separate Form 124 should be prepared for each ward in which field work was performed.

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Exhibit IV-4-1. OUTLINE OF THE FIELD ENUMERATOR'S POCKET MANUAL

Chapter 1. ENUMERATOR'S JOB

1. Why the census is taken
   - a. Purpose
   - b. Confidentiality
2. Your job
   - a. Specific duties
     - (1) Canvass your ED
     - (2) Complete questionnaires
   - b. Responsibilities
     - (1) Follow instructions
     - (2) Maintain confidentiality of census information
     - (3) Complete your assighment
   - c. Restrictions
     - (1) No soliciting or selling
     - (2) No delegation of authority
3. Your pay
   - a. Rate of pay
   - b. Training fee
   - c. Travel allowance
   - d. Miscellaneous expenses
   - e. How to fill Request for Payment, Form 124
4. Your hours of work
   - a. 8-hour day
   - b. Irregular schedule
5. Your training
   - a. Self-study
   - b. Classroom
   - c. On-the-job
6. Supervision
   - a. Provincial field offices
   - b. County agents
   - c. Estrella County interviewers
   - d. Use of mail and telephone
7. Terms you must know
   - a. Canvassing
   - b. Listing
   - c. Enumeration
   - d. Enumeration district (ED)
   - e. Establishment
     - (1) Mining and quarrying
     - (2) Manufacturing
   - f. Skip-list
   - g. Reference period
   - h. Enumeration period
8. Enumerator's field kit
   - a. Field Enumerator's Pocket Manual
   - b. Identification Card
   - c. Contents of kit
     - (1) Census questionnaires
     - (2) Form 123, Establishment Control Record
     - (3) Form 124, Request for Payment
     - (4) "Official Business" envelopes and stationery
     - (5) Map or description of your assigned ED
     - (6) Skip-list
     - (7) Materials Reference List
     - (8) Products Reference List
     - (9) Advance publicity material
     - (10) Large envelopes
9. Completion of assignment
   - a. Review your work for completion
   - b. Return completed work to supervisor or NSO

Chapter 2. INTRODUCTION TO QUESTIONNAIRES AND INTERVIEWING TECHNIQUE

1. Use of Form 123
2. Use of Forms ECP-1 and ECP-101
3. Use of Forms ECP-2 and ECP-201
4. Use of Form ECP-3
5. Design of questionnaires
   - a. Instructions on questionnaires
   - b. Types of questionnaire entries
     - (1) X-marks in boxes
     - (2) Write-in entries
     - (3) Coded write-in entries
     - (4) Estimation of values
   - c. How to ask questions
     - (1) Order of asking questions
     - (2) Use of data obtained in answer to earlier questions
6. Interview
   - a. Your approach
   - b. Whom to interview
   - c. How to conduct the interview
   - d. Review of questionnaire before leaving respondent
7. Callbacks

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Exhibit IV-4-1. OUTLINE OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

8. Incomplete interviews
   a. Your attitude
   b. Disposition of refusals
   c. Procedures for other non-interviews

Chapter 3. CANVASSING AND LISTING

1. How to canvass
2. How to list
3. Enumeration procedure
4. Types of establishments to be enumerated
   a. Determination of primary activity
   b. Definition of mining and quarrying
   c. Definition of manufacturing
   d. How to handle borderline activities
5. Using your map
   a. Area you are to cover
   b. Mapping terms
      (1) Block
      (2) Inset map
      (3) Legend (or key)
      (4) Map orientation
      (5) North arrow
      (6) Scale
   c. Entries to make on map
      (1) Landmarks
      (2) Stopping point at end of day
      (3) Path of travel
      (4) Serial number for callbacks
   d. Locating and following ED boundaries
   e. Map corrections
      (1) Additions
      (2) Deletions

Chapter 4. INSTRUCTIONS FOR ESTABLISHMENT CONTROL RECORD, FORM 123

1. Identification items
   a. Province
   b. County
   c. Ward and ED
   d. County agent
   e. Enumerator
   f. Reviewer
2. Column 1--Serial number
3. Column 2--Name of establishment
4. Column 3--Location
5. Column 4--On skip-list
6. Column 5--Number of persons engaged
7. Column 6--Type of form
8. Column 7--Industrial activity
9. Column 8--Dates of interview
10. Column 9--Names of persons interviewed
11. Column 10--Date completed questionnaire obtained
12. Column 11--Date of field office review
13. Column 12--Remarks
14. Shaded items g through m for office use only

Chapter 5. INSTRUCTIONS FOR COMPLETING QUESTIONNAIRES

1. All questionnaires
   a. Section I - Description of Establishment
      (1) Item 1--Name of establishment covered by this report
      (2) Item 2--Physical location of establishment
      (3) Item 3--Economic organization of this establishment
      (4) Item 4--Form of ownership and legal organization
      (5) Item 5--Period of operation during 1975 and change of ownership
   b. Section II - Number of persons engaged, labor cost, and man-days worked (number of persons engaged and payrolls)
      (1) Item 6--Persons engaged and payroll during week ended nearest 15 November 1975
      (2) Item 7--Payrolls during 1975
      (3) Item 8--Production workers employed quarterly, 1975
      (4) Item 9--Supplemental labor cost (1975) not included in item 7
      (5) Item 10--Plant-man-days of production workers, by quarters, 1975
   c. Section III - Inventories and acquisition of fixed assets
      (1) Item 11--Inventories of this establishment
      (2) Item 12--Acquisition of new and used fixed assets

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Exhibit IV-4-1. OUTLINE OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

2. Manufacturing questionnaires
   a. Section IV - Materials, fuels, electricity, and contract work; manufacturing processes
      (1) Item 13--Cost of materials, fuels, electricity, contract work, etc., during 1975
      (2) Item 14--Electricity purchased, generated and sold in 1975
      (3) Item 15--Fuels consumed in 1975
      (4) Item 16--Quantity and cost of principal materials consumed in 1975
      (5) Item 17--Manufacturing processes employed in 1975
   b. Section V - Shipments and receipts
      (1) Item 18--Products, contract work, and miscellaneous receipts of this establishment
   c. Section VI - Accuracy checks and certification of this report
      (1) Item 19--Checks to assure a complete and accurate report
      (2) Item 20--Contact
      (3) Item 21--Certification

3. Mineral industries questionnaire
   a. Section IV - Supplies, fuels, electricity, contract work and machinery; type of operation
      (1) Item 13--Cost of purchased supplies, fuels, electricity, contract work and machinery in 1975
      (2) Item 14--Electricity purchased, generated and sold in 1975
      (3) Item 15--Purchased fuels consumed in 1975
      (4) Item 16--Principal minerals received for treatment and supplies used in 1975
      (5) Item 17--Type of operation in 1975
   b. Section V - Production and receipts
      (1) Item 18--Products and contract work of this establishment
   c. Section VI - Accuracy checks and certification of this report
      (1) Item 19--Checks to assure a complete and accurate report
      (2) Item 20--Contact
      (3) Item 21--Certification

4. Electricity and gas questionnaire
   a. Section IV - Materials, fuels, electricity, and contract work
      (1) Item 13--Cost of materials, fuels, electricity, contract work, etc., during 1975
      (2) Item 14--Electricity purchased, generated, and sold in 1975
      (3) Item 15--Fuels consumed in 1975
      (4) Item 16 and item 17--Not applicable
   b. Section V - Receipts for products and services
      (1) Item 18--Electric energy, gas, and all other products and services
   c. Section VI - Sources and disposal of electric energy and gas
      (1) Item 19--Sources of electric energy
      (2) Item 20--Disposal of electric energy
      (3) Item 21--Sources of gas
      (4) Item 22--Disposal of gas
   d. Section VII - Location of power plants, generator capacity, and other equipment
      (1) Item 23A--Physical location of plants and generator capacity
      (2) Item 23B--Equipment for transmission and distribution of electricity, as of December 31, 1975
   e. Section VIII - Remarks and certification of this report
      (1) Item 24--Contact
      (2) Item-25--Certification

Chapter 6. TRAINING AIDS

1. Self-study lessons
2. Mock interviews

Appendix

Appendix A--Provisions of the 1970 Census Act

Appendix B--List of mining and quarrying industries

Appendix C--List of manufacturing industries

Appendix D--List of borderline manufacturing activities

Supplement

Instructions for Household Industries Survey

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Exhibit IV-4-2. PORTIONS OF THE FIELD ENUMERATOR'S POCKET MANUAL

CHAPTER 3. CANVASSING AND LISTING (PART)

.. How to canvass

Canvassing your ED means covering it systematically: searching every block, street, road, or lane for all places establishments could be found. A complete and systematic canvass of your ED is essential to insure that you locate every establishment in your ED.

