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THE RELATIONSHIP BETWEEN ADMINISTRATIVE ORGANIZATION AND CERAMIC PRODUCTION IN THE VALLEY OF OAXACA, MEXICO

City University of New York PH.D. 1980

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THE RELATIONSHIP BETWEEN ADMINISTRATIVE ORGANIZATION AND CERAMIC PRODUCTION IN THE VALLEY OF OAXACA, MEXICO

by

Gary Feinman

A dissertation submitted to the
the Graduate Faculty in Anthropology
in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
The City University of New York.
1980

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12/19/79
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The City University of New York

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ABSTRACT

The Relationship Between Administrative Organization and Ceramic Production in the Valley of Oaxaca, Mexico

by

Gary M. Feinman

Advisor: Gregory A. Johnson

This study examines long-term change in the prehispanic Valley of Oaxaca, Mexico. It focuses on the complex interrelationships between regional systems of administrative decision-making, exchange, craft production and land-use during the two thousand year period between the initial occupation of the city of Monte Albán (500 B.C.) and the Spanish Conquest. More specifically, based on an interpretive analysis of data collected by the Valley of Oaxaca Settlement Pattern Project, this study concludes that diachronic shifts in the organization of administrative decision-making were closely associated with changes in the structure of Valley-wide ceramic production and distribution. Those phases characterized by high degrees of administrative involvement in economic transactions were also marked by highly centralized

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large-scale ceramic production industries, while low degrees of overlap between administrative and economic networks were associated with more localized, small scale industries. In addition, it is noted that large scale ceramic production industries operated during those phases when periodic, localized food shortages must have been a serious problem for Valley administrators. At these times, large scale ceramic production was apparently part of a Valley-wide strategy that included intensive farming in the piedmont zone and the operation of region-wide systems of exchange. Alternatively, more decentralized ceramic manufacturing strategies are shown to have existed during those phases when Valley agriculture was oriented more to the less risky alluvial zone and when temporary population-resource imbalances could have been resolved through the operation of localized exchange networks alone. Additional implications can also be drawn from this research. Ceramic production in the Valley of Oaxaca is best understood in a broad systemic context. Simple models of linear or progressivistic change in technological processes could not satisfactorily explicate the complex cycles of change in the Oaxacan ceramic industry and there is no reason to believe that such models will work in other regions either.

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ACKNOWLEDGEMENTS

This analysis was conducted as part of the Valley of Oaxaca Settlement Pattern Project under the direction of Doctors Richard Blanton and Stephen Kowalewski. The support, assistance and intellectual stimulation that they have given me made this study possible. I would also like to thank Dr. Blanton for offering me the initial opportunity to work in the Valley of Oaxaca. The financial support for this research was granted to Doctors Blanton and Kowalewski by the National Science Foundation, Rice University, Hunter College, The City University of New York, Purdue University, Lehman College and the University of Georgia. I want to acknowledge these institutions as well as the Departments of Anthropology at Arizona State University and Purdue University. The latter two provided me with assistance that was necessary to complete the ceramic investigation.

In Mexico, the settlement pattern research was facilitated by the members of the Instituto Nacional de Antropología e Historia, who helped to arrange our permits. In numerous instances, Sr. Manuel Esparza, Director of the Centro Regional de Oaxaca, Instituto Nacional de Antropología e Historia, has provided us with invaluable assistance. Dr. Marcus Winter and the rest of the Centro staff also have aided us during the period of our fieldwork. I thank also

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the presidentes, síndicos, comiseriados, and secretarios of the municipios in the survey area for allowing us to work in their communities.

I am also grateful to all of the individuals who assisted in the surveys of the Monte Albán, Central and Valle Grande areas. I especially want to thank those people (Richard Blanton, Stephen Kowalewski, Fausto Olivera Mendoza, Jill Appel, Laura Finsten, Eva Fisch, Alexis Lee, Margaret Curran, Jackie Saindon, and Diana Traub) who worked tirelessly on the Valle Grande Project. In Oaxaca, Richard Blanton, Stephen Kowalewski, Jill Appel, Laura Finsten, and Eva Fisch all had major roles in the categorization and analysis of the ceramics. The period I ceramic category descriptions listed in Appendix I were written by Richard Blanton. Also in Appendix I, Stephen Kowalewski defined the Classic period categories, while Jill Appel wrote the Late Postclassic category descriptions. Patrice Ballenger, Joanne Daddario, Lee Horne, Linda Nicholas, and Kathy Roy also assisted in the coding, organization and analysis of the ceramic data.

The completion of this manuscript also is in large part due to the assistance and advice given to me by my dissertation chairman, Dr. Gregory Johnson. Dr. Johnson was not only extremely prompt in providing me with long lists of insightful comments on earlier drafts of this study, but he willingly undertook and completed several very important tasks for me in New York while I was in Tempe. I also want

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to thank the other members of my dissertation committee, Dr. Daniel Bates, Dr. Carol Kramer, and Dr. Susan Lees. They not only provided helpful comments on an earlier draft of this manuscript, but more importantly, they provided me with important information, mental stimulation and various kinds of support during my first four years of graduate school. I also want to acknowledge Dr. Kent Flannery for introducing the Valley of Oaxaca to me in several enlightening courses at the University of Michigan.

Many of the questions and problems that I have addressed in this research were initially formed during a series of discussions that I had with Richard Blanton and Stephen Kowalewski. These individuals, along with Laura Finsten, Eva Fisch, Jeffrey Hantman, Kent Lightfoot, Linda Nicholas, Dr. Barbara Stark and Steadman Upham, gave me many helpful comments on portions of previous drafts of this manuscript. This work has also benefitted from discussions and correspondence that I have had over the last several years with Jill Appel, Judith Berman, Bruce Byland, Dr. Geoffrey Clark, Joanne Daddario, Dr. Richard Drennan, Dr. Robert Fry, Roberta Jewett, Karen Judd, Dr. Joyce Marcus, Dr. Francesca Merlan, Rachel Most, Cindy Myers, Dr. John Paddock, Dr. Fred Plog, Elsa Redmond, Charles Spencer, Dr. Phil Weigand, Dr. Michael Whalen, Dr. David Wilcox, and Dr. Judith Zeitlin.

I would also like to thank Jill Appel, Patrice Bal-

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lenger, Jean Baker, Eva Fisch, Jeff King, and Jeff Scovil for their assistance in completing the illustrations. Doris Fultz typed several chapters of an initial draft, while Karen Gray ably typed several drafts, including the final manuscript.

Finally, I would like to acknowledge the encouragement and assistance given to me during the last seven years by Bernard Buchholz, David Buchholz, Phillip Buchholz, Elizabeth Petrillo Feinman, Linda Nicholas, Rose Schaler, Jill Johnson Stein, and especially both Ester Buchholz and Stephen Feinman. Without their support, this manuscript could not have been completed.

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CHAPTER I

INTRODUCTION

In the anthropological literature concerning long-term change in complex societies, most recent investigations have examined the question of state origins (e.g. Adams, 1966; Flannery, 1972; Johnson, 1973; Service, 1975; Wright, 1977). This research has focused principally on the causes and immediate consequences of changes in both the structure of administrative decision-making hierarchies (Flannery, 1972; Johnson, 1973; Wright, 1977) and in the kinds of decisions administrators have been able to make and to implement (Adams, 1966; Fried, 1968; Service, 1962, 1975). While very important, these studies are somewhat limiting for two reasons. First, they are concerned primarily with the evolution of governmental or political institutions and thus, they do not give sufficient attention to evolutionary transitions in other human systems such as exchange and production. Second, they have focused mainly on state development and so, primarily not on the long-term interrelationships between the economic, social and political changes which have occurred in regions controlled by state-local polities.

Recently, several innovative, large-scale analyses have begun to address these questions through the examination of long-term change in areas dominated by complex political

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systems (Johnson, MS; Skinner, 1977a, 1977b; Wallerstein, 1974). These studies have in part examined the diachronic shifts in the nature of the articulations between administrative or bureaucratic institutions and economic (e.g., marketing, exchange, production) networks (Blanton, 1976a; Skinner, 1964, 1977a, 1977b). They have found that in state societies the regional administrative and economic hierarchies may be distinct and that the extent of the distinctiveness is variable through time and across space (Blanton, 1976a; Skinner, 1964, 1977a, 1977b; C. Smith, 1976a).

> Despite the role of capitals as both administrative and economic central places, the distinction drawn between the two hierarchies is by no means simply a heuristic device. The boundaries of administrative units seldom coincided with those of marketing or trading systems. Thus, a given capital city fitted into two empirically distinct spatial structures (Skinner, 1977b:275).

The nature of administrative articulation with economic networks has been shown to have marked effects on regional systems of production and exhange (Blanton, 1976a; Johnson, 1970; C. Smith, 1976a; Skinner, 1977a; Twichett, 1966). Skinner (1976:359), writing about Late Imperial China, has noted that:

> In general, both merchants and officials preferred to sojourn in cities whose economic central functions overshadowed their administrative importance and avoided whenever possible cities whose administrative level was disproportionately high in relation to their economic importance.

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Similarly, in a cross-cultural review, Blanton (1976a:259) has argued that in regions characterized by a high degree of administrative involvement in the market system, "producers... might choose to participate less in the market institution." In general, most regional analysts have argued that in areas typified by a high degree of administrative control over economic institutions, competition is often limited and consumers as well as small-scale rural producers have relatively few economic choices (e.g. Blanton, 1976a; C. Smith, 1976a). Alternatively, it has been suggested that in systems characterized by the relative segregation of administrative and economic institutions, competition is more developed and economic choices are much less constrained (Blanton, 1976a; Skinner, 1977a; Twichett, 1966).

Yet, with the exception of the landmark works of G. William Skinner (1964, 1965, 1976, 1977a, 1977b), relatively few social scientists have attempted specifically to evaluate these hypothesized relationships through the analysis of long-term change within a given region or state. In addition, few studies have either examined the specific causes of the changes in the patterns of articulation between economic and administrative systems or measured the consequences of these shifts on the regional configurations of specific production systems. This dissertation was designed to evaluate further the causes and consequences of diachronic shifts in the regional patterns of articulation between administrative and economic institutions through an analysis of long-term

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change in the Valley of Oaxaca, Mexico (Figure 1). Specifically, it was devised to examine how changes in the degree of overlap between regional administrative and economic institutions affected the selection of different strategies of both ceramic production-distribution and land utilization during the roughly two thousand year period between the establishment of the prehispanic urban center of Monte Albán (500 B.C.) (Blanton, 1976b, 1978) and the Spanish Conquest (1521 A.D.).

The Valley of Oaxaca was chosen as the principal focus for this research for several reasons. Most importantly, intensive, systematic survey by the Valley of Oaxaca Settlement Pattern Project has yielded information on the size and distribution of prehispanic settlements within an 801 square kilometer block covering the central and southern portions of the Valley (Figure 2) (Blanton, 1978; Blanton, et al., MS; Kowalewski, 1976). In addition to mapping the sites, information was collected on the distribution of mounded architecture, ceramics and obsidian in this survey block. A survey (Varner, 1974) also was completed of the 200 square kilometer northern or Etla Arm of the Valley and ceramic collections were made at some of the sites from this area as well. Since information is also available on the size and the distribution of some of the larger settlements in the unsurveyed eastern or Tlacolula Arm of the Valley (Bernal and Gamio, 1974; Paddock (ed.), 1966; Peterson, 1976), a relatively com-

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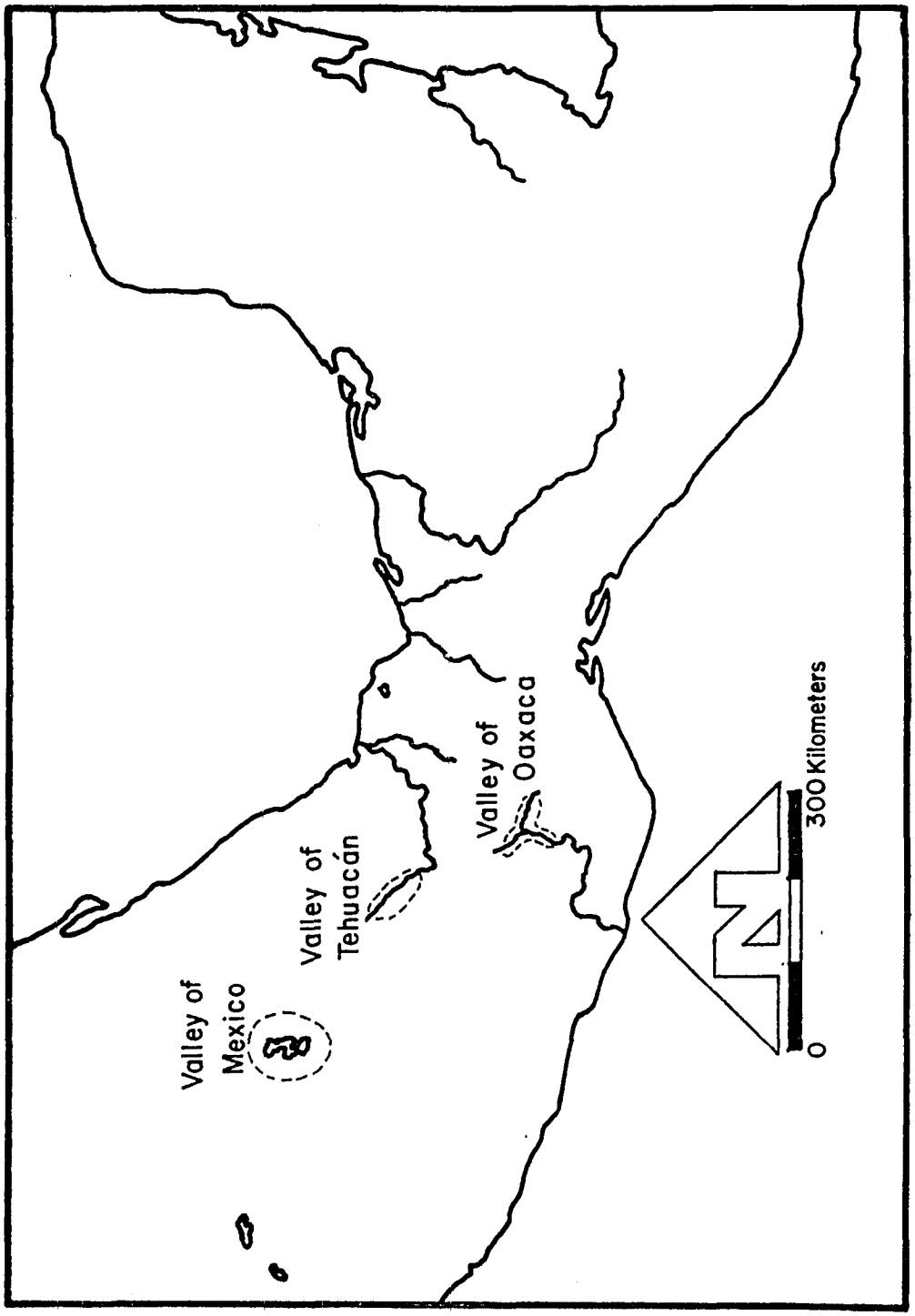

Fig. 1.--The location of the Valley of Oaxaca in Mesoamerica

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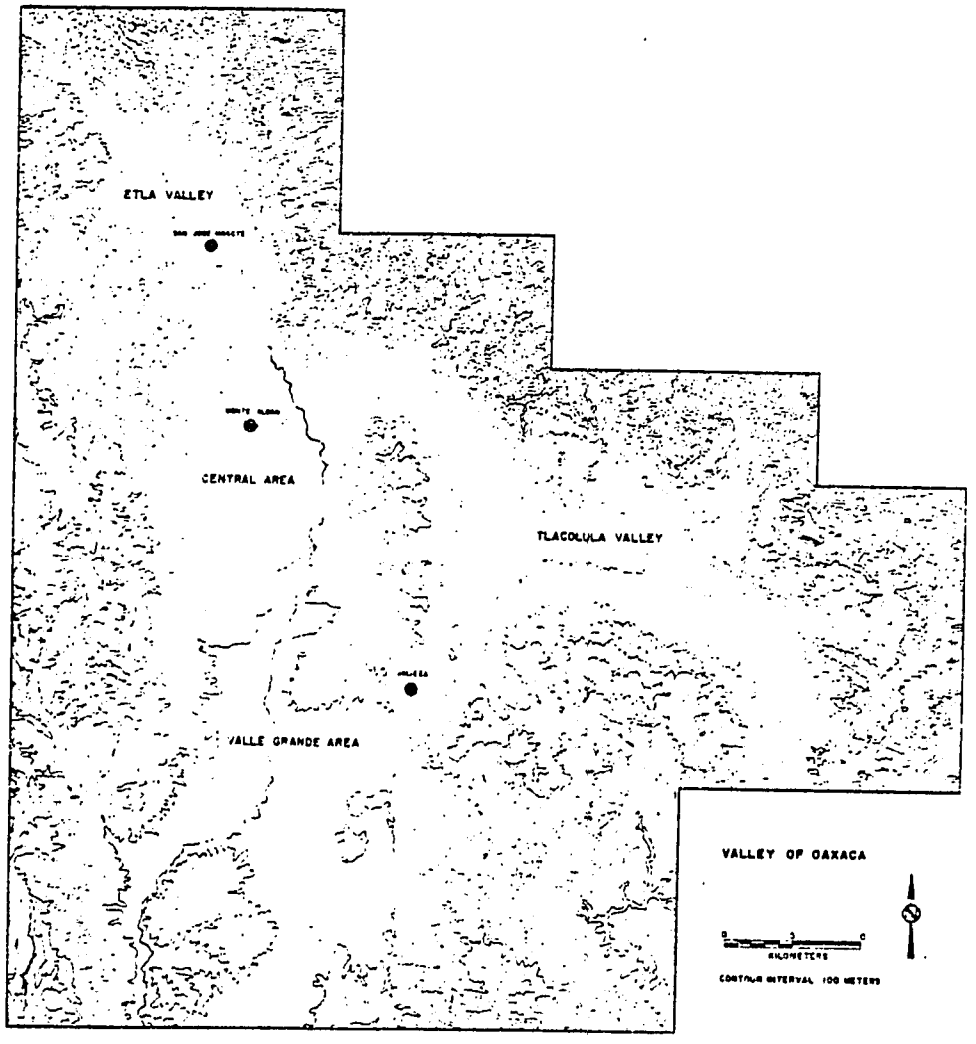

Fig. 2.--Valley of Oaxaca

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plete picture of the prehispanic settlement pattern of the Valley could be pieced together. Settlement pattern reconstructions that both span a comparable period of time and intensively cover a similarly sized area are not available from many, if any, other regions.

The availability of this relatively complete set of settlement data enabled us to reconstruct a tentative interpretation of the changing political organization of the Valley (Blanton, et al., MS). This tentative assessment, which relied primarily on the application of a series of specific geographic models and techniques to the data, was of course necessary for the evaluation of the expectations concerning regional organization, ceramic production and land use that were stated previously. Since the interpretations of the settlement pattern analysis (Blanton, et al., MS) are essential for the problems addressed in this dissertation, it is important to summarize some of the basic premises and results of that study. Although the field procedures employed by the Valley of Oaxaca Settlement Pattern Project are more comprehensively reviewed in chapter two, it is important to note at this time that each field within the survey area was intensively investigated and all archaeological remains were mapped and dated.

In our analysis, we made the assumption that there was a general relationship between habitation area and prehispanic population. Consequently, while some compensation

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was made for different artifact concentrations (presumably reflecting different occupational densities) (see Blanton, 1972; Parsons, 1971; Sanders, 1965; Sanders, et al., 1979) the population of most settlements was estimated to have been a direct function of site size. Since the majority of settlements were relatively small, compact villages, we utilized a range of ten to 25 people per occupied hectare to calculate prehispanic populations. This figure, which was ethnohistorically derived (Parsons, 1971; Sanders, 1965; Sanders, et al., 1979), was utilized to estimate the population of a similar class of settlements in the Basin of Mexico. The populations of the large, terraced, hilltop centers in Oaxaca were estimated somewhat differently. These estimates were derived primarily as a function of both the number and sizes of the inhabited residential terraces at the sites (see Blanton, 1978; Blanton, et al., MS). Since our principal concern was with relative changes in the sizes and distributions of Valley settlements, we simplified our calculations by using only the midpoint of the estimated population ranges. In order to retain consistency with the other Valley of Oaxaca settlement pattern reports (e.g. Blanton, et al., in press), I have continued to refer in this study to these mean population figures; however, I must caution the reader that they are only rough estimates of actual prehispanic populations.

The analyses undertaken in this dissertation were

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concerned, in large part, with the dichotomy between those contemporaneous settlements that served administrative functions and those that did not (see chapter four). In the absence of ceramic wall cones, cylinder seals and other artifact classes representative of political activities (Johnson, 1973, MS; Wright, 1977), certain types of carved stone monuments (Marcus, 1976, MS) and pyramid mounds (Acosta, 1965; Blanton, 1978; Flannery and Marcus, 1976; Millon, 1976; Marcus, MS) were used as indicators of administrative functions. Unfortunately, in the Valley of Oaxaca, carved stone monuments are only known from a small sample of settlements (Marcus, 1976, MS), therefore, the presence or absence of pyramid constructions was utilized as the primary indicator of administrative activities. In the settlement pattern analysis (Blanton, et al., MS), the relative administrative importance of contemporaneous settlements was calculated for each phase. The relative importance of each occupation was determined as a function of both its estimated population size and the total volume of mounded architectural construction present. For each phase, the settlements were ranked according to these variables and histograms were utilized to "break" these settlements into different classes or ranks (e.g. primary centers, secondary centers). These reconstructed administrative hierarchies are depicted in this text on the seven figures which show the suggested arrangements of central places, large sites, district boundaries and produc-

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tion loci for each of the Monte Albán phases. These figures are more thoroughly discussed in the settlement pattern analysis (Blanton, et al., MS).

A second important reason for basing this study in the Valley of Oaxaca is that two diachronic regionally scaled studies of land utilization have been completed (Kirkby, 1973; Kowalewski, MSa). These studies, in conjunction with the settlement data, allow for the evaluation of how shifts in regional political organization affected the strategies of land use employed throughout the Valley. Few comparable land-use studies have been completed in any other part of the world.

Kirkby's (1973) study measured the Valley's potential for growing maize at five different times between 1300 B.C. and 1970 A.D. Her calculations were based on an analysis of present land-use strategies and agricultural productivity in the Valley along with an archaeological study of the increasing size of maize cobs through time. The changes in the potential maize productivity were then compared with shifts in the size and distribution of the estimated population for the region through time.

Kowalewski's (MSa) analysis expanded and modified Kirkby's (1973) earlier study. He specifically focused on the interrelationship between agricultural productivity and the distribution of prehispanic population for each prehispanic phase between the foundation of Monte Albán (500 B.C.)

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and the Spanish Conquest (1521 A.D.). Because roughly 800 square kilometers of intensive archaeological survey was completed between the time Kirkby (1973) finished her investigation and the initiation of Kowalewski's (MSa) analysis, the latter study was better able to examine this interrelationship between the prehispanic population and agricultural potential.

Although all of the issues addressed in Kowalewski's (MSa) analysis cannot be discussed here, I will review some of the major findings of his research. Kowalewski (MSa; see also Kirkby, 1973; Downing, 1974:113) has argued that rainfall in the Valley of Oaxaca is, and for the period in question was, extremely variable both over time and across space.

> In other words, given the limits of best and worst years established by the modern rainfall measurements, rainfall might be said to be unpredictable in both space and time. Since the mean rainfall figures hover around 500 to 750 mm per year, just the range of marginal adequacy for corn, farming has probably always been fairly risky, and that risk would have had to have been adjusted for in any social organization after the threshold of dependency on sedentary life and maize agriculture (Kowalewski, MSa:15).

Based on his assessment of agricultural risk and productivity in the Valley of Oaxaca, Kowalewski (MSa) has arrived at two additional conclusions. Initially, he has argued that rainfall variability in the Valley would have

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been a serious problem and that it could have provided

> a powerful reason to maintain economic integration over a wide area of the Valley, presumably as wide as possible without entailing unacceptable high costs of communication and administration (Kowalewski, MSa:17).

Second, Kowalewski (MSa) has reasoned that agricultural productivity would have been most variable in the somewhat marginal, piedmont zone, which was located at least several kilometers away from the Rio Atoyac and its principal tributaries. He has concluded that while approximately ten percent of the Valley's total arable land (primarily in the alluvium) would have produced large maize harvests consistently, the yields from most of the Valley's agricultural land would have been quite variable. Thus, the returns from farming almost any portion of the piedmont zone could have varied annually from absolutely nothing to huge bumper crops. In addition, the annual yields from any part of the piedmont zone in the Valley was argued to have had little bearing on the returns from other portions of the Valley's piedmont in that year.

Given these general findings, Kowalewski (MSa) compared, by phase, the relationship between the distributions of arable land and prehispanic population in the Valley. He found that the likelihood of periodic imbalances between local populations and the potential productivity of their agricultural hinterlands was variable through space and time.

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More explicitly, he found that at certain times, specifically during periods of relative population nucleation, the likelihood of local food shortages would have been considerable. During these periods, shortages could have occurred periodically in many different parts of the Valley and, occasionally, it would have been necessary to transport food from one arm of the Valley to another. Alternatively, at other times, during periods of relative population decentralization, the likelihood of periodic food shortages would have been minimal and the potential for severe man/land imbalances would have been limited to comparatively few areas of the Valley. During these periods, local food shortages could have been alleviated principally through the exchange of food over very short distances. The specific differences between phases and the relationship of this data to shifts in other Valley subsystems will be discussed more thoroughly in chapter four.

A third reason for conducting this study in the Valley of Oaxaca is the availability of ceramic collections from the majority of prehispanic settlements in the Etla, Central and Valle Grande Survey Areas (a roughly 1000 kilometer block). The analysis of these collections has made it possible to reconstruct a series of tentative interpretations concerning changes in the organization of ceramic production and distribution in the Valley of Oaxaca through time. Evidence of ceramic manufacturing was located at a

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series of sites dating to each Monte Albán phase and this information was used to identify changes in the size, number and distribution of ceramic production places through time. These pottery manufacturing sites were not all large ceramic production workshops. In fact, many appear to have been small-scale operations. Analyses of the extent of the ceramic debris on the surface of each of these sites as well as the nature and the distribution of the ceramics dating to each phase were utilized to assess the changes in the organization of ceramic production between phases.

The decision to focus on ceramic manufacturing rather than other systems of non-agricultural production was largely a function of both the relative abundance of ceramic debris on the surface of archaeological sites and the ability, in Oaxaca, to date ceramics and not other archaeological materials. The focus is not meant to convey either that ceramic production was more important than other manufacturing systems or that all other craft production industries (e.g. lithic production, weaving) were organized in a manner similar to the organization of ceramic production in each phase. Additional surface and subsurface analyses (see Appel, 1979) will be necessary to evaluate changes in the other craft production industries through time.

The interpretations of the ceramic data that we were able to make were possible because of the excellent, relative, ceramic chronological system that was devised pre-

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viously for prehispanic Oaxacan pottery. Excavations from several areas of the large hilltop ruin of Monte Albán yielded large quantities of pottery that were described systematically, typed and subdivided into a series of chronological phases, dating from 500 B.C. through the Spanish Conquest (Caso, Bernal, and Acosta, 1967). This basic ceramic typology was later extended to include the Early and Middle Formative periods (Drennan, 1976a; Flannery, et al., MS; Winter, 1972) and slightly modified (Kowalewski, Spencer and Redmond, 1978; Appendix I) in order to construct an operational set of ceramic categories which could be used to classify the sherds from the survey collections. This uniform set of ceramic categories was used to order the ceramic collections from the entire survey area.

Petrographic analyses of prehispanic pottery (Abascal, Harbottle and Sayre, 1974; Payne, 1970; Shepard, 1967) as well as studies of contemporary ceramic producers in the Valley (Hendry, 1957; Shanson, MS; Shepard, 1977; Stolmaker, 1976; Van de Velde and Van de Velde, 1939) have also been helpful for establishing an understanding of the prehispanic ceramic variability in Oaxaca. These studies have not only provided useful information on the spatial availability and the distinct properties of the different local clays, but they have offered very valuable information on the manufacturing and marketing strategies employed by the contemporary potters in the Valley.

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A final reason for conducting this reasearch in the Valley is that the interrelationships between administrative organization, craft production, marketing and land-use in contemporary Oaxaca have been well investigated. Several ethnographic analyses (Downing, 1974; Kirkby, 1973; Lees, 1973, 1974) have examined the relative administrative and labor costs of different agricultural strategies. This information is very valuable for interpreting changes in land utilization within the Valley in the past. Other studies have outlined the organization and spatial structure of the contemporary market system in the region (Beals, 1975; Cook and Diskin, 1976; C. Smith, 1976b). These works have provided a baseline against which the spatial structure of the prehispanic exchange system could be compared.

The remainder of this study will be subdivided into four additional chapters. The next chapter begins with a brief review of regional survey work in the Valley of Oaxaca. It then discusses the methodology used in these surveys and the analytical techniques utilized in the interpretations of the settlement pattern data. The ceramic chronological system employed in the settlement pattern research also is reviewed.

Chapter three identifies and dates suspected loci of ceramic production within the Valley. A set of consistent criteria for determining these locations from surface remains is set forth. Diachronic changes in the size and loca-

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tion of these production places are noted. Recognition of these shifts is important since it forms a major criterion for establishing the changing organization of ceramic production in the Valley through time. In relation to chapter three, it is important to note that while ceramic distributional data are available from the Etla, Central and Valle Grande Arms of the Valley, information on central places and production sites are only available from the Central and Valle Grande Survey Areas. During the 1977 field season, ceramics were collected from many of the locations surveyed by Varner (1974) in Etla. The ceramics from these collections were integrated into the ceramic analyses applied to the data from the Central and Valley Grande Survey Areas. Detailed, systematic analysis of the settlement pattern information from the Etla Arm has, however, not yet been completed and so this material will be presented at a later date.

In chapter four, the basic questions that are addressed in this study are examined. Changes in the extent of the articulations between regional economic and political systems are evaluated using regional settlement pattern and ceramic data. The effects of these changes on the systems of agricultural and ceramic production in the Valley are also assessed. Some apparent regularities in the diachronic relationships between these subsystems were found. At certain times, the administrative subsystems exercised consid-

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erable influence or control over economic transactions in the Valley. These periods were also marked by relatively large total populations, relatively high proportions of those populations residing in the piedmont and mountain zones, intensive systems of agricultural production localized in certain portions of the Valley, and ceramic production systems that primarily produced mass-manufactured pots that were distributed uniformly throughout the Valley. Other periods were characterized by comparatively little overlap between political and economic hierarchies. At these times, smaller proportions of the Valley population resided in the piedmont and mountain zones, agricultural strategies were apparently somewhat less intensive and the ceramic complexes were both highly decorated and distributed heterogeneously across the region. These findings offered tentative support for the general expectations that were stated above.

Finally, concerning chapter four, it must be pointed out that the figures of the settlement patterns for each phase are not the final settlement pattern maps for the Central and Valle Grande Survey Areas. These final maps will be published in another publication (Blanton, et al,, MS). The settlement pattern configurations in this dissertation are meant only to provide the reader with a rough picture of shifts in the distributions of settlements between phases.

In chapter five, the results of this study are sum-

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marized and the implications of this analysis for future research are briefly discussed. It is suggested that this study hopefully will not only improve our understanding of long-term change in the Valley of Oaxaca, but that it will also help to explicate more general regularities in the dynamic relationships between specific political, economic and demographic changes in regions controlled by complex states. In addition, a suggestion regarding the examination of changing strategies of ceramic production within a regional system is outlined. Finally, an implication of this study for the development of a general framework for examining long-term change in human systems is discussed.

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CHAPTER II

THE VALLEY OF OAXACA: ENVIRONMENT, RELATED RESEARCH, SURVEY METHODOLOGY, AND CERAMIC CHRONOLOGY

In the opening chapter, I listed several reasons for undertaking this examination of the relationship between ceramic production and political organization in the Valley of Oaxaca. In this chapter, I discuss the Valley of Oaxaca and its prehistoric pottery in order to provide background for the analysis of ceramic production undertaken in the subsequent chapters. Initially, I describe the physical setting of the Valley of Oaxaca and the history of anthropological research in the region. I then outline the methodology and some of the analytical procedures that have been employed in the settlement pattern survey of the Oaxaca Valley. This discussion focuses specifically upon the techniques that were used in making observations and interpretations about the survey pottery collections. I next outline the ceramic chronology of the Valley of Oaxaca. Finally, I discuss some of the limitations of the ceramic data and enumerate some of the tentative hypotheses concerning ceramic typology and chronology that have been derived from our analyses of the survey collections.

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I. Valley of Oaxaca: Physical Setting

The Valley of Oaxaca, located in the modern state of Oaxaca, contains the largest expanse of relatively flat land in Mexico's Southern Highlands. The Valley floor, which ranges from 1420 to 1740 meters in elevation, is surrounded by steep mountains which rise above 3000 meters (Kirkby, 1973:7). Because the Valley of Oaxaca has approximately 700 square kilometers of relatively flat, arable land, its agricultural potential exceeds that of the rest of the Southern Highlands; an area composed primarily of deeply incised valleys and forested slopes (Kirkby, 1973:1; C. Earle Smith, 1978:9). The major limiting factor for Valley agriculture is water (Kirkby, 1973:1). In the Oaxaca Valley, relatively little rain falls annually and there is a pronounced variability in precipitation from year to year (Kirkby, 1973:15; Kowalewski, MSa). Consequently during most months, evaporation exceeds precipitation, especially at the lower elevations where temperature, slope and soils are best for cultivation. Most agriculture, therefore, requires some form of irrigation in order to make up for the annual water deficit and to eliminate the risk of drought at the time of planting.

II. Valley of Oaxaca: Related Research

Palerm and Wolf (1957:1-37) described the prehispanic Valley of Oaxaca as a "key area"; an area of massed economic

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and demographic power. The Valley also was identified as one of only five areas in Mesoamerica that maintained key or nuclear importance throughout the prehispanic sequence (Palerm and Wolf, 1957:30). Because of its political, economic and demographic importance, the Oaxaca Valley has been studied by many scholars interested in the processes associated with societal change.

In this century, it was the research of Alfonso Caso that established the importance of the indigenous Oaxacan population in the development of civilization in Mesoamerica. Caso, along with his students and colleagues, also devised the basic Oaxacan ceramic chronology for the two thousand year period that ended with the Spanish Conquest (Caso, Bernal, and Acosta, 1967; Paddock (ed.), 1966; Paddock, Mogor, and Lind, 1968). In 1966, Kent Flannery organized a long-term, multi-disciplinary research project that is designed to examine the "Prehistory and Human Ecology of the Valley of Oaxaca." This ongoing project has as its goal the explication of the complex processes by which human groups have made the organizational transition from hunting and gathering bands to urban civilization (Flannery, 1973:v).

As a part of this research, Flannery suggested the initiation of a settlement pattern survey of the Valley of Oaxaca. In 1971, the "Valley of Oaxaca Settlement Pattern Project," under the direction of Richard Blanton, began

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mapping the size and location of prehispanic settlements. Initially, the urban center of Monte Albán was surveyed (Blanton, 1978). After this site was completed, the Central Valley Survey Area was mapped by Stephen Kowalewski (1976). In 1977, Blanton and Kowalewski directed the settlement pattern study of the Valle Grande Survey Area. To date, this project has completed an intensive survey of 801 square kilometers or roughly 50% of the Valley of Oaxaca (Figure 2). In addition, a study of the Etla or northern Arm of the Valley has been completed by Varner (1974). All of the sites larger than three hectares in Varner's area were revisited, recorded on air photographs and surface collected as part of the fieldwork undertaken in 1977. In all, roughly 3,000 ceramic collections have been made at settlements within the Valley of Oaxaca. Of these, roughly a thousand were made at prehispanic settlements other than Monte Albán.

The settlement pattern survey initiated in the Valley of Oaxaca was designed to be one stage in a multi-tiered reconnaissance program (Redman, 1973; Struever, 1971). The goal of this initial Valley survey was to generate a series of observations and hypotheses concerning changing features of political and economic organization within the Valley of Oaxaca through time. Consequently, the study area was totally surveyed so that information was not only collected on site size and the environmental distribution of occupations, but

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also on the spatial relationships between settlements within the region. It is the interpretation of these changing spatial relationships between sites which enables us to generate hypotheses concerning changing economic and political organization within the region through time (Blanton, et al., in press, MS; Flannery, 1976; Johnson, 1973, 1975, 1977, MS; Kushner, 1970; Marcus, 1973).

The decision to cover the entire valley of Oaxaca precluded the adoption of statistically rigorous techniques of surface collection. In the Valley of Oaxaca, archaeological sites are: 1) numerous, 2) usually multi-component, and 3) often very large. In many portions of the Valley the multi-phase prehispanic remains contiguously cover almost the entire land surface. In other words, parts of the Valley are in effect one long continuous archaeological site. A statistically rigorous, probability sampling design for intensive surface pick-up would have been exceedingly difficult to implement during this initial stage of the research. Due to the size and complexity of many of the sites, the boundaries of each of the occupational components that composed a given site often could not be defined within a day or, at times, even within a week. If a statistically rigorous, intensive surface sampling design could be implemented, it would have certainly increased the time and energy cost of the project by at least one order of magnitude (Feinman, MS;

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Johnson, 1973:25-27). Since sites could not be simply found, defined, sampled and collected, supplemental return trips would have been necessary to many sites that had already been mapped. This would have been extremely expensive. In addition, even if only a very small portion of each site was intensively collected, the costs of washing, cataloguing and storing all of the sherds that would have accumulated would have been immense (see Johnson, 1973:25-27). Both Spores (1972:15) and Kowalewski (personal communication) found that non-intensive judgmental collections were more practical than intensive collections during this initial stage of investigation. More rigorous ceramic collection strategies are planned for later stages in the Valley of Oaxaca research.