You should look for evidence of industry, such as high voltage electrical connections, smokestacks, commercial signs, and absence of residential housing, and not waste time on obvious housing developments. The supervisor should review advertising, telephone listings, trade association information, and other outside evidence of industrial activity. In general, conclusions should be based on visual determination rather than time-consuming searches.

As you canvass, you will, of course, list and enumerate each establishment you find. In fact, canvassing and listing are practically combined operations.

a. General canvassing and listing rules

Certain canvassing and listing rules have general application to all types of areas and must be carefully followed by all enumerators.

(1) Start at designated starting point

Always begin your canvass of the ED at the starting point designated by your supervisor. He will mark "Start" on your map at the point he selected and he will also indicate the direction of travel from that point with several directional arrows (→). He will not plan the entire route, however. From the starting point, you will plan a systematic canvassing route through the rest of the ED's.

(2) List establishments in order

As you canvass, you must list each establishment <u>in order</u> as you come to it, whether or not anyone is there. If there is no respondent, you must inquire at nearby units to find out the best time to call back or any other available information.

(3) Show path of travel by directional arrows

As you canvass your ED, enter directional arrows (→) on the map to show your path of travel. Also when you have completely covered a block or a road, enter a checkmark (✓) on your map to show that this portion of the ED is complete. These devices are very useful to help you make certain you have canvassed all of your ED's.

(4) Look for out-of-the-way establishments

Look for establishments above or in the rear of housing units, partially built or abandoned buildings, improvised industrial quarters, and structures hidden from the road.

To help you locate out-of-the-way or hidden structures you should be on the look-out for various clues; for example, mailboxes, lead-in electrical wires, milk cans or produce crates stacked near the road, outside stairways, etc.

b. Rules for canvassing specific types of areas

There are specific canvassing rules to follow depending on whether you are assigned to an urban ED or rural ED and also specific instructions for canvassing certain types of structures. Follow the instructions below which are applicable to your particular ED.

(1) Urban areas and hamlets with blocks

If you are assigned an urban ED which is divided into blocks or squares (areas bounded on all sides by streets), canvass one block or square at a time. Do not go back and forth across streets. Begin each block at a convenient corner (usually the northwest corner) and proceed clockwise around the block until you reach your starting point. As you canvass in a clockwise direction, you should list and enumerate the establishments on your right. Check every alley, court, or passageway you come to in the block. You must canvass not only around but through the entire block to find all establishments before going on to the next block.

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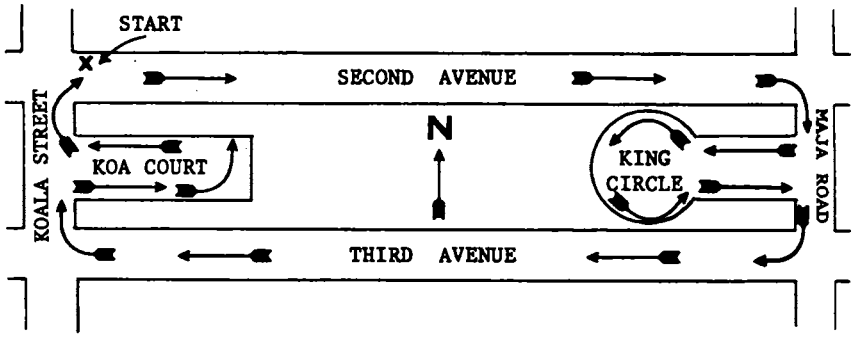
Exhibit IV-4-2. PORTIONS OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

As you canvass through your ED, remember to check (✓) off each completed block on your map. Also remember to enter directional arrows (⟶) on your map to show your path of travel through each block in the ED, as illustrated below.



(2) Urban places or hamlets without blocks

If your ED is an urban place or hamlet that is not laid out in blocks, you will have to canvass street by street and road by road, looking for all structures which contain establishments. In such areas, you should interrupt the canvassing of a main street or road to turn off and canvass any side streets as you come to them. You might miss some of the side streets if you wait until later to come back and canvass them.

It is most important in canvassing this irregular type of area to draw in your directional arrows to show your path of travel on your ED map, and to check off each completed road or street. Marking the completed portions in this way will help you to be certain that you have covered every part of the ED in your canvassing.

(3) Rural areas

If you have been assigned an open-country rural ED, you will have to canvass road by road and street by street. Generally, you should cover both sides of a road as you go, except for ED boundary roads where you will canvass only the side that is contained within your ED.

Although you will begin canvassing at the starting point and in the direction indicated by your supervisor on your map, you should study your map carefully before starting out and make a preliminary plan for your path of travel. This will help you make sure you cover every part of the ED. Occasionally you may find it convenient to go completely around small built-up sections, just as you would in block-type urban ED's.

Your objective is to canvass every road in your ED. You should turn off from main roads to canvass every side road, path, lane, and trail as you come to them, as such roads may lead you to establishments. The directional arrows you enter on your map to show your path of travel should clearly indicate where you turn off from a main road to canvass a side road before completing the canvass of the main road.

In rural areas there are many structures which cannot be seen from the road, and there may be no visible clues to indicate their location. Therefore in rural areas make it a practice to always ask at each establishment about other establishments, and find out exactly where they are located. Ask the respondent to point out on your map the approximate locations of the establishments. Most rural maps will show the location of housing units, and also of other buildings such as schools and churches, which serve as landmarks. Obtaining information from the local residents in this way will help you insure complete coverage of your ED.

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Exhibit IV-4-2. PORTIONS OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

Some roads that you canvass may be unnamed and unnumbered. In order to identify such roads when you list establishments located there, assign a letter to each, starting with "A" for the first one.

Be sure to enter the assigned letter both on the map and in the listing column for name or number of street or road.

For structures or establishments that do not have numbers, you should enter the serial number from Establishment Control Record Form-123 for each establishment on the map next to the unit symbol. This is a very helpful device for identifying the correct establishment when a callback is required.

Continue with discussion of
"HOW TO LIST"

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Exhibit IV-4-2. PORTIONS OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

CHAPTER 4. INSTRUCTIONS FOR ESTABLISHMENT CONTROL RECORD, FORM 123 (PART)	
1. Identification items	These items must be completed for each form that you use. Make sure that they are completed before you turn in the form.
a. Province	In this space, print the name of the Province in which you are working.
b. County	In this space, print the name of the county in which you are working.
c. Ward and ED	Enter both the name of the ward and the ED number from your map.
d. County agent	Enter the name of the County Agent's office.
e. Enumerator	Enter your name.
f. Reviewer	The county agent or field supervisor should sign his name after he has reviewed the listing.
2. Column (1), Serial number	Number each establishment as you list it, beginning with 1 for the first establishment listed for the ward or ED. If you use more than one form for a ward or ED, do not start with 1 again but continue the numbering from the previous form. In some circumstances you may use more than one line for an establishment; only number the first line used for that establishment.
3. Column (2), Name of establishment	Enter the name of the establishment. If the establishment does not have a name, enter the name of the owner.
4. Column (3), Location	Enter the number, name of the street, or other location data. If the establishment is difficult to find or there is no number or street name, describe how to get there so that it can be located by another person. Use the "Remarks" column or the back of the form if necessary. If the establishment has a mailing address different from its physical location, enter the mailing address in the "Remarks" column, with the notation "mailing address".
5. Column (4), On skip-list	Check the name of the establishment with your skip-list. If the name is on the list, enter "Yes" and end the interview. If the establishment is not on the skip-list and it is-- (1) Part of a multi-unit company (2) An electricity or gas establishment, or (3) Government owned-and-operated enter "No" and end the interview. Notify your supervisor or the field office as soon as possible of its existence. In all other cases enter "No" and continue with the interview.
6. Column (5), Number of persons engaged	Enter the total number of persons engaged by the establishment. If the respondent does not know the exact number, try to obtain the nearest approximation of the number by asking the respondent the number of-- 1. Working proprietors and active partners--All individual proprietors and partners who are actively engaged in the work of the establishment. 2. Unpaid family and other unpaid workers--Members of the family and other persons (living in the household of any of the

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Exhibit IV-4-2. PORTIONS OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

proprietors) working at least one-third of the normal working time without regular pay for the work done.

3. Production workers (operatives)--Workers (up through the working foreman level) engaged in fabricating, processing, assembling, inspection, receiving, storage, handling, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial, watchman services, product development, auxiliary production for plant's own use (such as a power plant), record keeping, and other services closely associated with these production operations.