The basic premise behind this multi-stage research strategy was that in an area like Oaxaca where site size and location were not a simple function of environmental criteria (Kowalewski, MSa) a suitable probability sample would be difficult, if not impossible, to select unless one had some prior notion of the spatial structure of the regional organization for each occupational phase. Of course, knowledge of the spatial structure of the regional organization would require specific information on the size and distribution of sites throughout the entire area and this could only be obtained through an initial survey of the entire region.

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The second stage of surface investigation will select a sample of sites for intensive collection from the population of archaeological sites found during the initial reconnaissance. The sample will be able to consider and stratify for such crucial variables as settlement size, the complexity of mounded architecture at different settlements, the distance of the specific settlements from the major centers dating to each phase and the evidence for craft production at the different sites. Obviously, the specific sampling design employed in this future investigation will depend upon the nature of the problems that will be examined.

III. Survey Methodology

The methodology employed in the Valley of Oaxaca settlement surveys initially was devised for and refined in the Basin of Mexico (Armillas, 1971; Blanton, 1972; Parsons, 1971, 1972; Sanders, 1965; Sanders, Parsons and Santley, 1979; Wolf (ed.), 1976). In the Valley of Oaxaca, this methodology has been used for entire rural survey (Kowalewski, 1976:5-8) although it has been modified slightly for the work at the urban center of Monte Albán (Blanton, 1978:6-19). The technique calls for the intensive and systematic coverage of the survey area on foot. Guided by aerial photograph mosaics enlarged to a scale of 1:5000, a crew, usually consisting of three people, systematically covered a designated area. The spacing between crew members varied between ten

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and 100 meters depending upon the terrain and ground cover. When archaeological remains were encountered, crew members moved more closely together in order to get an accurate description of the cultural materials. Sites which were present largely in the form of scatters of sherds, chipped-stone debris, and in some cases mounds and other architectural features were carefully plotted on the aerial photographs so that their surface areas could be measured. Features such as mounds, houses, and defensive walls also were mapped directly on the aerial photographs. These features were also drawn in greater detail in the field notebooks. In addition, information was recorded systematically at each site on topography, soil, modern land use, hydrography, vegetation, presence or absence of special resources (e.g., worked stone, shell), the nature and condition of archaeological features, the density of chipped stone debris and the quantity, distribution and estimated periodization of surface ceramics.

At most of those sites that were surveyed in the Valley of Oaxaca, the surface densities of pottery were dense enough to permit assessments of periodization. The survey crews examined the ceramics on the surfaces of each site and recorded the phases that were represented on the aerial photographs. On the surface of a site, a ceramic assessment was made every five to ten meters. In order to check these field assessments, one or more surface collections of ceramics

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were made at most of those sites that were surveyed. The primary purpose of these collections was to assist in the dating of sites to specific ceramic phases. Collections were not made when it was decided that the density of surface pottery was so sparse that it seemed unlikely that a collection would add much information to the field assessments that were noted at the site.

Most of the ceramic collections were made by picking up roughly 50 to 100 diagnostic sherds. Each collection area was mapped on the aerial photograph and the reasons why the collection was made were recorded along with its potential significance. In addition, each collection area was measured in square meters. Collection areas were measured so that the densities of ceramic vessel categories within these areas could be compared and contrasted throughout the survey region. When a mound less than a meter in height was collected, the collection area was simply recorded as the length times the width of the mound. Yet, in order to measure the size of the collection areas made on taller mounds, some means was necessary to account for the expanded surface of these three dimensional features. The collection area sizes of pyramidal mounds that were between one and eight meters in height were calculated by multiplying the product of the mound's length and width by 1.5. This was done because pyramids of these dimensions have roughly one and a half times the surface areas of flat surfaces with

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equivalent length and width dimensions. The size of the collection areas of those mounds that were larger than eight meters in height were calculated by multiplying the product of the mound's length and width by 1.67 because these taller features have surface areas that were approximately one and two-thirds times the size of flat surfaces with equal lengths and widths.

Ceramic collections of residential terraces were made on the terraces themselves as well as on the slopes immediately below the terraces. Sherds which had eroded out from the terrace retaining walls could be found on these slopes, and they could be used to date the terrace. In order to adjust for this collection strategy, the size of terrace collection areas was determined simply by multiplying the area of the terrace by two.

Once washed, each collection was treated separately in the lab. Responsibility for typological decisions and tabulating the occurrences of specific ceramic categories was divided. Eva Fisch and Laura Finsten analyzed the pre-Monte Albán I pottery. Richard Blanton was responsible for the period I analysis. I analyzed the Monte Albán II ceramics and shared the responsibility for Monte Albán IIIA with Stephen Kowalewski. Kowalewski also examined the Monte Albán IIIB and IV pottery. Jill Appel analyzed the ceramics from Monte Albán V. The quantity of sherds belonging to each

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identified type within each collection was recorded. Other sherds and non-diagnostics within each collection were described. In addition, the relative proportion of each phase within each collection was determined. All of the laboratory description was completed, and collections were deposited in Mexico with the Centro Regional de Oaxaca (INAH) before the crew returned to the United States in August, 1977. The raw counts of the ceramic tabulations for each collection area within the Valle Grande, Central and Etla Survey Areas are presented in Appendix II.

IV. Settlement Pattern Analysis

Before discussing the ceramic chronology used in this research, several of the analytical procedures utilized in both the ordering and the interpretation of the settlement pattern data will be enumerated briefly. A more complete discussion of these procedures will be available in the report on the Central and Valle Grande Survey Areas (Blanton, et al., MS).

In examining the changes in settlement and ceramic distributions through time, we found it very useful to conduct our investigations at several different analytical scales. Certain patterns could be examined by comparing specific sites or the entire survey areas but other trends were much easier to recognize at an intermediate scale. Two analytical units were created for these comparisons. First, an arbitrary

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grid was imposed on our map of the survey area. The squares measured four kilometers east-west by four kilometers north-south. Each grid was numbered according to its north and east distance from an imaginary 0-0 square at the southwest corner of the survey area. This grid system facilitated diachronic comparisons since it was held constant through time. The synchronic variation in the spatial distribution of specific ceramic categories also was demonstrated most clearly at this scale.

For each period, we also attempted to determine the areas politically controlled by certain administrative centers. For Early I through Monte Albán IIIB, administratively controlled districts were determined at the level of those centers secondary to the Valley capital of Monte Albán. For Monte Albán IV and V, the periods which post-date the decline of Monte Albán, there was no single capital of the entire Valley and consequently administrative districts were determined for the entire class of settlements at the top of the regional hierarchy.

Obviously, determining those sites administered by specific centers is virtually an impossibility in the absence of written materials from sites dealing with jurisdictional matters. The areas administered by these centers were approximated, however, by assuming that the size of the area administered by each center was proportional to the population of the center administering that area. Accepting

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this assumption, we demarcated administrative districts using the method of weighted Thiessen polygons (Blanton, 1978; Haggett, 1966:247-8). The vertices of the polygons were located at lines drawn between each pair of adjacent centers. The location of the point was determined by the relative sizes of the centers in question, so that the point was placed proportionately closer to the smaller center. In chapter four, several synchronic comparisons were made between the settlements within the administrative districts of different centers. One point that is important to remember is that the specific boundaries of these districts change over time as the size and distribution of the centers change.

Several analytical measures were utilized in the interpretation of the settlement data from the Central and Valle Grande Survey Areas. Rank-size (Haggett, 1966; Johnson, 1977) calculations were made for each phase. Interaction potential measures were also utilized for each temporal period. These measures were designed to examine changing patterns of community interaction. Although these patterns are difficult to reconstruct archaeologically, human interactions are subject to certain constraints which can be measured with data that we have collected. These constraints fall basically into two groups having to do with distance and the numbers of people involved in the interactions. Distance is relevant because interaction is subject to movement costs. This means we may infer that interaction

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decreases with increasing distance. Secondly, the intensity of interaction is related to the numbers of people who are potentially involved in interaction. The potential interaction between two villages is then less than the potential interaction between two cities if equal distances separate the two pairs of settlements.

Geographers have used the gravity model (cf. Haggett, 1966:35-40; Johnson, 1977; Olsson, 1965) to predict the intensity of interaction between communities. This model is derived directly from Newtonian physics, and suggests that the amount of interaction between two communities is proportional to the product of their population sizes, and inversely proportional to the square of the distance between them. That is,

$$I_{1,2,} = \frac{P_1 P_2}{d^2}$$

where $I_{1,2}$ is the interaction between communities 1 and 2, d is the distance between the two communities, P_1 is the population of community 1, and P_2 is the population of community 2.

This equation was utilized as a means of characterizing certain features of the regional system. This was done with the model's limitations kept in mind (Johnson, 1977; Olsson, 1965). The gravity model cannot be considered to be a cultural "law" applicable in all situations, nor does it comprise a direct measure of interaction. It is simply a deductive model which has been shown to have considerable

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empirical veracity in a variety of situations (cf. Johnson, 1977; Zipf, 1949).

In our analysis two sets of interaction potential measurements were made for each phase. The first set of measurements included only those settlements that, based on their size and volume of mounded architecture, were judged to be administrative centers. The second set, based solely on population estimates, included the top ten percent of the settlements for each phase. The latter measures were designed to provide some clues as to the functional importance of the larger sites in the regions which lack architectural evidence for administrative functions. This measure was calculated by determining the interaction potential between each settlement and its first and second nearest neighbors and between each settlement and Monte Albán. The goal in measuring the interaction potential of administrative centers was to diachronically assess the relative importance of interaction between same-level centers as compared with that between Monte Albán and smaller centers. This measurement was determined by calculating the interaction potential between each tertiary center and its first and second tertiary center neighbors; between each tertiary center and its two nearest secondary center neighbors; for each secondary center and its first two secondary neighbors; and for each tertiary and secondary center and Monte Albán.

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V. Ceramic Chronology

The Valley of Oaxaca settlement pattern study depends on the existing ceramic chronology for the Valley (see Table 1). This chronological sequence was devised by Caso, Bernal, and Acosta (1967), based primarily upon their excavations at Monte Albán, and by Flannery and his associates (Drennan, 1976a; Flannery, et al., MS; Winter, 1972), who worked out the sequence for the pre-Monte Albán periods. The settlement pattern research could not have been accomplished without the work of these investigators or the contributions of John Paddock, Ronald Spores and Donald Brockington, all of whom helped to develop the Valley of Oaxaca ceramic chronology. Most of this chronological research, however, was based upon and devised for the analysis of primary deposits recovered during excavations. Consequently, a modified ceramic typology was developed for the survey work at Monte Albán in order to meet the requirements of dealing with sherds from surface scatters (Kowalewski, Spencer and Redmond, 1978). For the Valle Grande Survey Project, this ceramic typology was expanded in order to include several "categories" or types that have been listed in Appendix I. These new categories include those pre-Monte Albán pottery types recognizable from surface collections, several Post-classic types not present or only present in small quantities at Monte Albán, and several types which had ranges of temporal variability that were not well-understood when the research

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TABLE 1

VALLEY OF OAXACA CHRONOLOGY

1520		
1300	Monte Albán V	Late Postclassic
1100		
900	Monte Albán IV	Early Postclassic
700	Monte Albán IIIb	Late Formative
500	Monte Albán IIIa	Early Classic
300		
100		
A.D. / B.D.	Monte Albán II	Terminal Formative
100	Monte Albán Late I	Late Formative
300	Monte Albán Early I	
500	Rosario	Late Formative
700	Guadalupe	
900	San José	
1100		Early Formative
1300	Tierras Largas	
1500		

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at Monte Albán was undertaken.

Before discussing the limitations of the ceramic data it should be noted that the ceramic typology that was used in the analysis of the survey collections relied solely upon the paste categories that were established initially in La Cerámica de Monte Albán (Caso, Bernal, and Acosta, 1967:18-19; Shepard, 1967:477-484). These four categories are:

A. Gris (ceramic category numbers that begin with 1)
   1. Fine (sand tempered)
   2. Coarse or gris-cremosa (diorite tempered)

B. Crema (ceramic category numbers that begin with 0)

C. Amarillo (ceramic category numbers that begin with 3)

D. Café (ceramic category numbers that begin with 2)
   1. Fine (sand tempered)
   2. Coarse (diorite tempered)

Ceramic category numbers beginning with "5" were used to identify types which either had pastes that did not fit into one of the four basic classes or that were made in a variety of paste types.

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VI. Limitations of the Ceramic Data

Because our primary purpose in making observations about pottery was to date our sites and portions of sites to specific ceramic phases, the Valley of Oaxaca Settlement Pattern Project relied almost exclusively upon judgmental ceramic collections. Yet, the analysis of close to 3,000 ceramic collections and well over 100,000 sherds from the survey region has led to some additional, more behaviorally significant findings. Analysis of the distributions of specific ceramic types across the survey area reveals some interesting spatial relationships which will be discussed in this and later chapters. Unfortunately, I cannot make statistically rigorous statements about these ceramic distributions because of the nature of our collections. However, because the non-chronological data from ceramic collections so often are consistent with hypotheses generated independently from the analyses of settlement pattern and land use. I believe that to ignore this ceramic information would be a serious error.

Yet prior to discussing our preliminary findings, I must discuss the inherent biases in our collection strategies as well as some of the ways that these biases may have affected our interpretations. Bias in our survey ceramic collections stems principally from the collection strategies that were employed at large sites. Representational problems would seem to be less serious at small

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sites where virtually every diagnostic sherd on the surface was either examined or collected. Collections were only made in select areas at large sites although survey crews often recorded the ceramic categories that were present in the uncollected areas at these sites. Since these collection areas usually were placed in spots where chronologically sensitive diagnostic types were relatively abundant, it seems likely that the proportion of these decorated diagnostics would be overrepresented within large site collections. Since these collections usually were made in areas where sherds were relatively dense, only a portion of the surface pottery present in the area would be included within the collection. In such situations, the collection strategies would tend again to overrepresent the decorated, chronologically sensitive types.

The major problems with the ceramic data therefore are likely to be the following:

1) the proportional overrepresentation of decorated types as compared to plain ware types within the collections from large sites.
2) the fact that the specific counts and densities of plain ware types within specific collection areas, especially at large sites, would not be representative of the amounts of these types on the surface of those collection areas.

Yet I believe that the number of a given highly decorated

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type (e.g., polychrome) within a collection is indicative of the relative abundance of that type within the collection area. In most cases, all or most examples of these highly decorated types observed on the surface of a collection area were included within the collection.

Several analytical procedures were employed in order to compensate for the biases inherent in our collection strategies. Most importantly, in the analysis very little emphasis was placed upon the actual counts or densities of specific ceramic types within individual collections. Rather, we focused upon certain relationships between specific classes of collections or sites (e.g.,sites of a certain population size, sites dated to specific phase, sites within a given grid square). The examination of classes of sites should have helped to "even-out" some of the problems associated with individual anomalous collections. It should also be pointed out that most of our interpretations of ceramic data were based upon more than one analytical index or procedure, and that these different techniques of comparison usually produced complementary results.

Finally, many of the interpretations that have been based upon the analysis of ceramic data have been compared with the tentative findings derived through independent analyses of settlement pattern (Blanton, et al., in press, MS), land use (Kowalewski, MSa) and epigraphic data (Marcus, 1976, MS). And, as will be shown in chapter

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four, the preliminary conclusions based upon the ceramic analysis were for the most part consistent and complementary with the interpretations derived from these other sets of data. This suggests that variability in the ceramic data was more the function of prehispanic behavior patterns than of post-depositional factors or sampling biases.

VII. Tentative Observations Concerning Ceramics and Dating

Given the limitations of our ceramic data and our procedures for coping with these problems, we are reasonably confident that our principal goals of site measurement and dating were achieved. I also would like to stress that the gross-level patterning in the ceramic data, such as the differential spatial distribution of certain fancy period II types, the relatively small number of types per site at settlements at the southern edge of the Valle Grande in the Early Classic, and the differential distribution of period V wares, can be best accounted for by regularities in ancient social behavior, rather than by post-depositional factors or collection biases. Having stated our analytical position, I will now discuss several tentative observations and hypotheses that have been generated through an analysis of Oaxacan ceramics.

A. The Rosario Phase

This study primarily examines the changes which took place in the Valley of Oaxaca between Monte Albán Early I

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and Monte Albán V. Consequently, this section is concerned mostly with the ceramic complexes dating to those phases. However, in order to understand the magnitude of the changes which took place during Monte Albán I it is necessary to assess the settlement pattern and regional administrative organization which existed during the preceding Rosario phase. Therefore, this section will also briefly discuss the Rosario phase ceramic complex and the diagnostics that were employed to distinguish Rosario phase settlements from the occupations dating to other phases.

Surprisingly, the Rosario phase settlements have not been difficult to identify. Some possible problems had been anticipated since the Rosario phase was the most recently defined and because it was sandwiched between the already known Guadalupe and Monte Albán Early I phases. Yet we have located a series of occupations with surface scatters that contain both the Fidencio Coarse/C-2 jars and the Socorro Fine Gray Outleaned wall bowls that are known to be diagnostic of the Rosario phase (Drennan, 1976a:40, 56-65). The latter, which were abundant on the surface of most of our Rosario phase occupations, have outcurved or everted rims and also often have the specific plastic decorations (pennants, crescents, wavy lines and line breaks) that have been associated with the Rosario phase (Drennan, 1976a:56-65).

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B. Monte Albán EI-II

Monte Albán Early I, Monte Albán Late I and Monte Albán II were fairly easy to distinguish on the surface because of the relatively large number of diagnostic types that could be identified with each of these phases (Kowalewski, Spencer and Redmond, 1978). The ceramic typology used to identify phases Early I through II at Monte Albán required only one modification in order to be useful for Valley survey: the large number of separate categories of decorated gris bowls [G-15, G-16, G-17 in Caso, Bernal, and Acosta (1967)] at Monte Albán were compressed into a smaller number of broad categories (see Appendix I). At Monte Albán, these categories described rather tight and consistently recurring attribute clusters, but each type occurred so infrequently outside Monte Albán that the detailed categories were not useful in the analysis of the collections from the Valley survey.

C. Monte Albán IIIA-IV

The most serious chronological problems for survey archaeologists working in the Valley of Oaxaca concern the Classic and Early Postclassic periods (IIIA-IV). These problems are due to:

1) the relatively small number of types that are identifiable to any one of these three phases. Whereas we identified 85, 88 and 53 ceramic categories for phases EI, LI and II respectively,

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we have only 33 types identifiable to IIIA, 22 types identifiable to IIIB and 19 types identifiable to IV.

2) the fact that so many of the Classic and Early Postclassic types were in continuous use throughout all three phases. In contrast, only 20 types were identifiable to Monte Albán V. However, it is not difficult to distinguish between V and the earlier prehistoric periods because most of the V types were identifiable to that phase alone.

3) the overwhelming predominance of a single category (T1126) of gris bowl (G-35; Caso, Bernal, and Acosta, 1967:385-395) in almost all of our collections from IIIA, IIIB and IV.

Because of these problems, I wish to discuss in some detail how we distinguished IIIA, IIIB and IV. After discussing this problem generally, a specific example, the field strategy employed to date Jalieza, the large Valle Grande settlement, will be discussed. Finally, several hypotheses that attempt to account for the small amount of ceramic variability between IIIB and IV pottery inventories will be presented.

In surveying the Valley of Oaxaca, it was not very difficult to distinguish Early Classic period settlements from occupations dating to IIIB or IV. For the most part,

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the IIIA diagnostic, the G-23 bowl (Caso, Bernal, and Acosta, 1967:80, 312, 317), was used to identify and define the limits of IIIA sites. Those gris bowls characterized by carved exterior surfaces (T1264, T1265, T1310) were excellent time markers because they were both relatively abundant and easy to recognize on the surface. In our collections from the Valle Grande Survey Area, we noted that café ollas with deep parallel incisions or "raking" on their necks (T2009) often were found with G-23's. Thus we also were able to use this olla type, especially when it occurred in contexts with other IIIA diagnostics (T1264, T1265, T1310, T1421, T3410), to define IIIA occupations. It also was noted that the ubiquitous III-IV plain gris serving bowl, the G-35 tended to have flaring or outcurving walls in IIIA, while the IIIB-IV G-35's were usually conical cajetes with straight outleaned walls. In addition, the exterior surface of the Early Classic G-35's often appeared to have been scraped with a broad tool when the clay was almost leather-hard. On the other hand, the exterior surfaces of most of the IIIB-IV G-35's were treated more sloppily if they received any surface treatment at all. Unfortunately at this time, these observations concerning the G-35's are difficult to support quantitatively.

Separating IIIB from IV occupations was somewhat more difficult. Originally, when Monte Albán was the only well-studied locality in the Valley of Oaxaca, IIIB was

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defined as the last phase during which there was new architectural construction at Monte Albán while IV was identified as a time of use and abandonment at the site. The two time blocks, however, were not distinguished ceramically (Caso, 1965:899), and it was noted that IIIB pottery had no marked differences with that of period IV (Caso, Bernal, and Acosta, 1967:381).

Later excavations at Lambityeco, a large center in the Tlacolula Arm of the Valley, did result in the recognition of certain ceramic differences between IIIB and IV (Paddock, Mogor, and Lind, 1968). The almost pure contexts of Early IV at Lambityeco, which were all C-14 dated to about A.D. 700, included several ceramic types (a soft-paste polished black ware and locally made Fine Orange similar to Altar-Balancán) which rarely have been found in Classic period contexts (Paddock, Mogor, and Lind, 1968). For example, at Atzompa (site subdivision 11 at Monte Albán), an area occupied almost exclusively in IIIB, no examples of these early IV ("Lambityeco phase") types were recovered in survey collections.

In 1974, the survey of the central part of the Valley located 216 sites with pottery similar to the IIIB ceramics found at Atzompa. These sites were located mainly in the area west of Monte Albán. No Lambityeco-like pottery was found in the Central Survey Region, but another distinct period IV complex was discovered in the Central area, east

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of the Atoyac (Kowalewski, 1976). Imitation Fine-Orange was absent at these sites and the G-35's often were harder and better-fired than those found in either IIIB or Lambityeco phase collections. In addition, thin bowls, made from almost temperless alluvial clay, were found at these sites. Though usually tan in color, these bowls closely resembled the Monte Albán V G-3M's (Caso, Bernal, and Acosta, 1967:448). Given collections of 50-100 sherds, this later IV complex was not very difficult to distinguish from the Late Classic period (IIIB) pottery.

New--and as yet not completely resolved--IIIB-IV problems arose during the survey of the southern part of the Valley. The clearest way of presenting the nature of this ceramic puzzle is to discuss the dating of the occupation of Jalieza. By chance, we began surveying in the IIIA sector of the site. This portion of the site was not difficult to date as there were G-23's along with scraped, flaring-walled G-35's on almost every man-made terrace. As we began moving through the site, working east, we mapped a series of terraces that were occupied in both IIIA and V. The V component was easy to detect because the ceramic inventory of that phase is so distinctive (Caso, Bernal, and Acosta, 1967:447-448). Further to the east and several days later, we began finding terraces that no longer had G-23's on them. In addition, the plain wares on these terraces began looking decidedly undiagnostic. We started to make more and larger

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collections on these terraces because we were not sure initially whether we were finding a "backwoods" IIIA complex, that did not include the decorated diagnostics of the Early Classic period, or a IIIB zone and/or a IV zone.

When we had mapped and made collections from what turned out to be about half of this eastern sector of the site, we examined in spatial order all the collections beginning with those from the western or Early Classic portion. Once the collections were studied together, we found that east of a certain point our collections no longer contained G-23's. In the collections without G-23's, the G-35's were the poor quality, conical cajetes, characteristic of IIIB-IV, that often had unfinished surfaces or surfaces that were scraped very sloppily while the clay was still wet. Appliqués (including several like those depicted in Figures 29 and 30 of Paddock, Mogor, and Lind, 1968), Imitation Fine Orange and polished black ware also occurred in these collections from the eastern sector of the site. In addition, several other features of these collections also led us to suspect that the eastern sector of Jalieza was not a IIIB occupation. For one, many of the collections included some buff-colored gray wares that were somewhat similar to the IV pottery found in the eastern portion of the central area. Also, more café pottery was found in these collections than in most known IIIB collections. Finally, the forms typical of Atzompa (IIIB) were found in lower

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frequencies at Jalieza than in the collections from the Late Classic period component of Tejas de Morelos, a site even farther south of Monte Albán than Jalieza. Thus, it is not likely that the pottery from this zone represented a variant of the IIIB assemblage found only in the Valle Grande.

Based on these considerations, we concluded that the western sector of Jalieza was occupied in the Early Classic period. We also were able to define a fairly large-sized Monte Albán V occupation. Most of the eastern part of the site was neither Early Classic nor Late Postclassic in date. Rather, we concluded that this portion of the site was occupied largely in the Early Postclassic (IV), and probably was contemporaneous with the occupation at Lambityeco. There was no evidence to suggest that the pottery from the eastern sector of Jalieza represented a local variant of IIIB, especially since the pottery from the Late Classic is so homogeneous throughout the rest of the Valley. It is possible that several small areas at Jalieza were occupied in IIIB, but that they were "swamped" on the surface by the IV occupation and consequently were unrecognizable. At this point, we are left to conclude that the presence of a few small IIIB occupations at Jalieza would not significantly alter our interpretations concerning Late Classic period settlement in the Valley of Oaxaca.

The same analytical procedure was used to isolate important period IV (Lambityeco-like) settlements at El Choco

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and Santa Cruz Mixtepec. Both of the occupations have ceramic inventories which are quite similar to the pottery found in collections from the eastern sector of Jalieza.

In summary, based on the survey of Monte Albán, Central and Valle Grande Areas, we have identified a IIIB occupation that was concentrated at Monte Albán, and in the central area and the northern part of the Valle Grande Survey Area. A cluster of IIIB settlements was also found around Tejas de Morelos. The ceramic components at IIIB occupations were found to be highly uniform.

The Monte Albán IV occupations were more spread out throughout the Valley (Blanton, et al., MS). At Monte Albán, the size and location of a IV occupation was identified tentatively based largely on the surface distribution of Imitation Fine Orange. This occupation was much smaller than the Late Classic settlement and was located at the center of the IIIB site. No gray ware associated with IV occupation could be differentiated from Late Classic period gray ware that was found at the site (Blanton, 1978: 58). Monte Albán IV settlement clusters also were found in several portions of the Southern Arm (i.e.,around Jalieza, Santa Cruz Mixtepec, and El Choco). These settlements apparently were contemporary with the occupation at Lambityeco. In the central area (and the northeast corner of the Valle Grande area), Monte Albán IV settlements were found in several clusters with pottery complexes that were slightly

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different from the ceramics found in the Lambityeco collections (Kowalewski, 1976:514). At this point, we do not know whether these differences were temporal, spatial or both. We definitely can conclude, however, that there was more variability in formal and paste attributes in the IV ceramic inventory than in the IIIB ceramic complex (Bernal, 1965:808; Kowalewski, 1976:517; Paddock, Mogor, and Lind, 1968). Since large Monte Albán IV occupations have been found at several locations in the unsurveyed Tlacolula Arm of the Valley (e.g., Lambityeco, Yagul, Mitla), we suspect (see also Paddock (ed.), 1966) that this area was very important in the Early Postclassic. It is therefore clear that we will not be able to make definitive statements about this phase until we survey the Tlacolula Arm.

Thus, our current findings (Blanton, et al., in press, MS) support the notion that major changes occurred in the Valley between IIIB and IV. The partial abandonment and the cessation of construction at Monte Albán (Caso, Bernal and Acosta, 1967:381; Paddock, 1978) in Monte Albán IV suggest that the Late Classic period Zapotec polity broke down. This interpretation is supported by the growth of several new IV centers of population and administration (e.g., Jalieza and Lambityeco) in the Valley (Blanton, et al., in press; Marcus, MS). The abandonment of the major Late Classic period ceramic production location at Atzompa is indicative of the major changes in the economic organization of the

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Valley that must have occurred at this time as well. Consequently, it is not surprising that certain communities distantly located from Monte Albán began to make pottery in the Early Postclassic. It is also understandable that the ceramics from these new centers were less similar to (and therefore easier to distinguish from) IIIB pottery than was the pottery from Monte Albán IV contexts at Monte Albán itself (Caso, Bernal, and Acosta, 1967; Paddock, 1978:48-50). Yet, given the expectations concerning ceramic production and organizational change discussed in chapter one, it is somewhat perplexing that the ceramic inventories of IIIB and IV are as similar as they are.

Two factors seem important for understanding this ceramic similarity. First, Monte Albán continued to be an important center for at least part of Monte Albán IV. Although it no longer was the largest site at this time, it still may have been very important politically and ceremonially. The Main Plaza was still in use (Caso, Bernal, and Acosta, 1967:381); Paddock, 1978:49) and thus Monte Albán contained the largest volumetric concentration of occupied mounded architecture at any site in the Valley at this time. One might expect that the elite groups associated with the Main Plaza used their influence to preserve the institutions, systems of production and exchange, and symbols and styles that had been associated with the Late Classic polity. If the rapid growth that occurred at the new IV

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centers was in part a consequence of the gradual exodus of population from Monte Albán, the elite at Monte Albán may have been able to maintain close contacts with the rest of the Monte Albán IV population. Decision makers at Monte Albán thus may have been able to use this power and influence to preserve into Monte Albán IV certain Classic period institutions that were associated with exchange and production.

Second, most of the small Monte Albán IV polities appear to have been similar in several important ways to the Late Classic period Zapotec polity, centered at Monte Albán, although the former were all much smaller in their territorial extent. As will be discussed more fully in chapter four, most of the IV polities were centered around one or two very large settlements that dwarfed all of the smaller settlements in the settlement clusters or polities. This was very similar to the relationship between Monte Albán and the other Valley settlements in IIIB. As in this latter case, most of the architectural construction was concentrated at these centers in IV. These IV centers, like Monte Albán in IIIB, also had access to a wider assortment of ceramic goods (chapter four) than did the smaller settlements. The organization of ceramic production within these IV polities thus may have been similar to the structure of production in IIIB at Monte Albán (see chapter four for a more thorough discussion).

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D. Monte Albán V

The main chronological problem with Monte Albán V is that the phase is several hundred years longer than the other Monte Albán phases. This is problematical as it raises some questions concerning the comparability of the period V settlement data with the settlement data from other phases. Recently it has been recognized (Bernal and Gamio, 1974; Brockington, 1973:60) that the phase can be subdivided. It is believed that the latter half of V was characterized by both polychromes and G-3M bowls with zoomorphic supports (Caso, Bernal, and Acosta, 1967:448). The earlier half of the phase is believed to have included both G-35M and G-3M bowls. Eventually, this scheme may help us to gain better temporal control of Monte Albán V. When the entire Valley has been covered, we will seriate the surface collections in order to obtain a better idea of temporal change within phases. For now, however, we should point out that the suggested V divisions are defined by the absence of types, and that the proposed diagnostics of Late V, polychromes and snake supports, are both highly decorated vessels that were found to be concentrated in the central portion of the Valley. This suggests that other factors as well as time may well influence the presence or absence of these types.

Another potentially valuable time marker might be Huitzo Polished Cream (Paddock, 1966:208) which is very similar to the Red-on-Cream pottery of Nochixtlán (Spores, 1972: 30-32). Thus far, however, a beginning date for this type

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has yet to be established, and we can only assume that it runs from A.D. 1000 into the sixteenth century.

The second major problem that we have with the Late Postclassic ceramic chronology concerns the distinction between Monte Albán V and the Colonial period. We know that the Spanish Conquest of the Valley of Oaxaca occurred in 1521 (Taylor, 1972:36; Whitecotton, 1977:185), but the exact timing of the political and economic changes that occurred after conquest is not known. We also do not know how or at what speed these organizational changes were reflected in the strategies of ceramic production and distribution. We do know that the gris pottery, associated with distinctive Colonial period ceramic types (e.g., glazed ware), was similar but not always identical to Monte Albán gray ware. For example, a fairly thick G-3M olla with a tall, straight neck and an everted, bevelled rim can be dated to the post-conquest period. In addition, Spores (1972:48-49) was able to distinguish chronologically between two varieties of polychrome pottery, one of which was made primarily in the prehispanic era while the other dated to the mid-seventeenth century. He based his distinction on differences in vessel shape, location of decoration and design motifs. We, however, were not able to subdivide our polychrome ceramics because most of our surface samples were too small and eroded to evaluate the distinctive attributes. Additional work on this problem certainly is necessary.

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Finally, it should be pointed out that Colonial period occupations were not mapped by survey crews. Sites that were found with only ceramics from the Colonial and/or Contemporary periods were noted on the aerial photographs but not recorded systematically. However, if occupations had diagnostics of the Colonial period along with at least two diagnostics of Monte Albán V, the occupations were judged to have had a Monte Albán V component, and those were mapped and recorded in the usual manner. These sites were thought to represent occupations that began in Monte Albán V and continued into the Colonial period.

In summary, this chapter has provided a basis for the settlement and ceramic distributional analyses that will be discussed in the remainder of this study. The physical setting of the Valley of Oaxaca has been described and a brief history of archaeological research in the region has been outlined. The methodological procedures employed during the survey also have been reviewed. Finally, the ceramic categorization and pottery chronology for the region have been discussed in depth. This discussion stressed the major problems that were encountered during the survey and the resolutions to those problems which were employed.

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CHAPTER III

THE IDENTIFICATION OF CERAMIC PRODUCTION LOCI

I. Introduction: Criteria for Defining Ceramic Production Loci

Anthropologists have long been interested in the labor organization and technical processes associated with prehispanic ceramic production in Mesoamerica (Brenner, 1931; Foster, 1955; Vaillant, 1966:157-162). Recently, excavations at several prehispanic sites have uncovered activity areas which apparently were associated with ceramic production (Abascal, 1976; Becker, 1973; Bordaz, 1964; Sanders, 1971; Sisson, 1973, 1974; Winter and Payne, 1976). These excavations have yielded considerable information concerning the firing process and the artifactual remains that were associated with ceramic production at specific sites during particular periods in the past. But, these studies have provided relatively little information about the organization of ceramic production within any area through time (Shepard, 1977:16).

In order to broaden the spatio-temporal framework within which locations of ceramic production could be identified and studied, archaeologists have begun to identify ceramic making sites based on surface analyses.

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Archaeological settlement pattern projects at Teotihuacán (Millon, 1976) and within the Tehuacán Valley (MacNeish, et al., 1972; Nowack, 1977; Spencer and Redmond, 1977) have used surface data to identify loci of ceramic production. But, the methods used to identify ceramic manufacturing sites have not been specified adequately. In addition, these studies examined specific sites rather than large survey regions and so they could not describe the variability in the spatial organization of ceramic production for a region through time. In the following chapter, a procedure for identifying ceramic making sites using the information collected during the Valley of Oaxaca Settlement Pattern Project is outlined. This procedure is used then to identify ceramic production sites within the 801 square kilometer surveyed area which covers the central and southern portions of the Oaxaca Valley.

In the Valley of Oaxaca evidence of ceramic production has been found at occupations dating to each of the seven Monte Albán phases. These loci of ceramic production were identified according to a two-step procedure. An initial identification was made based upon the field observations of our survey crews. When kiln wasters were recorded in field notes as present at a given site that occupation was described as a locus of production. Sites also were identified as ceramic production places when a road or barranca cut revealed evidence either of ceramic firing or a kiln at

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the settlement. Sites initially identified as loci of ceramic production based on field observations were coded accordingly.

A re-evaluation of those sites identified in the field as loci of ceramic production was made after the coding of 1055 ceramic collections from the Valley survey (Appendix II). It then became possible to check the tentative field identifications of production sites with ceramic distributional data. Densities and raw counts of certain types and wares were examined at four levels: the collection, the site, the sub square, and the four by four kilometer grid square. It was expected that a site which produced pottery during a given period would have relatively high counts and densities (number of sherds of given type/collected area) of those types that field indications suggested were being made locally. For example, a site which field observations suggested was a locus for the production of period I red painted crema ware would be expected to have relatively large quantities of the types made in that ware in its collection. In addition, spatial analyses of utilitarian artifact distributions (Bradley, 1971; Hodder, 1974; Hodder and Orton, 1976; Johnson, 1973, 1977:481-487; Rands, 1967) have suggested that settlements located close to production sites should have higher quantities of the locally produced artifacts than should similar settlements located farther away. This expectation is supported by several descriptions of

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contemporary utilitarian ceramic production and distribution (Hendry, 1957; Shepard, 1977; Stolmaker, 1976). Consequently, I also expected that the grid square in which a ceramic production site was located would contain larger quantities of locally produced ceramics than would most other grid squares within the survey area.

The second phase of the ceramic workshop identification then considered these seven following variables:

1. Presence of kiln wasters or clay concretions (Bordaz, 1964:24, 75, 117). Kiln wasters were defined as sherds which had bubbles or cracks of the kind that most probably resulted from firing a vessel that was not totally dry. Clay concretions were defined as the bricks or modeled lumps of fired clay which have often been associated with ceramic firing (i.e., Bordaz, 1964:117).
2. Evidence of kilns or ceramic firing.
3. The presence of burnishing tools or other artifacts possibly used in ceramic manufacture.
4. The relative abundance of particular types and/or wares in specific collections.
5. The relative abundance of particular types and/or wares at specific sites.
6. The relative abundance of particular types and/or wares in two by two kilometer subsquares. The subsquare density of a given type

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for a particular phase was calculated by dividing the total number of that type in the collections dated to a particular phase in a specific subsquare by the total collected area of those same collections.

7. The relative abundance of particular types and/or wares in specific four by four kilometer grid squares. The grid square density of a given type for a particular phase was calculated by dividing the total number of that type in the collections dated to a particular phase in a specific grid square by the total collected area of those same collections. These densities were calculated in sherds/hectare.