4. All other employees--Administrative, technical, clerical, and all other paid employees. Examples are salaried managers and directors, research workers, clerks, typists, bookkeepers, administrative supervisors, salesmen, etc.

Do <u>not</u> include homeworkers; that is, persons who do the manufacturing of a product in their homes on a contract basis.

Continue with discussion of column 6, "TYPE OF FORM"

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Exhibit IV-4-2. PORTIONS OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

APPENDIX A. PROVISIONS OF THE 1970 CENSUS ACT APPLICABLE TO INDUSTRIAL CENSUSES

1.	Introduction	Not many respondents will wish to see the legal provisions for the Census, but those who do should be promptly supplied with the information. You should familiarize yourself with the legal provisions so that you will be able to find the sections readily in which the respondent is particularly interested.
2.	Applicable sections of the 1970 Census Act	
	(a) Definitions	As used in this Act, unless the context requires another meaning, or unless it is otherwise provided: "Office" means the National Statistical Office, "Ministry" means the Ministry of Economic Planning and Development, and "Minister" refers to the head of that Ministry.
	(b) National Statistical Office	The Office is transferred from the Ministry of Finance to the Ministry of Economic Planning and Development, and is henceforth under the jurisdiction of the latter Ministry.
	(c) Functions of the Minister; delegation	The Minister of Economic Planning and Development shall perform the functions and duties imposed upon him by this Act, or he may delegate any of them to such officers, employees, or Offices of the Ministry as he designates, subject to the limitations provided in this Act.
	(d) Questionnaires; number, form and scope of inquiries	The Minister shall prepare questionnaires, and shall determine the inquiries, and the number, form, and subdivisions thereof, for the statistics, surveys, and censuses provided for in this Act. The Minister shall maintain liaison with other data gathering agencies in Providencia, both public and private, and, in planning the programs of this Office, shall attempt to minimize any duplication between their objectives and those of other organizations. In determining the content and scope of statistical inquiries, he shall seek the advice and counsel of other government agencies and of interested private organizations and individuals.
	(e) Confidential information	Neither the Minister, nor any other officer or employee of the Ministry, may use the information furnished under the provisions of this Act for any purpose other than the statistical purposes for which it is supplied. They may not make any publication whereby the data furnished by any particular establishment or company can be identified. No one may be permitted to examine any filled-in questionnaires except officers and employees of the National Statistical Office. (Penalties for violation of this paragraph are set forth in Paragraph 10.)
	(f) Officers and employees	The National Statistical Office shall be headed by a Director, to be appointed by the Minister. The Director shall perform such duties as may be imposed upon him by law, regulations, or orders of the Minister. The Director, with the concurrence of the Minister, shall secure the services of such other employees as he deems necessary to carry out the provisions of this Act. In addition to such regular employees, the Director may arrange to secure the services of employees of other government agencies to assist the Office in the conduct of field enumeration. Before assuming their duties, all such employees shall swear under oath to abide by the provisions of Paragraph 5.
	(g) Censuses of Manufacturers, Mineral Industries, and Other Businesses	The Office shall take, compile and publish censuses of manufacturers, of mineral industries, and of other businesses, including the distributive tasks and public utilities. The terms "manufacturers," "industries," and "businesses" shall be construed to

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Exhibit IV-4-2. PORTIONS OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

include establishments owned and operated by the government as well as those owned and operated by private individuals or companies. A census covering manufacturers, mineral industries, and the production and distribution of electricity, gas and water shall be taken covering the year 1975 and every tenth year thereafter.

(h) Interim current data

The Office may make surveys deemed necessary to furnish annual, monthly and quarterly statistics on the subjects included in the censuses provided for in this Act.

(i) Use of sampling

In carrying out the provisions of this Act, the Office is encouraged to make full use of methods whereby only a sample group of potential respondents is required to furnish replies to particular inquiries.

(j) Penalties--officers and employees

1. Whoever receives or secures to himself any fee, reward, or other compensation as a consideration for the appointment or continued employment of any person under the provisions of this Act shall be fined not more than *(amount)* or imprisoned not more than five years, or both.

2. Whoever, being an officer or employee referred to in this Act, having taken the oath of office and having agreed to comply with the provisions of Paragraph 5 of this Act, publishes or communicates, without the written authority of an officer of the Ministry, any information coming into his possession by reason of his employment, shall be fined not more than *(amount)* or imprisoned not more than two years, or both.

(k) Penalties--other organizations and persons

Whoever, being the owner, official, agent, person in charge, or assistant to the person in charge, of any company, business, institution, establishment, or other organization, neglects or refuses, when requested by the Office, to answer completely and correctly to the best of his knowledge all questions relating to his company or other organization contained on a questionnaire of the Office, shall be fined not more than *(amount)* or imprisoned not more than one year. If he willfully gives a false answer to any inquiry, he shall be fined not more than *(amount)* or imprisoned not more than three years, or both.

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Exhibit IV-4-2. PORTIONS OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

APPENDIX B. LIST OF MINING AND QUARRYING INDUSTRIES

The brief industry title in the following list should be entered on Form 123, Column (7), where appropriate. The description is given only where the brief title is not self-explanatory.

If more than one industry title is given in the list below, enter only one as appropriate. For example, enter "Stone quarry" if only stone is extracted.

Describe activity as not "elsewhere classified" industries, such as Industry 2909.

Industry number	Brief title	Description
2100	Coal mining	Includes lignite. Includes manufacture of briquettes and other packaged fuels at mine sites. Peat is in Industry 2909.
2200	Oil and gas wells	Petroleum refineries are in Industry 3530. Gas distribution is in Industry 4102.
2301	Iron ore mining	Pyrite and pyrrhotite mining is in Industry 2902.
2302	Non-ferrous ore mining	
2901	Stone quarrying, clay pits, sand and gravel pits	The manufacture and delivery of ready-mixed concrete, when conducted as a separate enterprise, is Industry 3699.
2902	Chemical and fertilizer minerals	Phosphates, nitrates, guano, fluorspar, sulphur, potash, sodium and borate minerals, barites, prites, pyrrhotites, arsenic, strontium and lithium, and their ores.
2903	Salt mining	The refining of salt, when conducted as a separate enterprise, is in Industry 3121. Evaporating salt in salt pans is included in this industry.
2909	Mining, not elsewhere classified	Includes all mining and quarrying nor classifiable above.

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Exhibit IV-4-2. PORTIONS OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

APPENDIX C. LIST OF MANUFACTURING INDUSTRIES (PART)

Industry number	Brief title	Description
3111	Slaughtering and meat packing	Slaughtering and dressing of all animals and birds for meat; curing, smoking, salting, freezing, and canning of meat; manufacturing casings, meat soups, rendering of edible animal fats; and manufacture of refined animal fat products such as stearin and lard oil.
3112	Dairy products	Manufacture of butter, cheese, and other processed milk and cream products; frozen cream and milk desserts; and other edible milk products. The processing of fluid milk for wholesale and retail distribution is also included.
3113	Preserved fruits and vegetables	Canning, freezing and drying of fruits, vegetables and juices, and the manufacture of prepared vegetable products such as soups, pickles, sauces, and prepared foods.
3114	Preserved fish and other seafood	Canning, salting, drying, smoking, pickling or freezing seafood such as fish, shrimp, oysters, clams, crabs, prawns, mussels, octopi, squid, lobsters, or sea mammals such as whale. The capture of fish and other seafood is out-of-scope of the industrial census, but factory-type vessels engaged in capturing and processing seafood are included and are to be enumerated.
3115	Fats and oils, n.e.c.	Pressing of oilseeds and nuts; extraction of fish and marine mammal oil; rendering of inedible animal fats and oils; refining and hardening of fats and oils; and production of margarine, shortening and salad oils. Production of lard and other edible animal fats is in Industry 3111.
3116	Grain-mill products	Grinding of flour, meal and dry livestock feeds; polishing of rice; manufacture of cereal breakfast foods, blended and prepared flour mixes, and other cereal preparations. Includes the factory husking and peeling of coffee, roots, etc.
3117	Bakery products	Manufacture of bread, cakes, cookies, doughnuts, pies, pastries, biscuit, crackers, macaroni, spaghetti, noodles and similar products.
3118	Sugar mills and refineries	Manufacture and refining of sugar from cane or beets.
3119	Confectionery	Manufacture of cocoa and chocolate from cacao beans; sugar confectionery such as marshmallows, pastilles, and fondants; salted nuts, stuffed dates and chewing gum.
3121	Food products, n.e.c.	Manufacture of food products not elsewhere classified, such as starch, starch products, baking powder, yeast, flavors, sauces, dried, frozen or liquid eggs, spices, roasted coffee, blended tea, etc.
3122	Animal feeds	Manufacture of animal feeds other than dry livestock feeds, such as dog and cat food, rabbit feed, chicken mash, etc.
3131	Distilled liquors	Distillation of whiskey, ethyl alcohol, and other alcoholic beverages, except from sulfite residues. Includes the blending of liquors to make mixtures such as gin, liqueurs, cocktails, etc.
3132	Wines	Wineries and similar establishments making fermented fruit beverages. Includes establishments blending and bottling wines from ingredients fermented elsewhere.