In almost all cases, sites were not identified as ceramic producing sites unless at least two of these variables indicated that ceramic manufacture occurred there. The only exceptions were a few sites where the amount, density and formal variability of a particular ware were so unusually high (compared to other contemporaneous occupations) that production of that ware was indicated. This latter interpretation was based upon contemporary studies of ceramic production in Oaxaca which indicated that the presence and use of the widest assortment of forms made of a given ware tended to occur near the site producing that ware (Hendry, 1957:179, 236-239; Shanson, n.d.:11; Shepard, 1977:18).

In general, analysis of ceramic distributional

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information supported the designation of places of ceramic production based upon field evaluations. Most of the sites that were coded as locations of production initially were identified as ceramic production sites in this second stage of analysis. The exceptions were, primarily, multi-component sites that were coded initially as loci of production and then were not identified as ceramic manufacturing sites after supplemental analysis. The periodization of the ceramic production at these multi-component occupations was somewhat unclear in the field and so the location often was coded positively for all occupational periods. Ceramic distributional analysis enabled more accurate periodization of ceramic production at these sites and consequently, some components were deleted as production sites. The other discrepancies were created in cases where a site initially was coded as a ceramic production location because a single kiln waster was found. If no corroborative evidence was found, the site was removed from the ceramic production list. This was done because some of the collected kiln wasters, though flawed, possibly may have been part of functional vessels (Hendry, 1957:120). These vessels therefore may have been distributed for use to the site where they were found rather than made and discarded there. Prior to listing the sites where the presence of ceramic production was observed, it must be stated that we do not believe that we have found all of the locations where ceramic production occurred within the survey

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area. We do believe, however, that for each phase we have a large enough sample of the major ceramic production sites to observe meaningful patterning in their size and location through time. Furthermore, we suggest that variability in the mean size and the location of the identified ceramic production sites, when interpreted in conjunction with other data, will enable us to make certain tentative statements regarding changes in the strategies of ceramic production in the Oaxaca Valley over time.

In this chapter, I will list and describe the settlements that appear to be sites of ceramic production for each of the seven chronological phases between Early I and V. The specific collection area, in which evidence of ceramic manufacturing was noted, also will be listed (in parenthesis) after the site number of each locus of production. Listing these collection numbers will enable the reader to determine the grid square that contains evidence of ceramic manufacture for each phase. The first four digits of each collection number refer to the grid square in which the collection was made. After the ceramic production sites are listed for each phase, a few additional remarks will be offered concerning ceramic production during that phase.

II. Ceramic Production Sites

A. Ceramic Production Sites: Monte Albán Early I

1. 2-5-3 (N14E5): This site in the Central Valley Survey Area (Figure 3) has been described by Kowalewski (1976:45-46). It sits just west of a source of fine textured

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Fig. 3.--Central Places, Large Sites, Estimated District Boundaries, and Production Loci.

Early I

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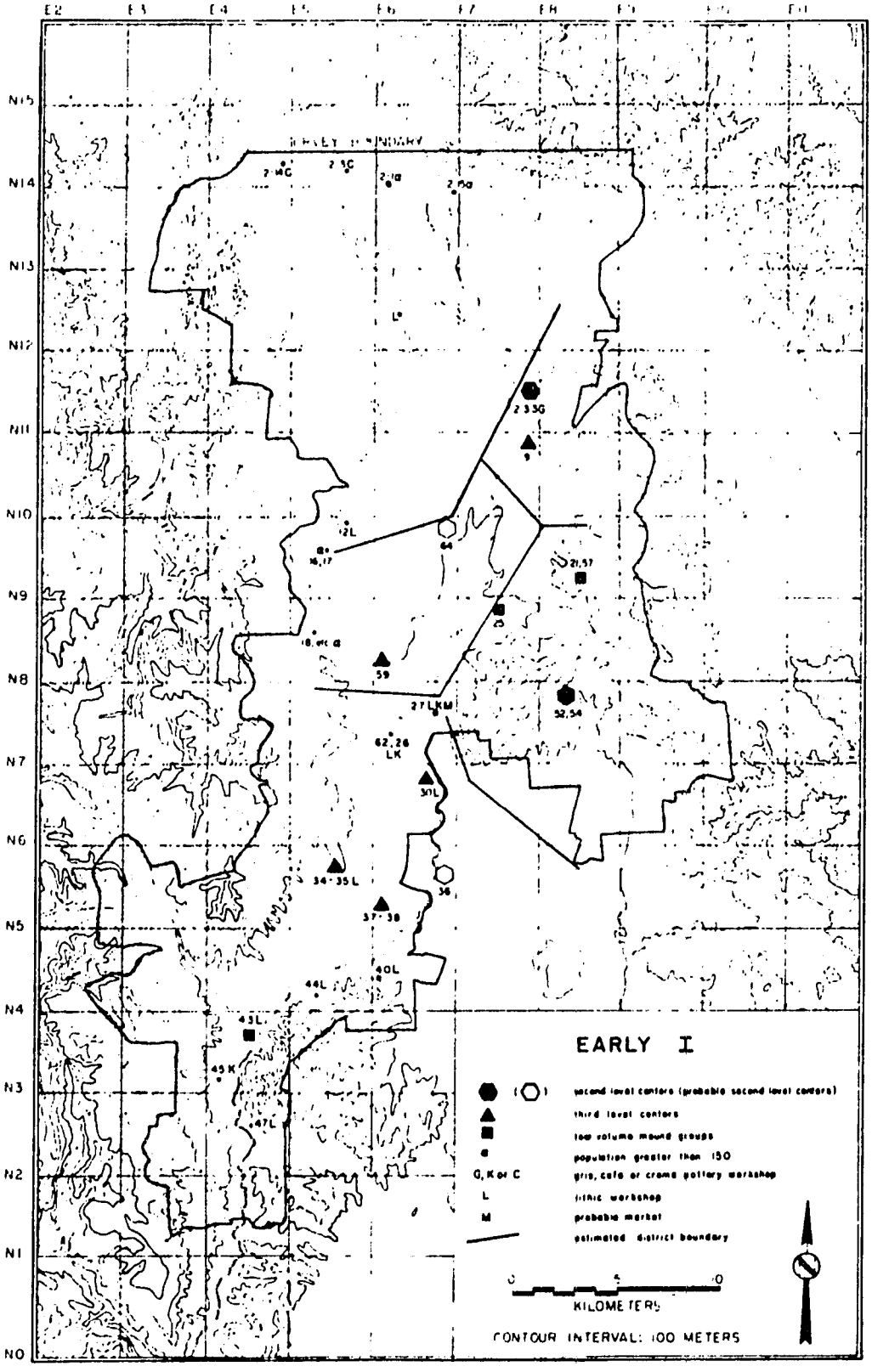

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clay used by the contemporary potters of Atzompa. The surface densities of Early I ceramics were described as light and one kiln waster was recorded in collection 1405404 at this site. The densities of almost all period I crema types, within grid square 1405, were high compared to the other grid squares within the survey area and this suggests that ceramic production occurred locally (Figures 4-9). The number of both unpainted crema bowls (6) and non-diagnostic crema sherds (20) in collection area 1405404 were relatively high and it appears that this settlement may have been a crema ware ceramic production site in Early I.

2. 2-5-14 (N14E4): This site also was previously described by Kowalewski (1976:56) who reported moderate to heavy densities (Parsons, 1971:22-23) of surface ceramics over a 0.8 hectare area of the occupation. The dense surface concentration of pottery at this site could not be attributed to any specific erosional, agricultural or habitational factors and so it was suggested that these unusual densities were related to prehispanic ceramic production. The nearly exclusive presence of a single ware (period I crema) in these surface concentrations also suggested that the densities were related to pottery production. A dense concentration of relatively homogeneous ceramic debris was found during the excavation of a known locus of ceramic production in the Netherlands (Van der Leeuw and Schimmer, 1976:115). The relationship between heavy surface densities of ceramics

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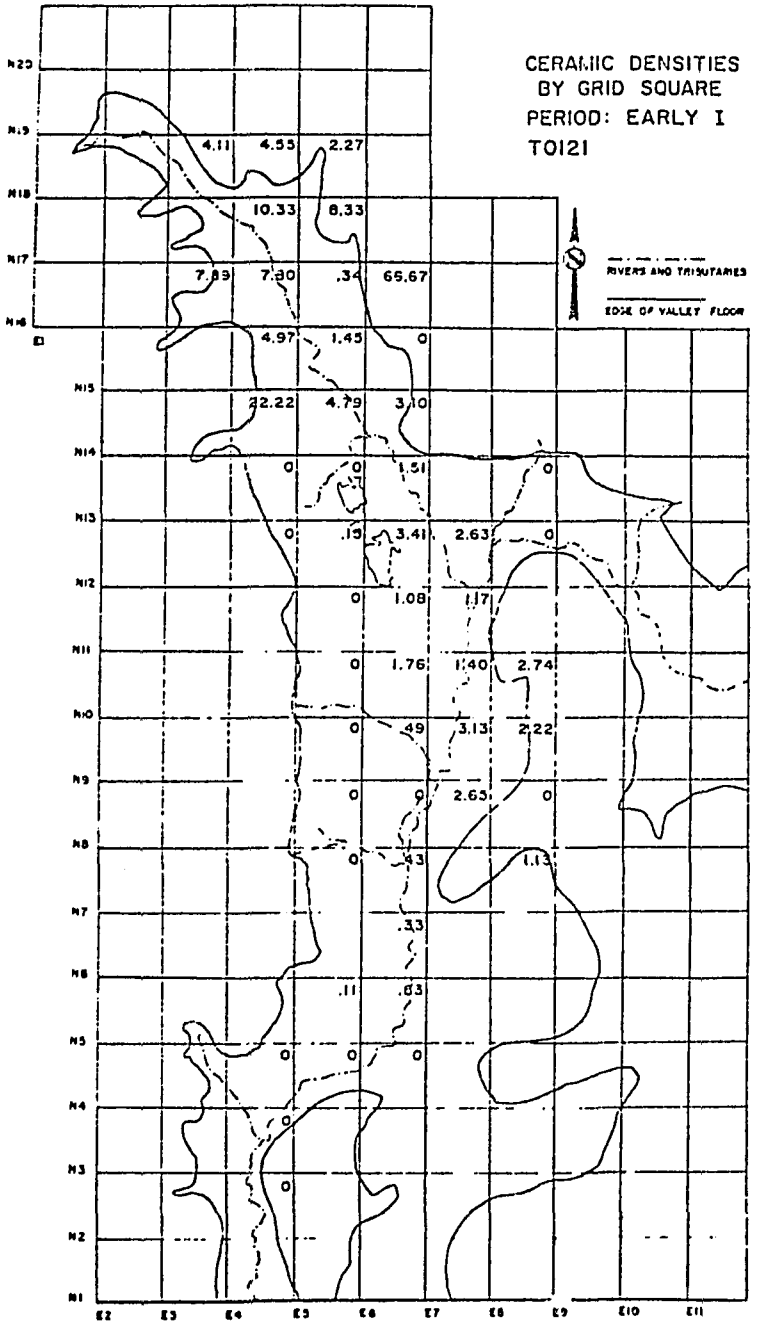

Fig. 4.--Ceramic Densities by Grid Square
Period: Early I T0121

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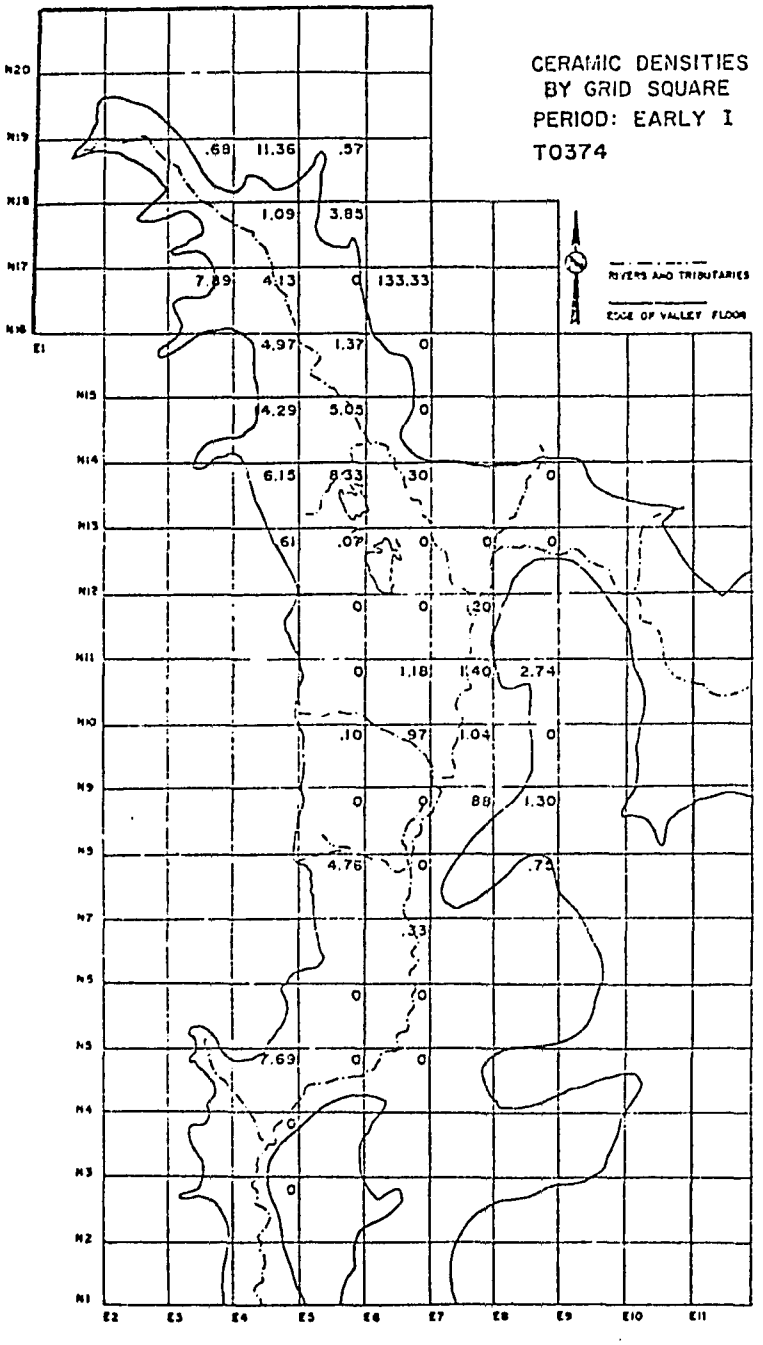

Fig. 5.--Ceramic Densities by Grid Square
Period: Early I T0374

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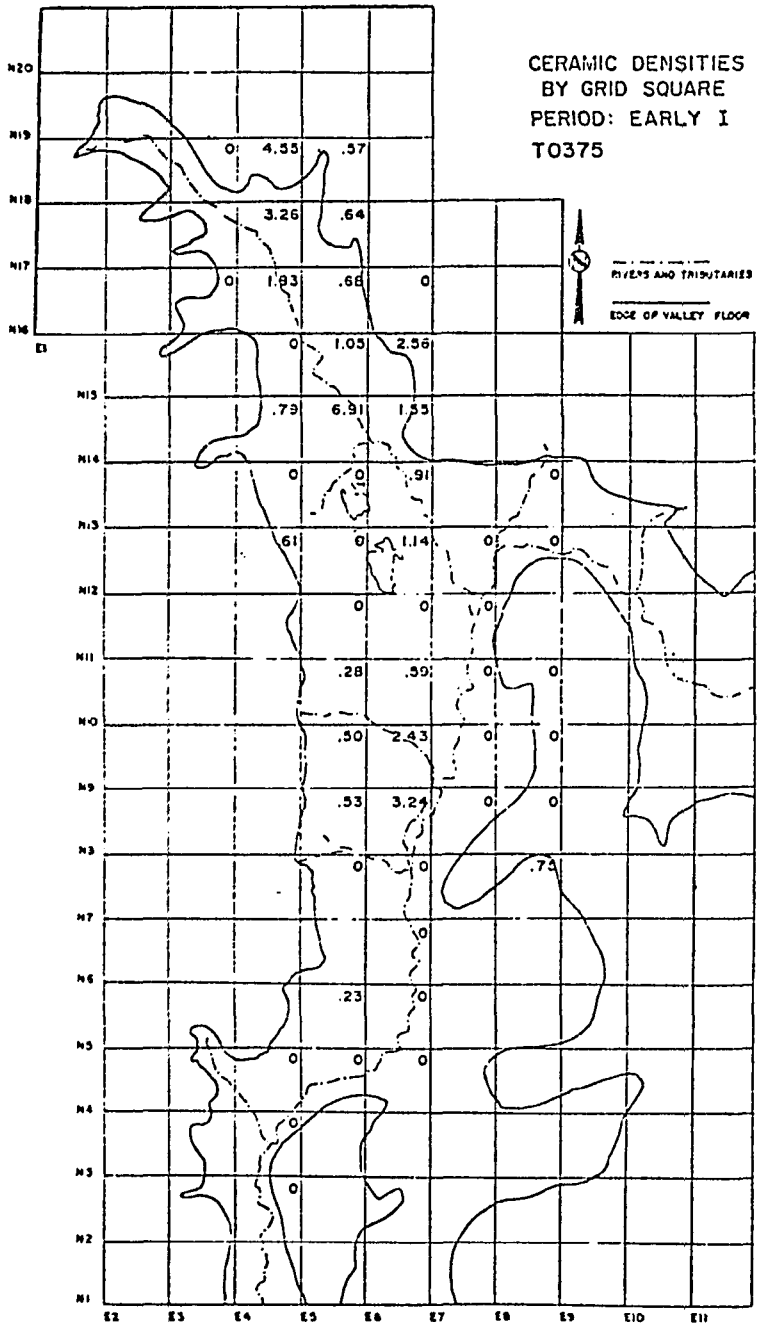