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Exhibit IV-4-2. PORTIONS OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

3133	Malt and malt liquors	Includes breweries and malthouses.
3134	Soft drinks and bottled water	Manufacture of flavored soft drinks, and the bottling of spring and mineral waters.
3140	Tobacco products	Stemming and redrying of leaf tobacco, and the manufacture of cigarettes and other tobacco products.
3211	Textiles, except knitting	Preparation of fibers such as ginning, retting, scouring, carding, combing, or throwing; spinning of yarn; weaving of cloth; bleaching, dyeing, printing and other finishing. Manufacture of narrow fabrics and braids. Includes "converters" who engage contract labor to perform manufacturing operations on their materials but do not manufacture in their own establishments.
3212	Textile products, except clothing	Manufacture of house furnishings, textile bags, sails and other canvas products, trimmings, embroideries, flags and pennants. Includes stitching, pleating and tucking for the trade.
3213	Knitting mills	Establishments using knitting machines to produce hosiery, sweaters, underwear and other garments, and knitted cloth. Bleaching, dyeing and finishing of knit products is included. The manufacture of garments from purchased knit cloth is in Industry 3220.
3214	Carpets and rugs	Manufacture of floor coverings from textile fibers, or from twisted paper, grass, jute, rags. Not included are hard-surface floor coverings such as linoleum, plastic rugs or tile, etc.
3215	Cordage and twine	Manufacture of rope and twine from any textile fiber, including nylon, polypropylene, sisal, henepen, jute, abaca, hemp.
3219	Textiles, n.e.c.	Manufacture of textile and related products not classified elsewhere, such as oilcloth and other textile products resembling leather. Includes manufacture of felt, batting, padding, wadding, processed waste fibers, and tire cord.
3220	Apparel	Manufacture of wearing apparel, except footwear, from textiles and similar materials. The operations performed consist of cutting, sewing and finishing. It is common in this industry for one company to perform the buying and selling functions, and to employ homeworkers or contract labor to produce the garments. The firms buying the materials and marketing the finished products are called "jobbers".
3231	Tanneries and leather finishing	Establishments engaged in finishing leather: tanning, currying, embossing, japanning, etc.
3232	Fur dressing and dyeing	Establishments engaged in preparing fur pelts for the trade; scraping, currying, tanning, bleaching, dyeing, etc., or in the manufacture of fur rugs, and other fur articles except garments.
3233	Miscellaneous leather goods	Manufacture of products of leather or leather substitutes, except wearing apparel. Includes luggage, hand bags, cigarette cases, key cases, saddlery, coin purses and other small leather goods.
3240	Footwear, except rubber	Manufacture of footwear from leather and similar materials, except material that is made almost wholly of wood, molded rubber or plastics. Includes the manufacture of cut stock and findings, such as heels, soles, etc., made for sale to the trade.
3311	Sawmills and other wood mills	Manufacture of lumber products such as sash, doors, frames, dimension lumber; veneer, plywood and particle board; cooperage and other wood stock; excelsior. Includes wood preservation plants.

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Exhibit IV-4-2. PORTIONS OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

		Logging and the rough-hewing of poles, bolts and similar wood materials is not classified as an industrial activity and is not to be enumerated.
3312	Wooden containers	Manufacture of boxes, crates, drums, barrels and other wooden containers; baskets and other rattan, reed, willow or wicker containers, and other small products made of these materials.
3319	Wood and cork products, n.e.c.	Manufacture of cork products; small ware consisting entirely or mainly of wood; wooden lasts, ladders, blocks, handles, picture frames, coffins, and other miscellaneous wood products.

Continue with industry descriptions, which would be essentially the same as those published under ISIC numbers 3320 through 4102. The ISIC edition followed is that published by the United Nations in 1968 as Series M, No. 4, Revision 2.

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Exhibit IV-4-2. PORTIONS OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

APPENDIX D. LIST OF BORDERLINE MANUFACTURING ACTIVITIES

Awnings, tents, sails, and canvas covers	It is common for establishments making these products to resell similar products made by other manufacturers. If the volume of resales is greater than that of products made in the establishment, you should consider it to be wholesale or retail, and out-of-scope for the industrial census. Establishments in this group also commonly install the products they make, and the value of finished products includes the amount charged for installation.
Bakeries, confectionery shops, ice cream stores and tobacco shops	Stores selling these and other products to retail customers on the premises are considered to be manufacturing establishments if the volume of sales of goods made by them is greater than their resales of other products.
Coffee roasting	Establishments primarily engaged in roasting and/or grinding coffee are considered to be manufacturers, even though some or all of the product is sold at retail on the premises.
Contract manufacturing	Shops or factories in which the work is performed on raw materials furnished to them by others are considered to be engaged in contract manufacturing. Such establishments normally do not buy raw materials nor sell the finished products. Their receipts for contract work (payments made to them for performing manufacturing operations) are to be reported in item 18, line b, on the manufacturing questionnaires. If the activity is mixed (that is, the establishment does contract work but also manufactures some products from its own materials) the establishment should report both the cost of materials (item 13 a) and the value of finished products (item 18 a), for the portion of its operations representing "regular" manufacturing (that is, from its own materials). As a contract manufacturer, the establishment will not report either the cost of materials or the value of finished products. These figures will, however, be reported by the company which supplied the raw materials to the contract manufacturer (see "Jobbers, converters, etc." below).
Cotton cleaners and rehandlers	Establishments engaged in buying and selling cotton which put the fiber through cleaning or conditioning processes should be reported as industrial establishments. Those which simply buy and sell the product, but do not process it, are considered out-of-scope for the industrial census. Establishments engaged in the processing of cotton waste or other textile mill fiber waste are classified as manufacturers. Those cleaning or washing rags and other fabric waste materials are, however, wholesalers and are considered out-of-scope.
Farm and farm products	When the manufacture of butter, cheese, cider, vinegar, molasses, syrup, sugar and other products is performed on a farm primarily from raw materials grown on the farm, the establishment is considered to be out-of-scope. If the manufacturing operations are performed primarily on materials grown elsewhere, the farm should be treated as a manufacturing establishment. The sales of unprocessed farm crops or livestock should be reported as "resales", item 18 d on the manufacturing questionnaires. You need not question every farm operator as to the existence of manufacturing operations. Only those which make their activity known in some conspicuous way, such as advertising, need to be contacted to determine their primary activity. In general, the preparation of farm products for the market, such as cleaning, shelling, peeling, is not treated as manufacturing. If, for example, the farmer shells his own field corn, the resulting shelled grain would be treated in the census as though it were ear corn.

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Exhibit IV-4-2. PORTIONS OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

Fishery products	The processing of fish and other seafood (salting, drying, smoking, curing, canning or filleting) is considered to be manufacturing. The sale of whole fish should be treated as resales, and establishments primarily engaged in this kind of sale considered out-of-scope. When the capture of fish or other seafood is conducted in conjunction with a processing activity, the primary sales volume (whole versus processed) should determine whether the establishment is to be treated as in-scope or out-of-scope. When the establishment is large (that is, with 10 or more persons engaged in fishing and another 10 or more in processing) the case should be referred to the central office because it may be a candidate for treatment as a multi-unit enterprise.
Furriers and fur shops	The manufacturing of fur garments and other fur goods is to be treated as a manufacturing activity, even though the fur goods are made to the individual order of customers. Jobbers engaged in buying fur materials and having garments made for them by contract manufacturers should report on a manufactures questionnaire, even though they do not employ production workers. Their principal contribution to the census is the cost of materials and the value of products, which the contract manufacturers are unable to report. Fur shops primarily engaged in selling fur goods made elsewhere are retailers and are out-of-scope for the industrial census.
Grist mills	You should enumerate all mills manufacturing grain products such as feed and flour, except those whose primary income is from resales of products manufactured elsewhere. Some mills operate on a custom basis; that is, farmers bring in grain to be ground or otherwise processed, and pay the grist-mill operator a fee for performing the work. Such receipts should be reported as "contract work," item 18 b on the manufactures questionnaires. If the payment is made in grain rather than in money, the value of this "payment in kind" should be estimated and included in item 18 b.
Households	Except in designated sample areas, there will be no attempt to enumerate the manufacturing activity of households systematically. However, those which make their activity known in some conspicuous way, such as advertising, should be contacted to determine their primary operation. You should enumerate those of the latter type which are principally engaged in a manufacturing activity. In deciding on the primary activity, you should balance the income from manufactured goods made in the household (usually by family members) against the family income from all other sources. The approach described here will not ordinarily locate homeworkers who work on materials supplied to them by manufacturers or jobbers, because they do not sell products and do not advertise. If you do run across such a case, however, the income from such homework should be treated as "all other income" in determining the primary activity. Cases of a recognizable manufacturing establishment whose owner happens to live in the same building should not be treated as a household but just like any other factory.
Jobbers, converters, etc.	As mentioned above in the "Introduction to manufacturing," the Providencia system includes in manufacturing those establishments which are primarily engaged in buying materials, hiring homeworkers