Fig. 6.--Ceramic Densities by Grid Square
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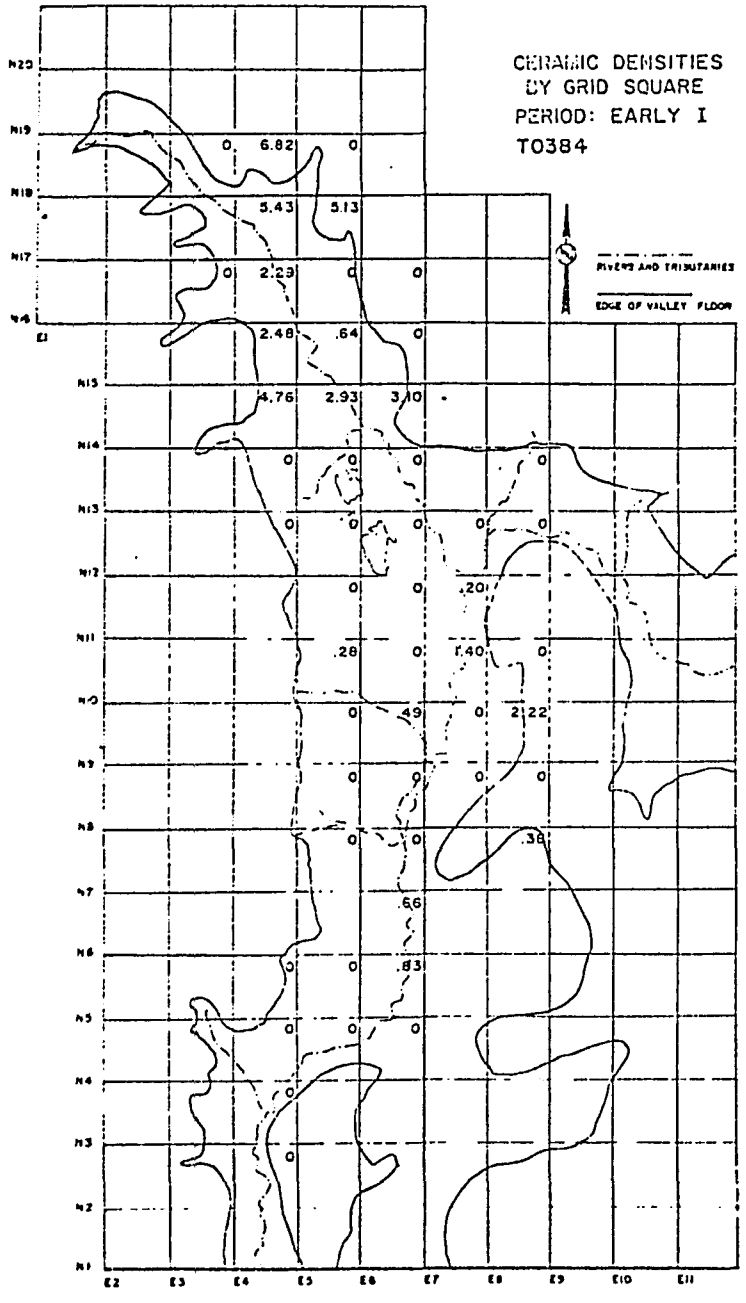

Fig. 7.--Ceramic Densities by Grid Square
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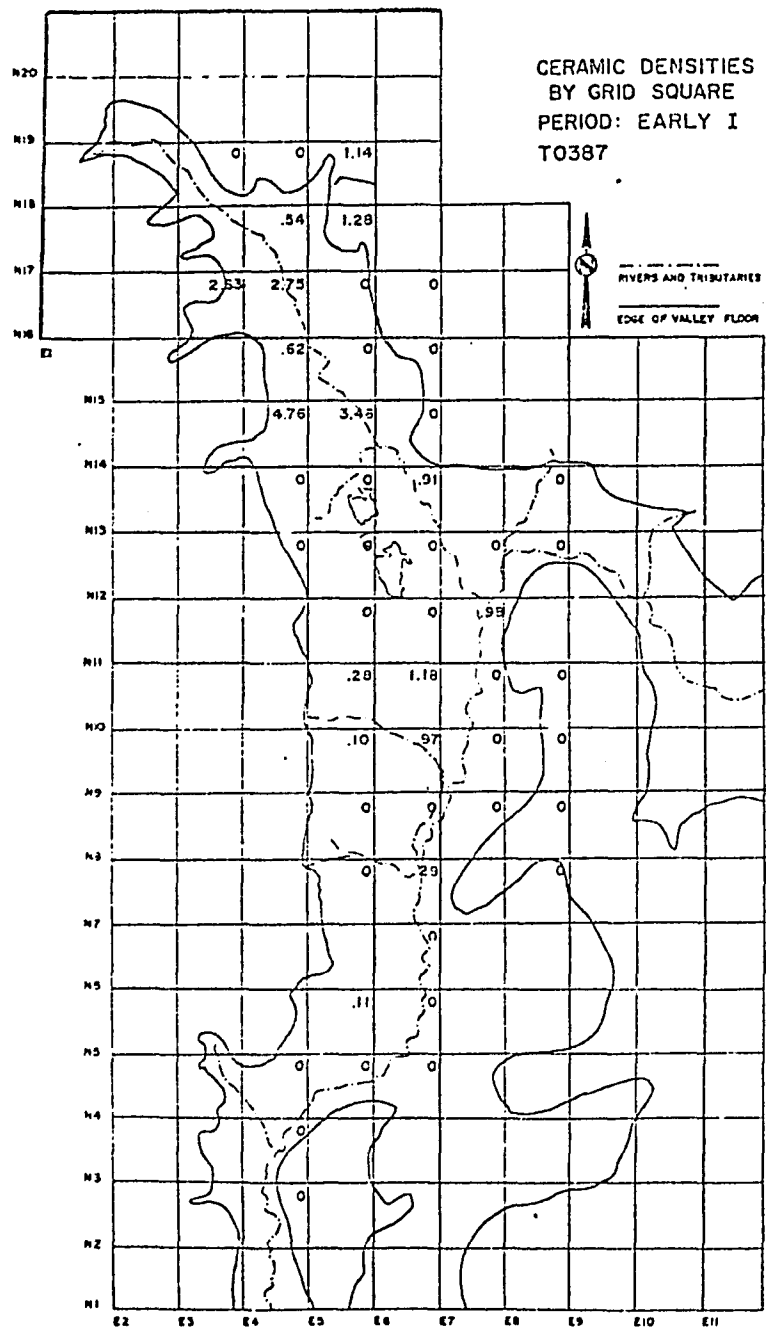

Fig. 8.--Ceramic Densities by Grid Square
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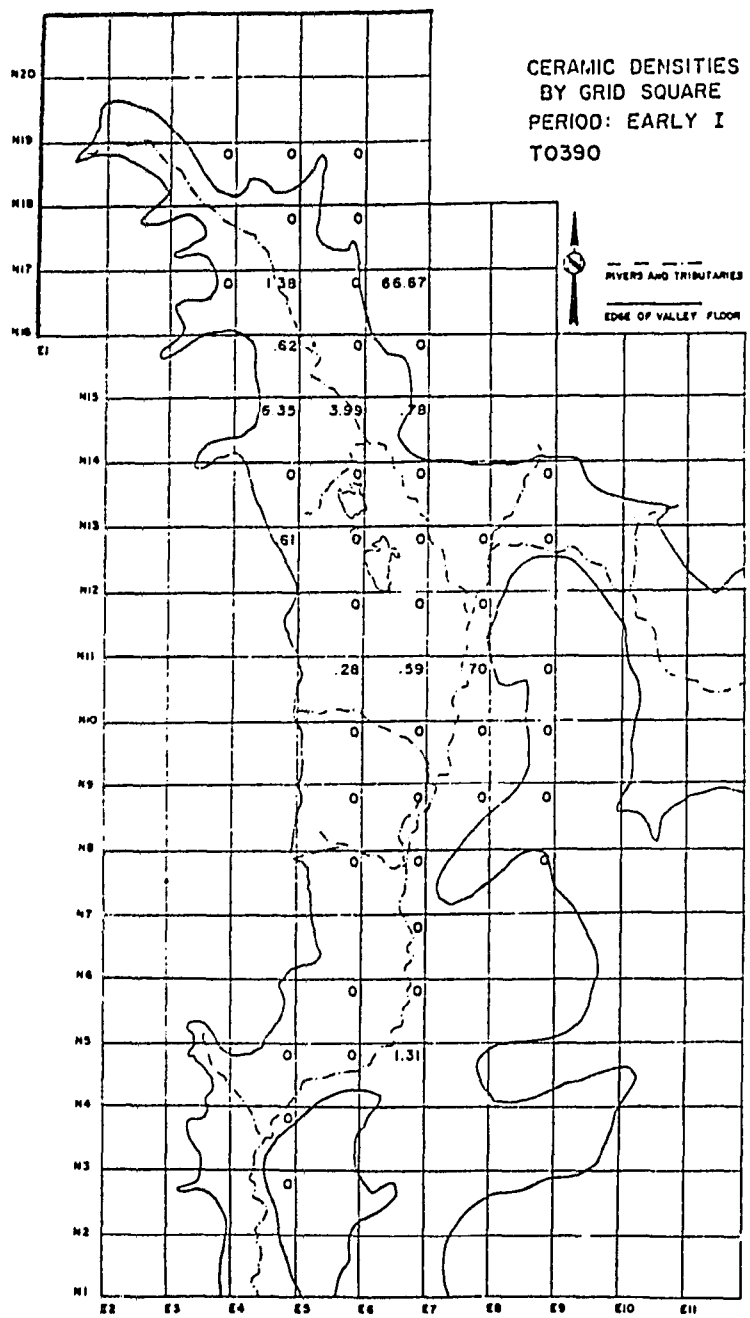

Fig. 9.--Ceramic Densities by Grid Square
Period: Early I T0390

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of a single ware and ceramic production was also noted by our survey crews that walked through the modern pottery producing town of San Bartolo Coyotepec in the Valley of Oaxaca. The accumulation of debris from black pottery production in the fields and in the barrancas within this village far surpassed the surface concentrations of modern pottery that were observed at any other location within the Valle Grande Survey Area.

In addition, 2-5-14 is located in grid square 1404 where the densities of most of the period I crema ceramic types in the Early I collections were relatively high in relation to the rest of the survey area. It is also interesting to note that although crema pottery was plentiful and found in many formal varieties here, Early I gris pottery was almost absent.

3. 2-5-33 (N11E7): Light-moderate surface densities of Early I ceramic types were observed over a portion of this occupation located in the Central Valley Survey Area (Kowalewski, 1976:73-76). One probable kiln waster, an outleaned wall, flaring rim, period I gris bowl, was found in a collection (1107410) from this site. In addition, unlike most collections from Early I occupations within the survey area, gris pottery seems to be predominant in collections from 2-5-33. The collected total of Early I incised gris bowls ("Fangris") (Caso, Bernal and Acosta, 1967:32-35) from grid square 1007 was more than twice the collected

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total of these types (T1111, T1332, T1338, T1343, T1345, T1348, T1349, T1358, T1370, T1372, T1509, T1513, T1514, T1515, T1516, T1517, T1518 and T1519) from any other grid square (excluding those containing Monte Albán). Consequently, it seems very likely that these gris types were made in this grid unit. The unusual surface densities and the kiln waster found here suggest that this site was the locus of manufacture (Figure 10).

4. 3-5-26, 62, (N7E6): The densities of unpainted Early I café pottery types found in the collections from the grid squares surrounding the contemporary town of Zimatlán (0805, 0806, 0705, 0706, 0606) were, for the most part, higher than the densities of those types from any other portion of the Central or Valle Grande Survey Areas. Consequently, it seems likely that some of this utilitarian ware was made in the general area. The presence of two unpainted café kiln wasters in collection 0706310 suggested that some of that ware was made at this site between Early I and II. Unfortunately, more refined dating of ceramic production at this site was not possible and so this location was identified as a production location for all three phases.

5. 3-5-27 (N7E6): The predominance of period I café pottery types over other period I types on the surface of this site suggested that unpainted period I café ceramics were produced in this area. The relatively high densities of Early I unpainted café types in the collections from grid

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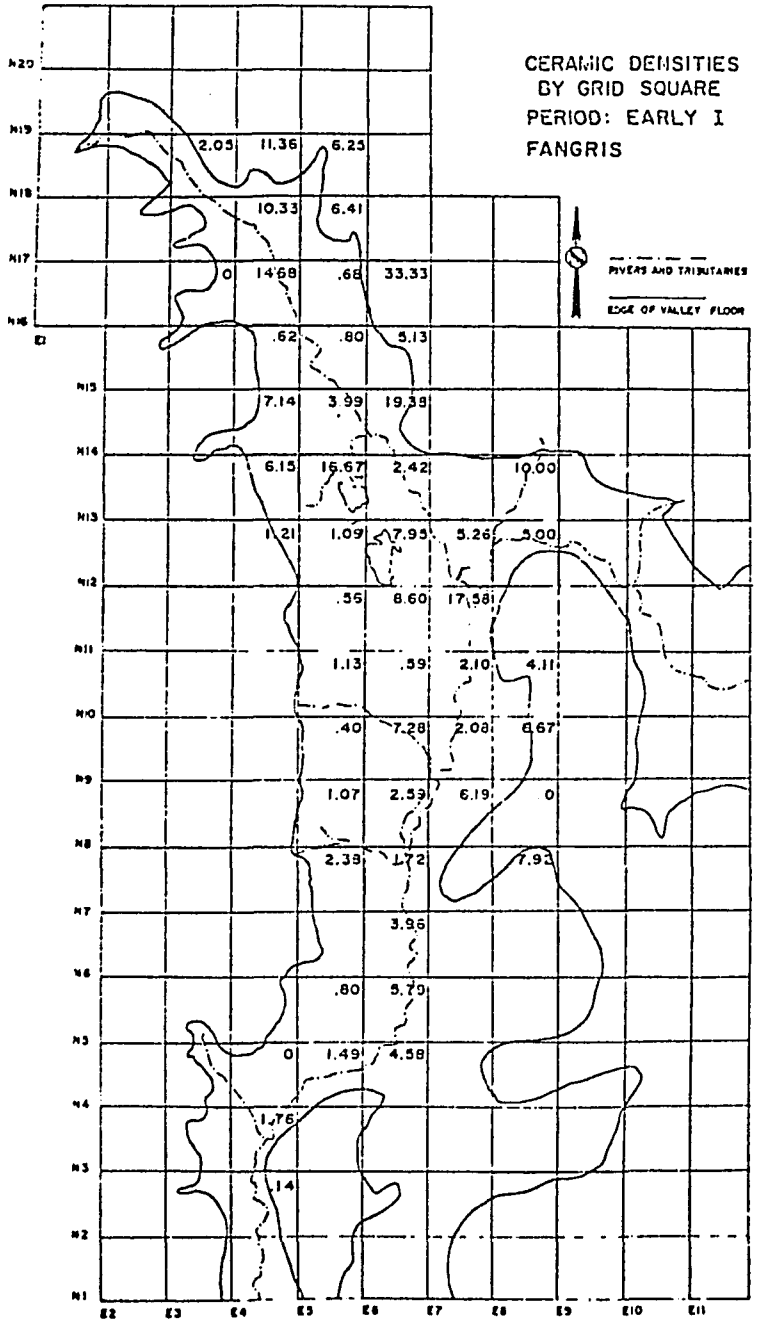

Fig. 10.--Ceramic Densities by Grid Square
Period: Early I Fangris

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squares 0805, 0806, 0705, 0706, 0606 as compared to the densities of the same types in the central part of the Valley also suggested that those types were produced around modern Zimatlán. The presence of two kiln wasters, both period I plain café bowls, in collection 0706202, suggested that at least some of that production occurred at this occupation during either Early I or Late I.

6. 3-5-45 (N3E4): The presence of a fired lump of clay along with the large amount of non-diagnostic café pottery (44 sherds) collected at this site suggested that it was a ceramic workshop in Rosario and/or Early I. This was suggested by the fairly high density of one café bowl type (T2079) in the collection from this site. The density of red painted café pottery (K-3) was higher in the grid square (0304) containing this site than in any other grid unit in the Valley not including either Monte Albán or grid square 0606 (where one red painted café sherd was collected in the lone Early I collection made). Unfortunately, no red painted café pottery was picked up at 3-5-45.

Monte Albán Early I: Additional Comments

The site designated ET-SLC-SLC 5 in the field and located in the Etla Arm near the modern town of San Lorenzo Cacaotepec was an additional location where Early I ceramics were produced. The site lies several hundred meters from a modern source of riverbed clay. The density of surface

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pottery in two areas of the site was light-moderate. Most of the surface pottery was period I crema ware. Clay concretions were observed scattered in collection area 1405303, the area where surface pottery was the most dense. These concretions, which were shaped like rounded clay bricks, were made in crema paste with diorite temper. Almost all period I crema ware types were present in relatively high frequencies both at this site and in grid square 1405. In addition, at ET-SLC-SLC 5 the period I crema types were far more abundant than were the period I gris or café types.

3-5-3 was coded as a ceramic production site (Blanton, et al., MS). A road cut into the site revealed evidence of two kilns. Each was more than a meter in diameter and at least two meters deep. The soil around these tubular features was baked bright red. No kiln wasters were found but crema ceramics were observed to have been abundant in a collection made near the kilns. Since Early I through II pottery was found in this collection (1006101) the site was identified and initially coded as a workshop for each of the three phases. Upon further analysis, however, most of the collected cremas were found to date to Monte Albán II and so the periodization of the ceramic production at the occupation was re-evaluated to only include that latest epoch.

An analysis of the densities by grid unit of the various Early I types suggested that café pottery was also made at some location in the Etla Arm during Early I.

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Densities of several of the café types (Figures 11, 12) were relatively high in the northern part of the Etla area. The near absence of Early I café types in the intervening central part of the Valley make it rather unlikely that the café pottery collected in Etla was produced at and distributed from the Valle Grande café pottery manufacturing sites. Unfortunately, no specific locus of Early I café pottery production has been found yet in the Etla Arm.

B. Ceramic Production Sites: Monte Albán Late I

1. 3-6-136-139 (N11E7): This occupation (Figure 13) was considered an Early I ceramic production locus (2-5-33). Once again, the gris pottery, dating to Late I, substantially outnumbered the other Late I types in the collections from this occupation. Seventy Type 1207's (Caso, Bernal, and Acosta, 1967:25-27; Kowalewski, Spencer and Redmond, 1978:179) alone were collected at the site as compared to a total of only 11 Late I cremas. Since the kiln waster in collection 1107410 cannot be dated more finely than to period I and since it was found in a collection which contains both Early I and Late I, it must be considered as possible evidence for Late I ceramic production. The relative abundance of certain Late I gris types in grid square 1007 also suggests that ceramic production continued at this location in Late I.