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Exhibit IV-4-2. PORTIONS OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

	or contract manufacturers to make finished products from the materials, and then selling the finished products. Such establishments may produce nothing. They are included in the census primarily because they are the only ones who can report the cost of the materials and the value of the finished products. These establishments are called by various names, depending on the trade. In the textile industries, the "converter" buys materials, hires a contract manufacturer to do the work, and then sells the finished product. In the apparel industries, the "jobber" does much the same thing except that he may also employ homeworkers.
Milk pasteurizing and bottling	Note that the dairy industry includes plants which pasteurize, bottle and distribute fluid milk as well as those which manufacture dairy products such as butter, cheese, canned and dried milk, etc.
Poultry dressing	The slaughtering industry includes the killing and dressing of all types of animals and birds, including poultry. Establishments which grow poultry and kill and dress the birds on the same premises are ordinarily not included as manufacturing establishments. An exception would be the case where the poultry-raising operation was incidental to the killing and dressing operation, because the bulk of the birds were raised elsewhere.
Rendering by garbage collectors	Some establishments are engaged primarily in the collection and disposal of garbage, but derive some income from rendering fatty materials to obtain inedible grease. Rendering is a manufacturing operation, but the other operations are not. In determining the primary activity, therefore, you should balance the income from sales of grease against other income, and enumerate the establishment only if the sales of grease is the larger figure.
Salting of hides	Some establishments salt down hides to preserve them until they can be sold to a tannery. The operation of salting is not considered a manufacturing activity in itself, and such establishments are out-of-scope.
Slaughtering	Butcher shops or meat markets may do some slaughtering or manufacture meat products incidentally to the retail business. Such establishments should be considered out-of-scope unless the income from slaughtering and meat-packing exceeds the income from retail sales of products made elsewhere.
Tourist goods	Retail stores engaged in selling novelties, leather goods and similar products to tourists may manufacture some of these products on the premises. You should inquire as to whether the principal source of income was the sale of goods made on the premises; if so, the establishment should be enumerated on a manufactures questionnaire.
Wool pulling	In general, the processing of hides before they are sold to a tannery is not manufacturing. An exception is made in the case of wool pulling; when conducted as a separate operation this is considered to be manufacturing and the establishment should be enumerated.

Continue with examples of borderline activities that would affect ISIC industries 3320 through 4102. The examples should be applicable to the country and should include only the most common cases which the enumerator may expect to encounter.

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Exhibit IV-4-2. PORTIONS OF THE FIELD ENUMERATOR'S POCKET MANUAL--Continued

SUPPLEMENT FOR THE HOUSEHOLD INDUSTRIES SURVEY (PART)

1. Introduction	This supplement to the Pocket Manual contains enumeration instructions for the household industries sample survey, which will be conducted as part of the 1975 Industrial Census. You should also keep your copy of the regular Pocket Manual, because the only topics which will be discussed in this supplement are those which apply particularly to the household survey. Most of the topics in the regular manual, such as the administrative procedures and the definitions of industrial activity, are also applicable to the household survey.
2. Objective and scope	The objective of the household industries survey is to measure the extent of industrial activity in households. Since the only important industrial activity in households is manufacturing, the other activities included in the census (mining, electricity, and gas) will not be covered in the household survey. The household industries survey is not a complete canvass like the census, but will be undertaken for only a sample of ED's, in which every household will be interviewed. No households in other ED's will be interviewed, even though you may know of some manufacturing activity among them. In order to assure coverage, every housing unit in your assigned area should be canvassed. A housing unit is a house, apartment or flat occupied or intended for occupancy by a family or other group of persons living together, or by a person living alone. A tent or makeshift dwelling where people live is also a housing unit. Structures can contain more than one housing unit. For example, in urban areas, many of the structures contain a number of housing units; an apartment building with 24 separate apartments would have 24 housing units. For the purpose of this survey all the occupants of a housing unit will be considered a household. While vacant units, units under construction, hotels, trailers, vacation homes, and all institutions are to be listed and identified on Form-123H, they are not within scope for this survey. Therefore, they are <u>not</u> to be enumerated.
3. Accuracy	In sample surveys, each household interviewed represents many other households. Accuracy is therefore of great importance. In the case of income or receipts from work done, this does not mean that you have to spend a lot of time getting exact accurate figures; estimates are perfectly satisfactory if they are somewhere within reason. But it does mean that you should make sure you identify all the households in the sample ED's and that you get complete reports from those who qualify for Form ECP-102. Errors of omission, duplication or seriously inaccurate information are magnified many times in tabulating the results of a small sample survey.
4. Areas enumerated	Your supervisor will assign specific ED's to you for enumeration, usually in the form of a map on which the boundaries have been indicated in red. In each of the assigned ED's you are expected to canvass the entire area and, with certain exceptions as noted in 2, to interview all households and list the results on Form 123H. For households which qualify, Form ECP-102 must also be filled out.

Continue with discussion of
"WHOM TO INTERVIEW"

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Appendix

Exhibit V-1-1. MASTER LIST OF ED'S, FORM 230

Sheet 1 of 6

FORM 230

MASTER LIST OF ED'S

PROVINCE CATEDRAL CODE 01

COUNTY AMPARO CODE 01

POSTED BY- B. Ali DATE 12/07/73

Ward Name (1)	Ward No. (2)	Name of place, hamlet, or settlement (3)	ED No. (4)	Ward Name (1)	Ward No. (2)	Name of place, hamlet, or settlement (3)	ED No. (4)
Barbados	01		001				
BENI	02		001				
Buenos Aires	03		001				
			002				
(etc)							

Exhibit V-1-2. MASTER CONTROL LIST FOR NON-SKIP LIST ESTABLISHMENTS, FORM 501

Sheet 1 of 3

FORM 501

MASTER CONTROL LIST
FOR NON-SKIP LIST ESTABLISHMENTS

PROVINCE Catedral CODE 01

COUNTY Amparo CODE 01

Ward No. (1)	ED NO. (2)	Total forms (3)	Manufacturing-short		Mining-short		Manufacturing-long		Mining-long		Reel No. (12)
			Number of forms (4)	Work Unit No. (5)	Number of forms (6)	Work Unit No. (7)	Number of forms (8)	Work Unit No. (9)	Number of forms (10)	Work Unit No. (11)	
01	001	16	5	101	2	201	3	301	6	401	
02	001	6	1	101	0	—	4	301	1	401	
03	001	12	3	101	1	201	6	301	2	401	

NOTES: Columns 1 and 2--Must contain complete list of wards within the county.
Column 3--Total of columns 4,6,8, and 10.
Columns 4,6,8, and 10--From Form 123.

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Exhibit V-1-3. MASTER CONTROL LIST FOR SKIP LIST ESTABLISHMENTS, FORM 502

Sheet__of__

FORM 502 MASTER CONTROL LIST FOR SKIP LIST ESTABLISHMENTS				PROVINCE Catedral		CODE 01	
				COUNTY Amparo		CODE 01	
Ward No.	ED No.	Serial No.	Work Unit No.	Date			Reel No.
				To edit	From edit	To DPD	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

NOTE: Columns 1 to 3--Must contain identification for each establishment.