2. 3-6-33 (N9E6): This occupation was apparently a locus of café utilitarian production in Late I and/or II. A kiln

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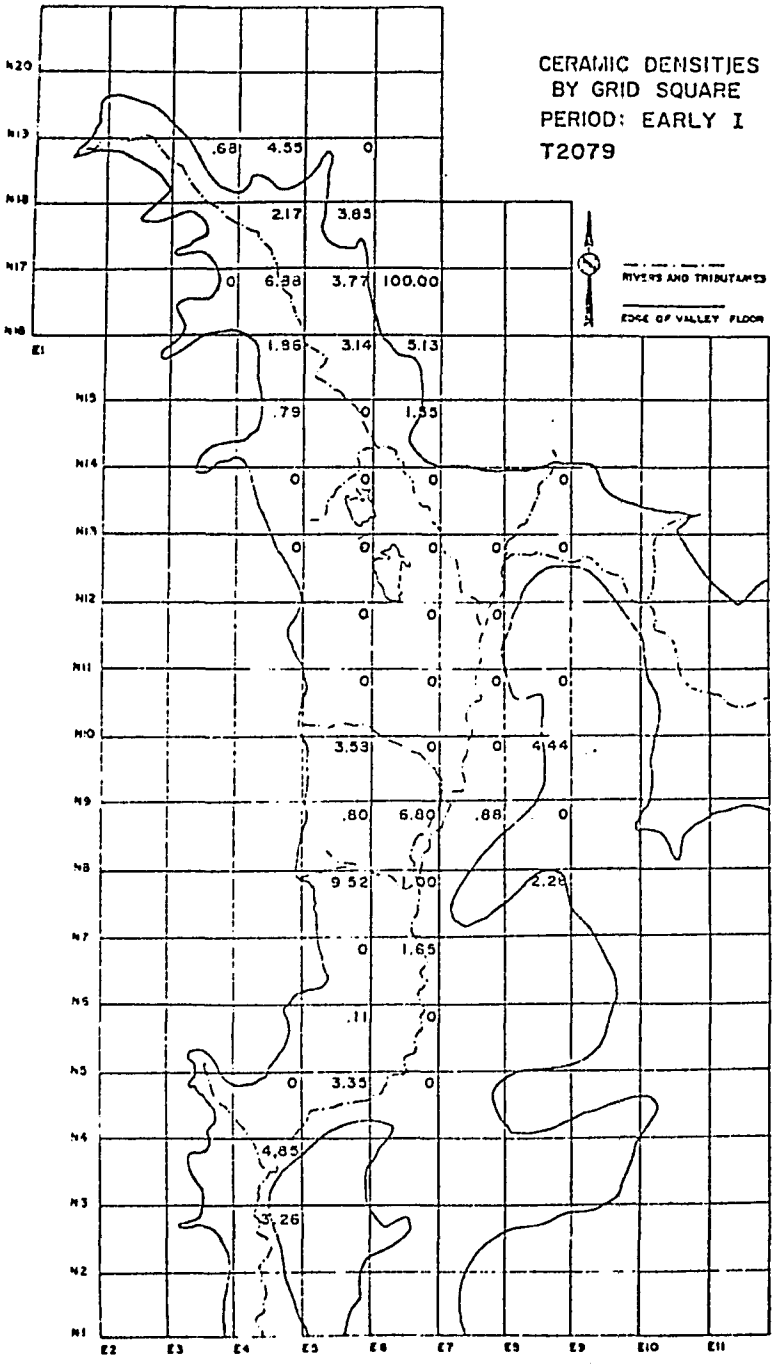

Fig. 11.--Ceramic Densities by Grid Square
Period: Early I T2079

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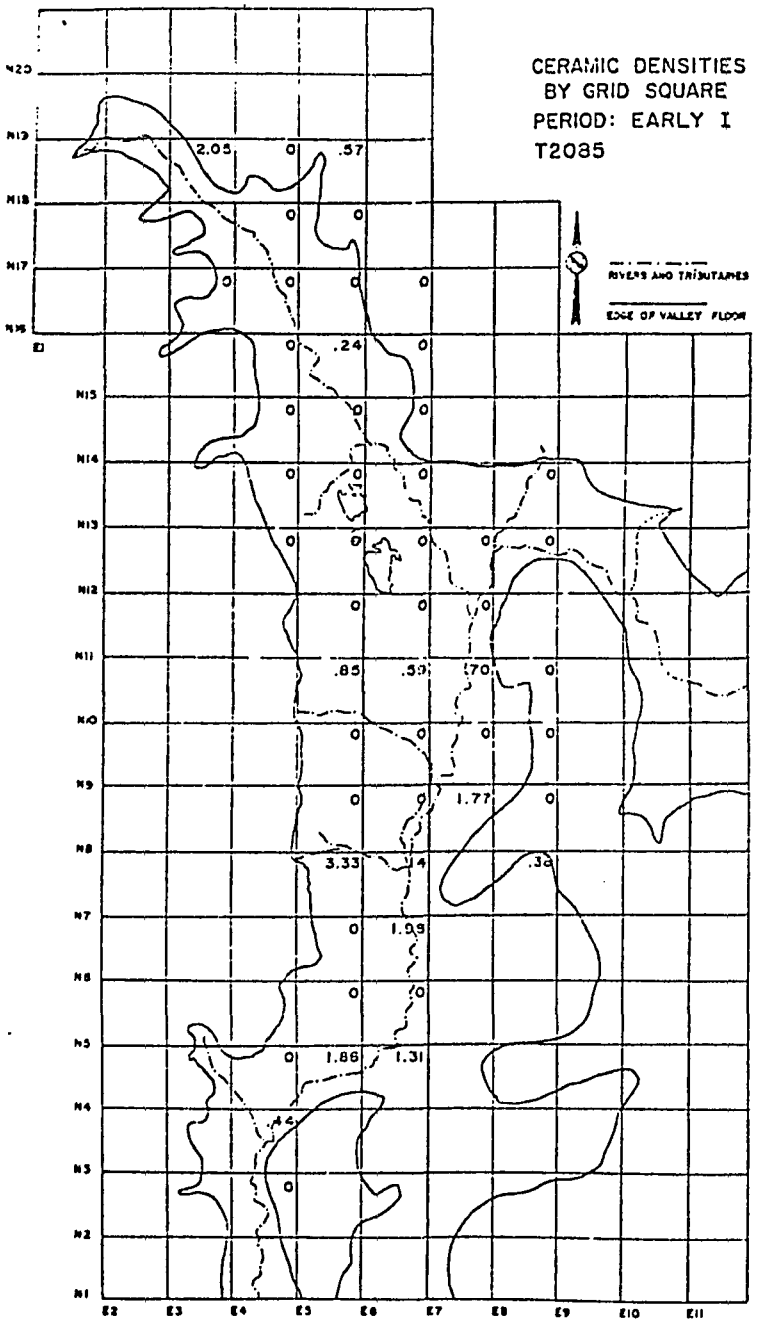

Fig. 12.--Ceramic Densities by Grid Square
Period: Early I T2085

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Fig. 13.--Central Places, Large Sites, Estimated District Boundaries, and Production Loci, Late I

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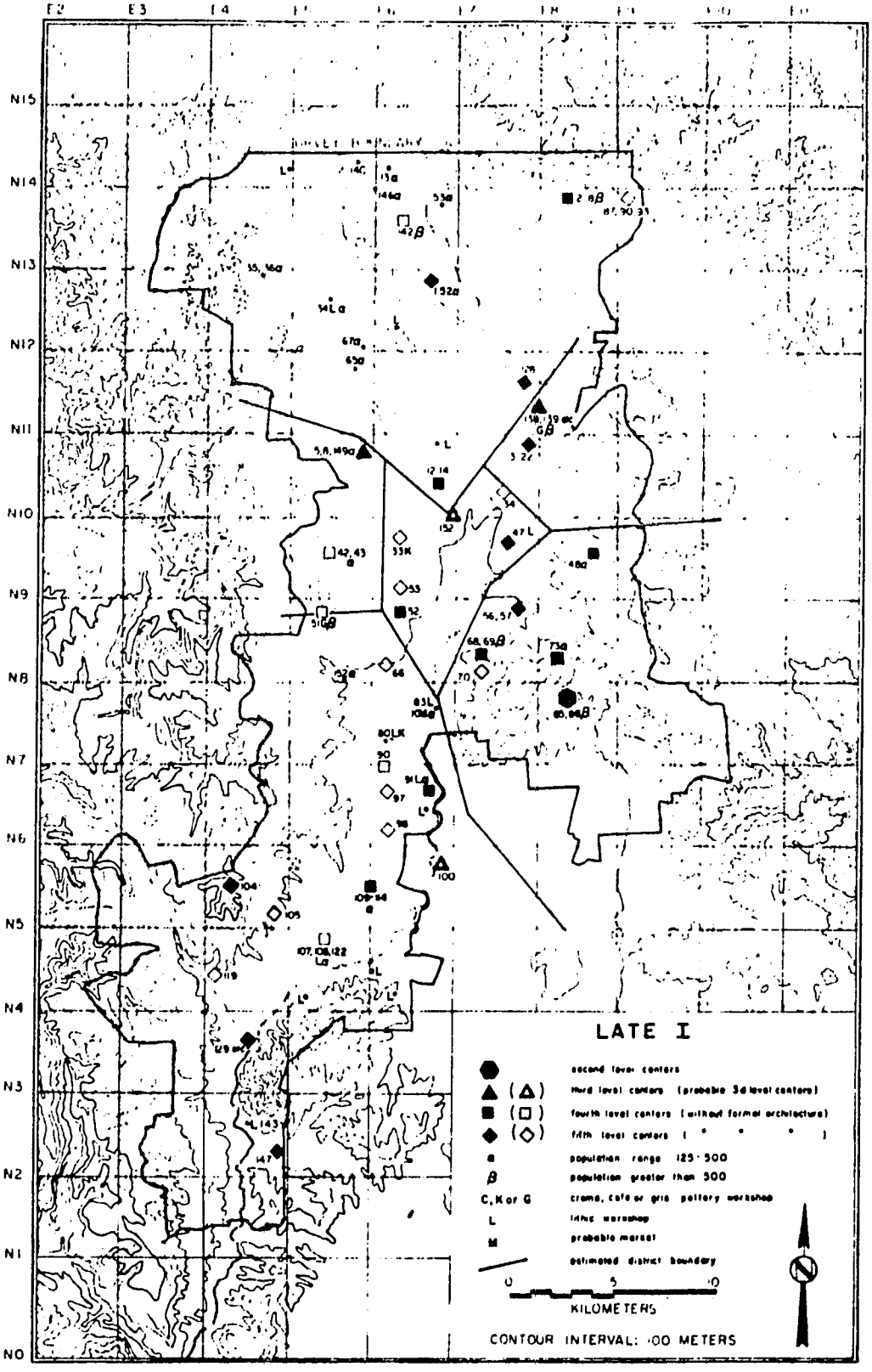

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waster (a café ware olla) was found in area 0906102. More raked café ollas (T2009) were collected in area 0906104 than in any other Late I collection. In addition, considering only those collections dated to Late I, raked ollas were found in greater density in grid square 0906 than in any other grid square in the survey area.

3. 3-6-51 (N8E5): There is considerable evidence that Late I gris paste combed bottomed bowls (Caso, Bernal, and Acosta, 1967:26, 28; Kowalewski, Spencer and Redmond, 1978: 181) were made at this site. Eighteen sherds of this type (T1297) were collected in area 0805101. This represents seven more examples of T1297's than were picked up in any other survey collection. In addition, 19 more T1297's were collected in the other collections made at this site. One of the combed-bottomed bowls collected in area 0806101 was a vessel that apparently was combed too deeply during production. An incision went through the bowl bottom causing the pot to break. It also should be noted that more T1207's (Kowalewski, Spencer and Redmond, 1978:179) were picked up in collection area 0805101 than were found in any other Valley survey collection.

4. 3-6-80 (N7E6): This occupation was considered to be an area of plain café ceramic production in Early I (3-5-26). Two plain café kiln wasters were found in collection 0706310, and these sherds represented evidence of ceramic production.

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Unfortunately, this production could not be dated more finely than sometime from Early I to II. Consequently the occupation was considered a production site in all three phases. Additional evidence for café pottery production at this location was derived from the distributional data on certain café olla types within Late I collections. More plain café ollas with thin straight necks (T2013B) were collected in the Late I collections in grid square 0706 than in the Late I collections from any other grid square. In addition, the 47 plain café ollas with curved-back necks (T2013A) that were found in 0706 were the second largest amount of this type that were found in any grid square in the Valley survey area.

5. 3-6-83 (N7E6): The relatively high densities of unpainted Late I café vessels (T2013A, T2079) in certain grid squares (0805, 0806, 6705, 0706, 0605, and 0606) as compared to the densities of these types in other parts of the survey region, suggested that plain café pottery was made near Zimatlán in Late I (Figures 14, 15). The presence of the two period I plain café bowl wasters in the collection from the southern portion of 3-6-83 suggested that some of that manufacturing may have occurred at this site.

Monte Albán Late I: Additional Comments

Production of crema utility wares probably continued at ET-SLC-SLC5 into Late I. Many of the ceramic types

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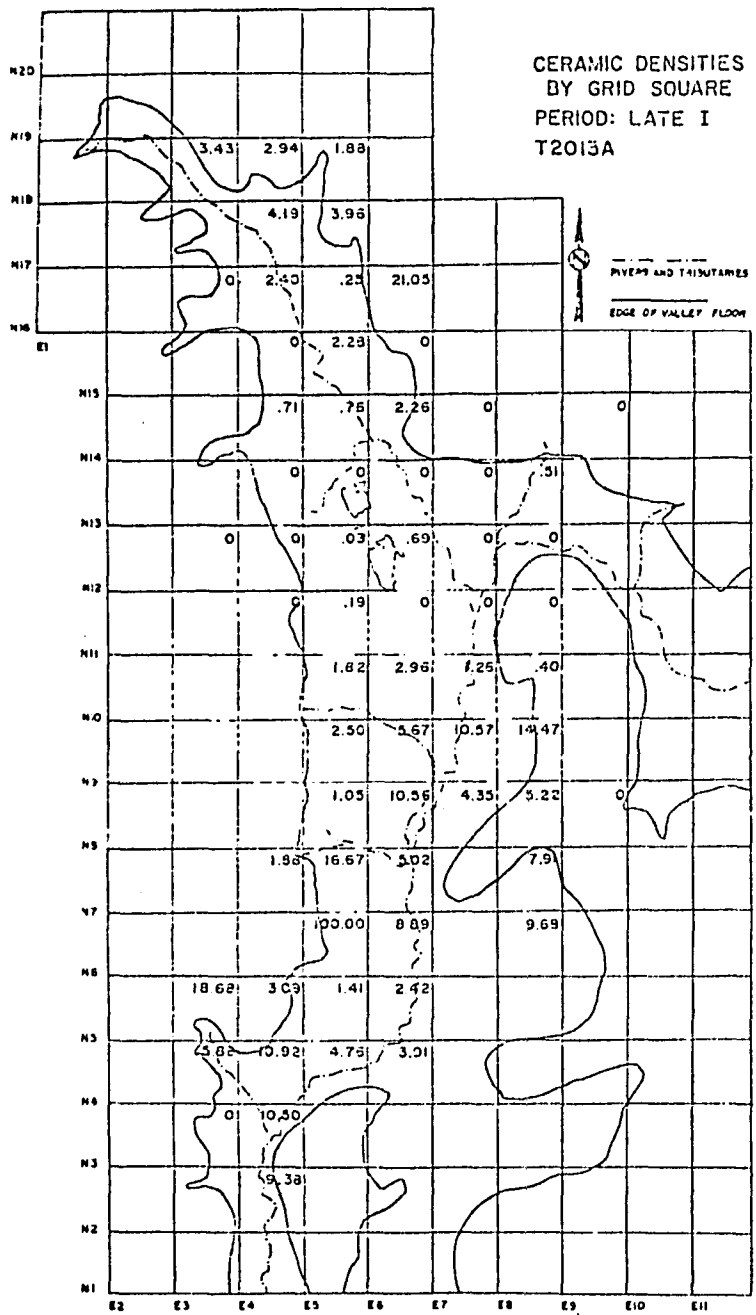

Fig. 14.--Ceramic Densities by Grid Square
Period: Late I T2013A

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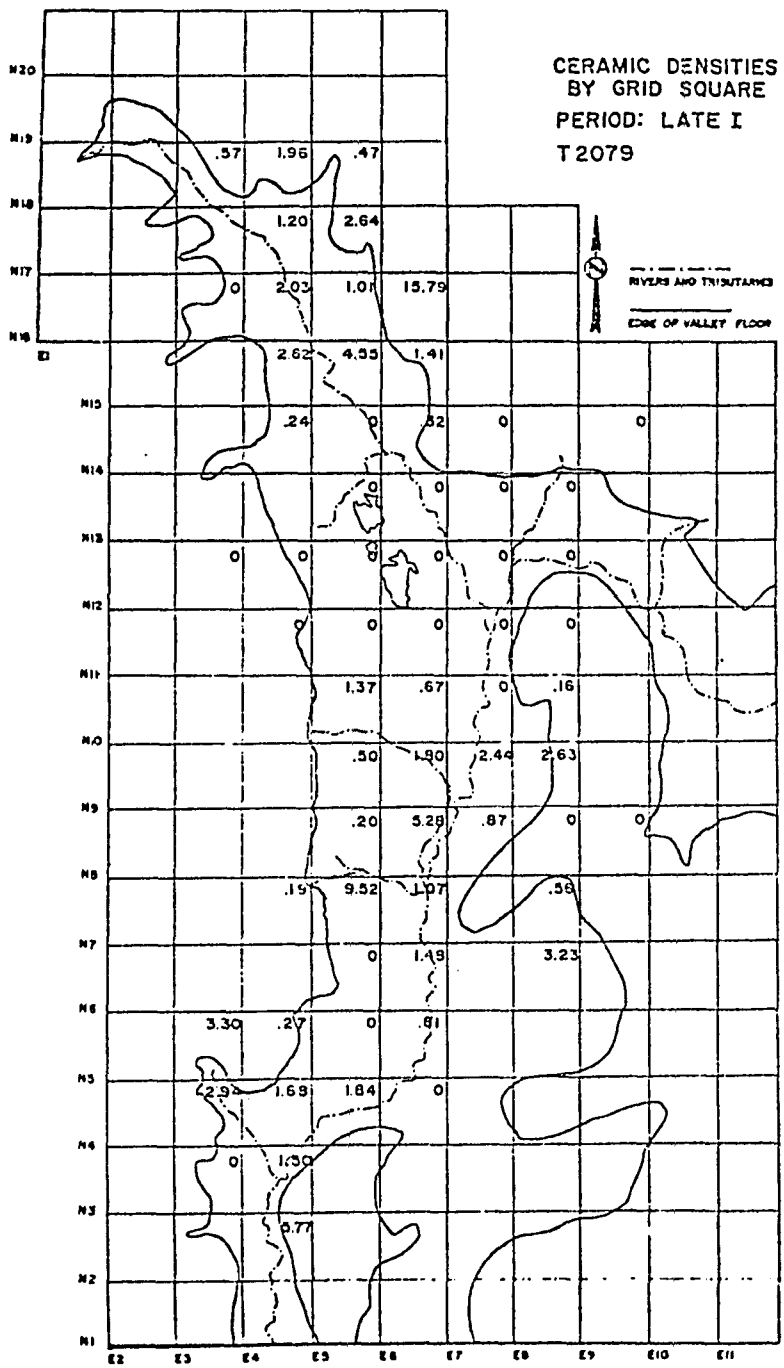

Fig. 15.--Ceramic Densities by Grid Square
Period: Late I T2079

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densely concentrated on the surface of the site and relatively abundant in the collections made at the site were known to have been used in Late I as well as Early I. In addition, the collection area at the site (1405303), in which the surface concentrations of crema ceramics were extremely dense and where several clay concretions were noted, included a G-12 (T1207) (Caso, Bernal, and Acosta, 1967:25-26) which suggested that the occupation of this locus of production continued into Late I. Finally, the densities of many ceramic types (T0016, T0018, T0057, T0121, T0376, T0384, T0385, T0389, T0390, T0391, T0398) in collections dated to Late I were greater in grid unit 1405 than in any other grid square in the Valley survey area and this also suggested that production occurred within this area. Since ET-SLC-SLC 5 was the only occupation in grid square 1405 at which there is some indication of ceramic manufacturing, it seems likely that Late I crema production occurred here.