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Exhibit V-1-4. **DATA PROCESSING CONTROL SHEET, FORM 507**

Sheet___ of ___

FORM 507

DATA PROCESSING CONTROL SHEET

Province ___ Code ___

County ___ Code ___

Work Unit No.	Number of forms	Editing-coding			Key punching												Tabulation	
		Date to E-C	Date from E-C	Number of errors	Date to KP	Date from KP	Number of errors	Total cards	Card 1	Card 2	Card 3	Card 4	Card 5	Card 6	Card 7	Card 9	Date to TAB	Date from TAB
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)

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Exhibit V-1-5. WORK UNIT CONTROL LABEL, FORM 503

ORM 503 WORK UNIT CONTROL LABEL			PROV.	COUNTY
ORK UNIT NO.	NUMBER OF FORMS	TYPE OF FORM Manufacturing-long ☐ Mining-long ☐ Electricity/Gas ☐ Manufacturing-short ☐ Mining-short ☐		

ACTIVITY	NUMBER OF ERRORS	DATE	SIGNATURE	REMARKS
DITING-CODING				
ERIFICATION DITING-CODING				
EY PUNCHING				
ERIFICATION EY PUNCHING				
OUNTING CARDS				

ARD COUNT	TOTAL	CARD 1	CARD 2	CARD 3	CARD 4	CARD 5	CARD 6	CARD 7	CARD 9

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Exhibit V-4-1. PROCESSING SEQUENCE A: TESTS FOR COMPLETENESS

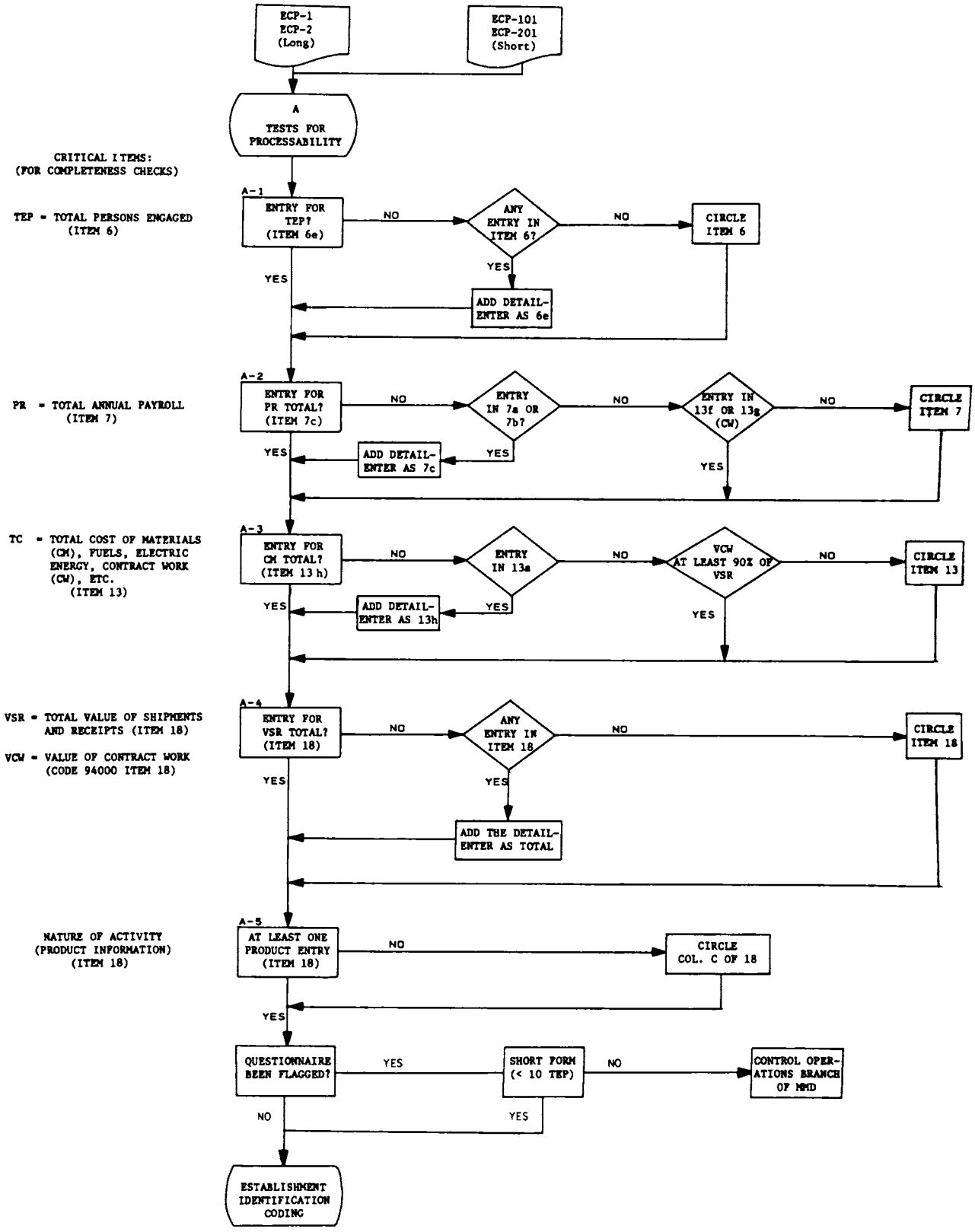

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Exhibit V-4-2. PROCESSING SEQUENCE C: EDITING PRODUCTS AND MATERIALS

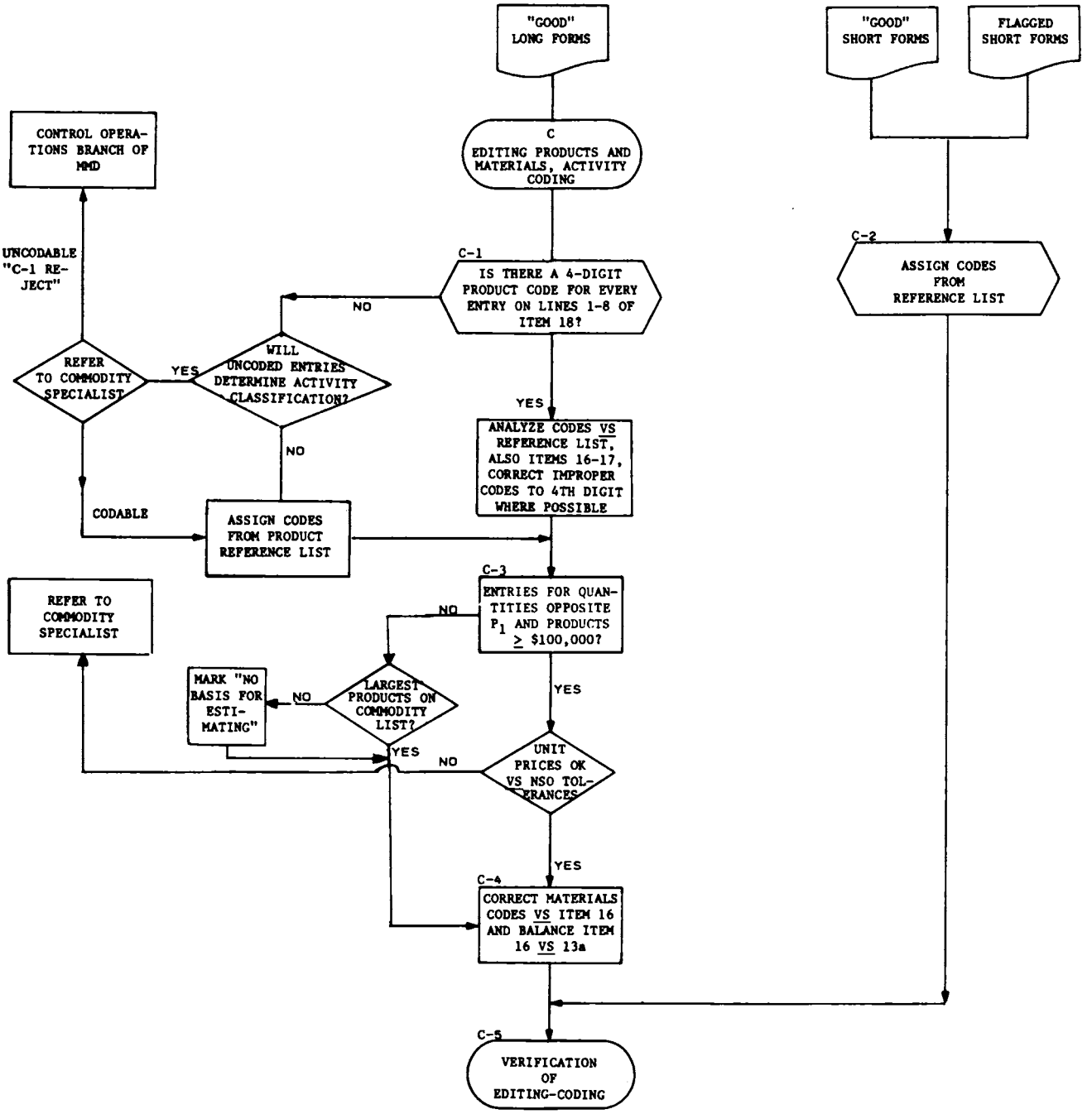

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Exhibit V-5-1. CARD CONTENT BY TYPE OF CARD

CARD TYPE 1

Identification codes

Card type

Section II
- Item 6, all
- Item 7, all
- Item 8, all

CARD TYPE 2

Identification codes

Card type

Section II
- Item 9, all
- Item 10, all

Section III
- Item 11, all
- Item 12, lines a through c

CARD TYPE 3

Identification codes

Section III
- Item 12, lines d and e

Section IV
- Item 13, all
- Item 14, lines a and b

CARD TYPE 4

Identification codes

Section IV
- Item 14, line c
- Item 15, all

CARD TYPE 5*

Identification codes

Section IV
- Item 16

CARD TYPE 6**

Identification codes

Section V
- Item 18

CARD TYPE 7

Identification codes

Section II
- Item 6, all
- Item 7, all
- Item 13, all

CARD TYPE 9***

Identification codes

Section V
- Item 18

*Since more than three principal materials may be reported in item 16, more than one card may be needed per questionnaire.

**Since more than three line entries may be reported in item 18, more than one card may be needed per questionnaire.

***Since more than five line entries may be reported in item 18, more than one card may be needed per questionnaire.

Exhibit V-5-2. DETAILED PUNCHING INSTRUCTIONS

CARD TYPE 1

Questionnaire item	Location on questionnaire	Digits in field	Card columns
Identification			
Province	Upper right corner, boxes 1-2	2	1- 2
County	Upper right corner, boxes 3-4	2	3- 4
Register No.	Upper right corner, boxes 5-9	5	5- 9
Ward	Upper right corner, boxes 10-11	2	10-11
Acting	Upper right corner, boxes 12-15	4	12-15
F/O	Upper right corner, box 16	1	16
Card type	1	1	17
Section II			
Item 6	Line a, column C	2	18-19
	Line b, column C	3	20-22
	Line c, column C	4	23-26
	Line c, column I	6	27-32
	Line d, column C	3	33-35
	Line d, column I	5	36-40
	Line e, column C	4	41-44
	Line e, column I	6	45-50
Item 7	Line a, column C	8	51-58
	Line b, column C	7	59-65
	Line c, column C	8	66-73
Item 8	Line f, column C	4	74-77

CARD TYPE 2

Questionnaire item	Location on questionnaire	Digits in field	Card columns
Identification	Duplicate Card 1		1-16
Card type	2		17
Section II			
Item 9	Line a, column C	7	18-24
	Line b, column C	6	25-30
Item 10	Line e, column C	5	31-35
Section III			
Item 11	Line a, column B-2	4	36-39
	Line a, column B-4	4	40-43
	Line b, column B-2	3	44-46
	Line b, column B-4	3	47-49
	Line c, column B-2	4	50-53
	Line c, column B-4	4	54-57
	Line d, column B-2	5	58-62
	Line d, column B-4	5	63-67
Item 12	Line a, column C	4	68-71
	Line b, column C	5	72-76
	Line c, column C	4	77-80

(Continue with instructions for cards 3 to 9)

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Exhibit V-5-3. WORK UNIT SEPARATOR CARD

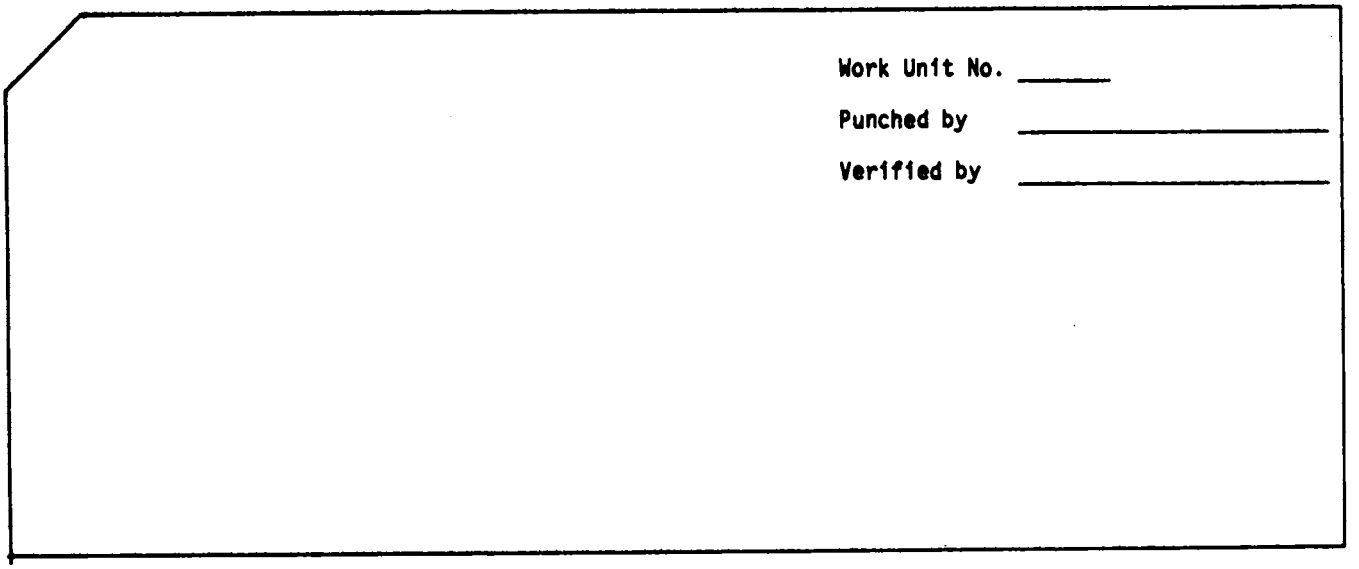

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Exhibit V-6-1. FORMATS OF MASTER ED FILE AND ED TABULATED COUNTS FOR MANUFACTURING-LONG FORMS

FORMAT FOR MASTER ED FILE

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 39 40 41 42 43 44 45	77 78 79 80
PROVINCE	COUNTY	WARD	ED NO.	INDUSTRY CODE	FORM CODE	HAND COUNT OF ESTABLISHMENTS	CHANGE CODE	TABULATED COUNTS BY RECORD TYPE: TOTAL	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6	AREA NAME	

FORMAT FOR MASTER ED LISTING OF TABULATED COUNTS

MASTER ED LISTING FOR MANUFACTURING ESTABLISHMENTS ≥ 10 TEP

PROV	COUNTY	WARD	ED	ESTAB. COUNT HAND	ESTAB. COUNT TAB	TOTAL	RECORD COUNT BY WARD TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6
01	01	01	001	4	4	27	4	4	4	4	6	5
01	01	02	001	5	5	34	5	5	5	5	7	7
01	01	03	001	6	6	36	6	6	6	6	6	6
01	01	04	001	2	2							
01	01	04	002	4	4							
01	01	04	003	3	3							
01	01	04		9	9		9	9	9	9	9	9
01	01			24	24		24	24	24	24	28	27
01	02	01	001	9	9							
01	02	01	002	7	7							
01	02	01		16	16	103	16	16	16	16	20	19

(etc.)

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MANUFACTURING ESTABLISHMENTS WITH ≥ 10 TEP

DATE	WORK UNIT	REEL#	PROV	COUNTY
22 08 76	103	1041	03	12

REG NO	REC	REG NO	REC	REG NO	REC	REG NO	REC	REG NO	REC	REG NO	REC	REG NO	REC	REG NO	REC
26001	8	26002	6	26007	7	26008	6	26009	7	26012	8	26016	6	26019	7
26021	7	26022	8	26025	7	26028	7	26029	8	26030	6	26033	6	42012	9
42013	10														

COUNT OF RECORD TYPES

	ESTAB	TOTAL	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5	TYPE 6
HAND COUNT	17							
TABULATED COUNT	17	123	17	17	17	17	28	27
% VARIATION	0							

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Exhibit V-6-3. CARD-TO-TAPE AND COMPUTER EDIT CONTROL, FORM 513

Sheet__ of__

FORM 513	A. PROVINCE	CODE
CARD-TO-TAPE AND COMPUTER EDIT CONTROL	B. COUNTY	CODE
	C. TYPE OF FORM Manufacturing-long ☐ Mining-long ☐ Gas/electricity ☐ Manufacturing-short ☐ Mining-short ☐	

Work Unit No. (1)	Ward (2)	ED No. (3)	Date received (4)	CARD-TO-TAPE						EDIT					
				Rejected			Accepted			Rejected			Accepted		
				Date (5)	Reel No. (6)	Record count (7)	Date (8)	Reel No. (9)	Record count (10)	Date (11)	Reel No. (12)	Record count (13)	Date (14)	Reel No. (15)	Record count (16)

REMARKS	SUMMARY		
	OPERATION	INITIALS	DATE
	D. MACHINE EDIT COMPLETE FOR COUNTY		
	E. SORTED AND MERGED		
	F. COMPARED TO MASTER ED FILE		
	G. REEL NO. _____		

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Exhibit V-6-4. MACHINE PROCESSING SEQUENCE A: TESTS FOR SCOPE AND REASONABLENESS

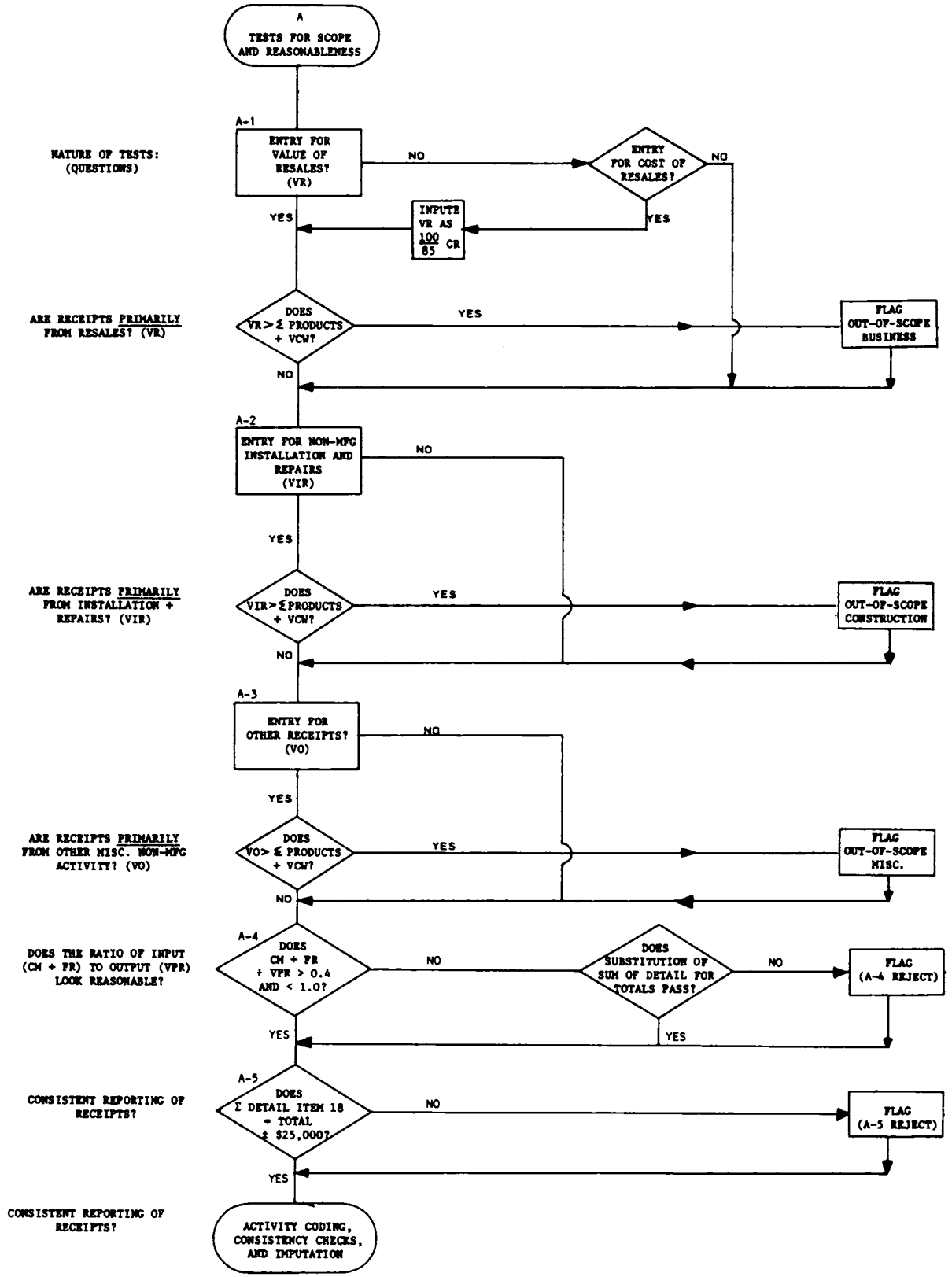

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Exhibit VI-3-1. DATA RELATIONSHIPS

The following relationships are to be examined in the final review of the tabulations. For action to be taken, refer to the discussion of "data relationship checks" in the text.

1. Value added as percent of shipments
2. Payroll as percent of value added
3. Payroll per employee
4. Supplemental labor cost per employee
5. Supplemental labor cost as percent of total labor cost
6. Value added per production worker
7. Value of shipments per production worker
8. Value added per dollar of wages
9. Wages per production worker
10. Wages per production worker man-day
11. Value added per production worker man-day
12. Annual man-days per production worker
13. Fixed assets acquired as percent of value added
14. Fixed assets acquired as percent of value of shipments
15. Fixed assets acquired per production worker
16. End-of-year inventories as percent of value of shipments
17. Value added minus payroll and supplemental labor cost as percent of value of shipments (gross margin)
18. Gross margin per employee

NOTE: The ratios specified above represent many of the most significant relationships from an "economic inventory" or "structural analysis" point of view. For example, "payroll as percent of value added" provides a measure of labor intensity; "inventories as percent of value of shipments" is an indicator of product turnover rates; "gross margin per employee" amounts to a rough approximation of profit margin; etc.

Exhibit VI-3-2. EFFECT OF IMPUTATION FOR BLANKS AND ZEROS

(Based on a sample of 84 of the approximately 425 industries tabulated in the 1967 U.S. Census of Manufactures)

Percent imputed[1]	Percent of total industries			
	Total employed	Total man-hours	Total cost of materials	Total value of shipments
Percent imputed of total of all industries.....	5.4	7.4	4.6	3.0
PERCENT DISTRIBUTION				
Total.....	100	100	100	100
0.00 to 1.49.....	29	25	26	25
1.50 to 3.49.....	20	12	11	33
3.50 to 5.49.....	12	16	24	13
5.50 to 7.49.....	8	7	8	12
7.50 to 9.49.....	8	12	10	8
9.50 to 14.49.....	17	15	8	8
14.50 and over.....	6	13	13	1

[1]Percent of the value in the preliminary publication.

Source: Unpublished memorandum prepared by U.S. Bureau of the Census on edit referrals, analyst corrections, and imputation rates in the 1967 U.S. Census of Manufactures.

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Exhibit VI-3-3. EFFECT OF PROFESSIONAL REVIEW OF TABULATIONS BEFORE PRELIMINARY PUBLICATION

(Based on a sample of 116 of the approximately 400 industries in the 1963 U.S. Census of Manufactures)

Percent change made during review	Percent of total industries				
	Total employed	Total payroll	Total man-hours	Total cost of materials	Total value of shipments
Total.....	100	100	100	100	100
Below -50.0.....	-	-	-	1	1
-50.0 to -32.1.....	3	2	1	3	1
-32.0 to -16.1.....	3	1	3	-	1
-16.0 to -8.1.....	4	1	6	6	5
-8.0 to -4.1.....	10	14	14	13	5
-4.0 to -2.1.....	5	16	9	13	20
-2.0 to -0.1.....	3	17	3	12	24
0.0 to 0.9.....	60	28	50	23	17
1.0 to 1.9.....	1	8	1	3	8
2.0 to 3.9.....	2	3	3	16	8
4.0 to 7.9.....	6	6	4	5	6
8.0 to 15.9.....	3	3	4	3	3
16.0 and over.....	1	2	1	2	1

SOURCE: Computer Editing Methods--Some Applications and Results by Leon Pritzker, Jack Ogus, and Morris H. Hansen, Bulletin of the International Statistical Institute, Vol XLI, pt. 1, September 1965.

* U. S. GOVERNMENT PRINTING OFFICE : 1960 311-046/1289

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