Three suspected period Late I ceramic production sites (3-6-5, 8, 149, 3-6-24, 3-6-118) were no longer considered to be loci of ceramic manufacturing after more careful analysis.

3-6-5, 8, 149: This site was coded initially as a ceramic production site; however, it is no longer believed to have been a Late I locus of production. A road cut into collection area 1006101 revealed evidence of several kilns. Since pottery from phases Early I through II was present

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in this collection, the site was coded initially as a ceramic manufacturing site for each of these three phases. Upon further analysis, it was found that most of these cremas present dated to period II. Consequently, the periodization of ceramic production at this location was re-evaluated to include only that latest phase.

3-6-24: One gris kiln waster was noted in this collection, which included a few ceramic types that date to Late I. Consequently the occupation was coded as a possible Late I ceramic production site. No corroborating evidence for Late I ceramic production at the site was found, however, and, in fact, the collection containing the waster (1007203) had hardly any Late I gris types. It seems more likely that the gris waster pertains to Monte Albán IIIB.

3-6-118: A gris kiln waster was found at this occupation in collection area 0403207, which was dated to several phases including Late I. The surface ceramic density at the site was for the most part sparse and an analysis of the distributional data on gris ceramic types did not provide any corroborating evidence of ceramic production for any occupation.

C. Ceramic Production Sites: Monte Albán II

1. 3-7-1-5, 7 (N10E5): The surface concentrations of ceramics were relatively dense over much of this site (Figure 16) which may have been a locus of ceramic production between

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Fig. 16.--Central Places, Large Sites, Estimated District Boundaries and Production Loci, II

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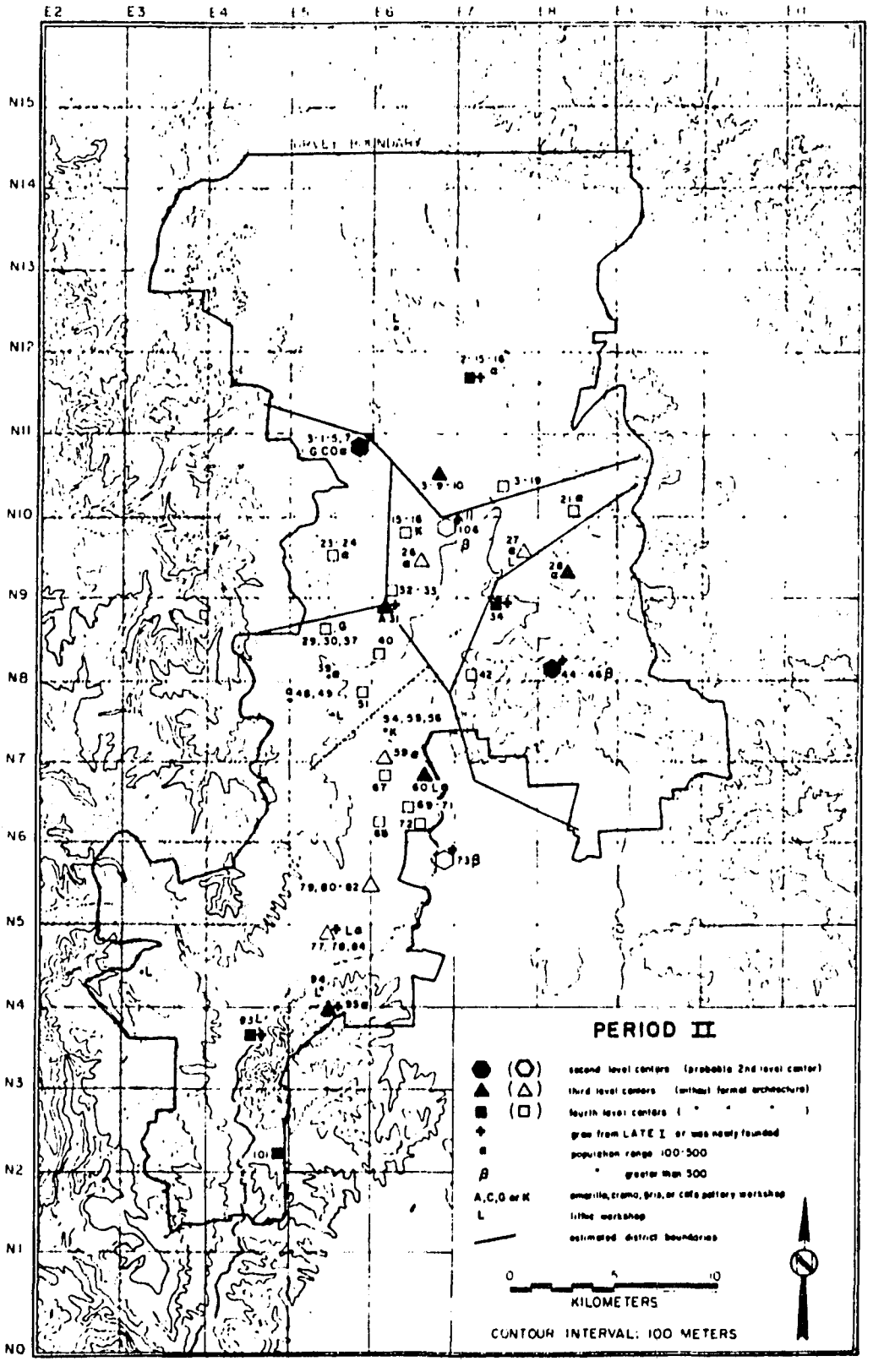

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phases II and IV. Two distinct collection areas were judged to be production locations in Monte Albán II. The collection from area 1005218 contained a single kiln waster made of gris alluvial clay. The collection also contained 48 non-diagnostic gris sherds. In addition, the collections from 3-7-1-5, 7 contained more examples of one Monte Albán II gris paste type (T1419-white rimmed black ware) than did any other site in the Valley excluding Monte Albán.

Several kilns or areas of ceramic firing were observed in a road cut at this site. These features were each more than a meter in diameter and more than two meters deep. The areas surrounding these features were baked to a bright red color. A collection area (1006101) was positioned adjacent to the kilns in an area where crema pottery was abundant. The cremas from this collection area for the most part were dated to Monte Albán II and this suggested that period II crema production occurred here as well.

2. 3-7-15, 16 (N9E6): The presence of a café kiln waster in collection area 0906102 at this occupation suggested ceramic production. This was supported by the presence of eight café raked ollas with curved-back necks (T2013A) in this same collection. In addition, 46 T2013A café ollas (Kowalewski, Spencer, and Redmond, 1978:188) were collected in grid square 0906 and this was the largest number of this type that was collected in II collections from any grid square in the survey area excluding Monte Albán. The

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39 T2009's and the 18 T2013C's that were collected in grid square 0906 also represented the largest number of these types that were collected in period II collections from any grid square, again excluding Monte Albán (Figure 17).

3. 3-7-29, 30, 37 (N8E5): This occupation was a location of Late I gris production (3-6-51). One collection (0805101) made at this site also contained the second largest quantity of period II type 1194 gray bowls in any collection other than those made at Monte Albán. This same collection also contained more type 1207's than did any other period II collection again excluding Monte Albán. Consequently, it is suggested that some II gris pottery was made at this site. This suggestion is supported by the fact that in contrast to the abundance of II gris types here, relatively few II café or crema sherds were collected here.

4. 3-7-31 (N8E6): The relative abundance of the usually rare red painted amarillo pottery (T3408) on the surface of this site was noted by the survey crews. Twenty-five A-9 sherds (Caso, Bernal, and Acosta, 1967:70) were picked up at this site in collection area 0806101 and this was more than twice the number of A-9's recorded in any other collection area. Six additional A-9's were collected in other parts of this site. As expected, the density of T3408's in grid square 0806 was one of the highest in the Valley (Figure 18). Another category of amarillo bowls (T3066) also was relatively abundant in the II collections

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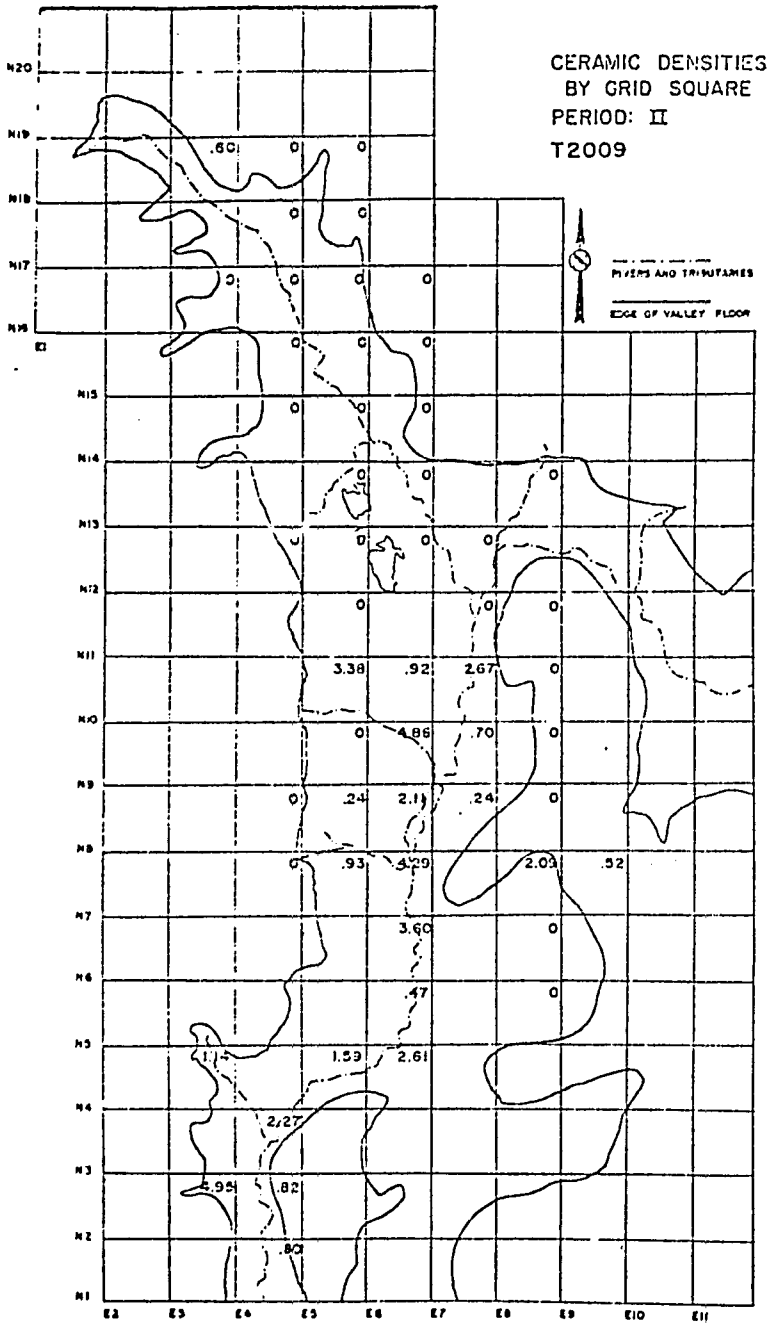

Fig. 17.--Ceramic Densities by Grid Square
Period: II T2009

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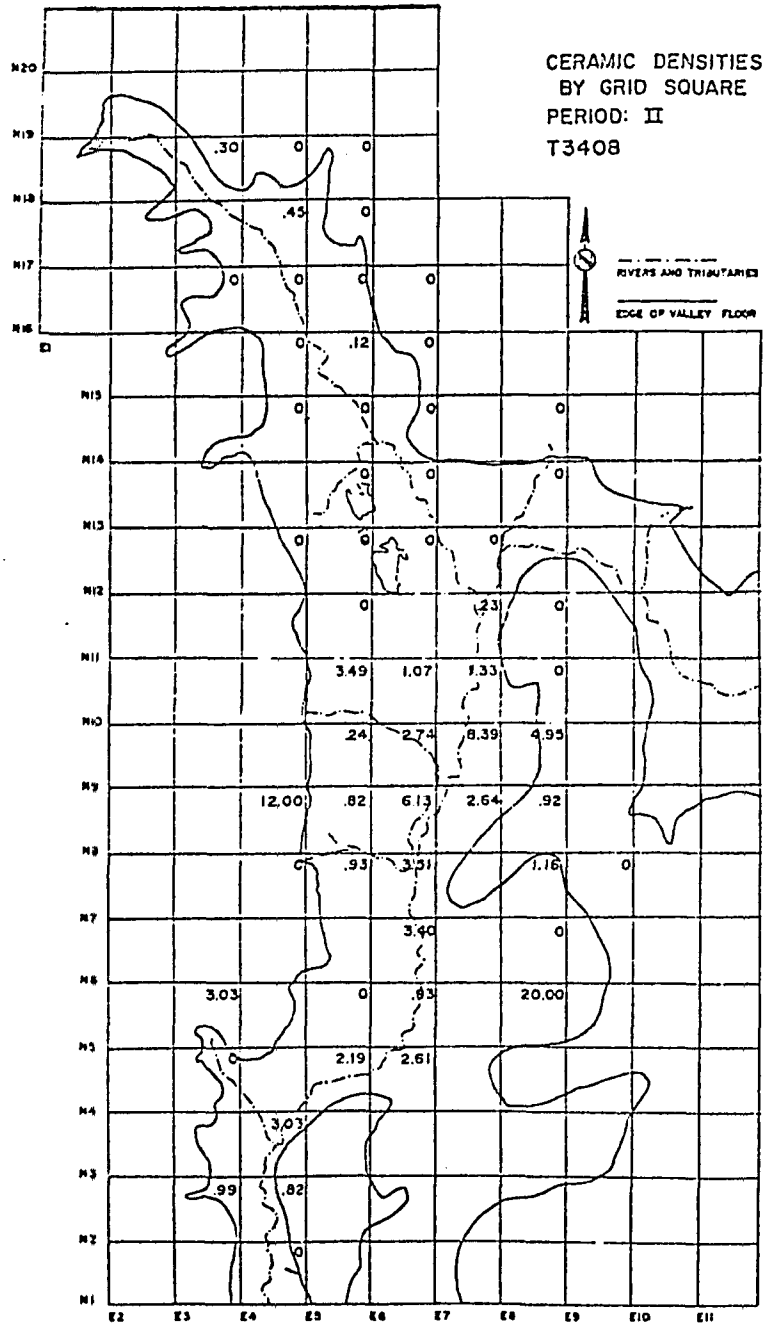

Fig. 18.--Ceramic Densities by Grid Square
Period: II T3408

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from grid square 0806. Consequently, it seems likely that some II amarillo pottery was produced at this site.

5. 3-7-55 (N7E6): This occupation was identified as an area of plain café ceramic production in both Early I (3-5-26) and Late I (3-6-80). Two plain café kiln wasters were found in collection 0706310 and these sherds represent evidence of ceramic production. Unfortunately this production could not be dated more securely than to sometime between Early I and Monte Albán II and the occupation was judged to be a production site in all three phases. The relatively high densities of several café ware types (T2009, T2013B, T2414) in the collections dated to II in grid square 0706 also suggested that café ceramic production may have continued at this site during period II (Figures 17, 19, 20).

Monte Albán II: Additional Comments

Some cremas were probably made during Monte Albán II in the Etla Arm of the Valley. Some of this production of crema pottery may have occurred at ET-SLC-SLC 5 where period I cremas were made. But, period II production at ET-SLC-SLC 5 seems unlikely given that most of the crema types diagnostic to II alone were not abundant in the collections from this site. Identification of specific II crema production sites awaits additional research in this arm of the Valley. The wide variety of the highly decorated crema ware vessels and their rather distinctive spatial

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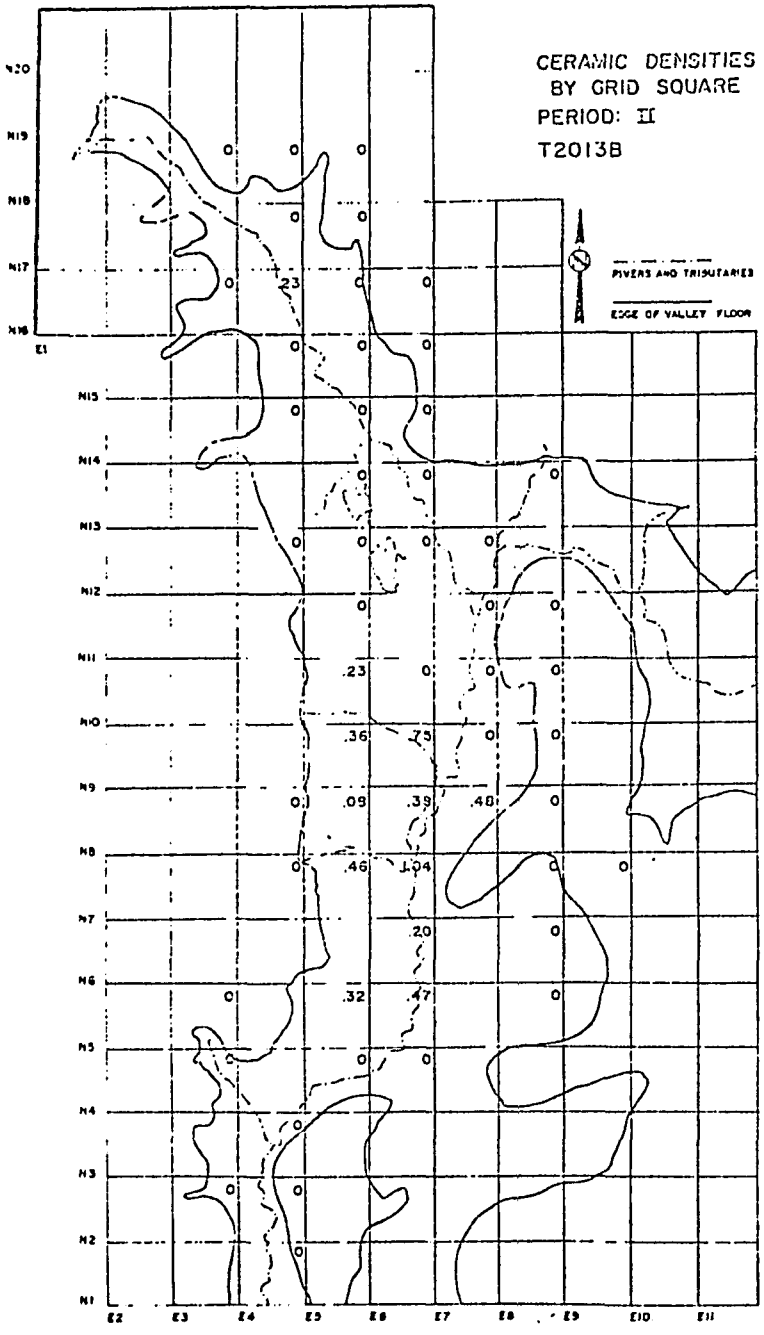

Fig. 19.--Ceramic Densities by Grid Square
Period: II T2013B

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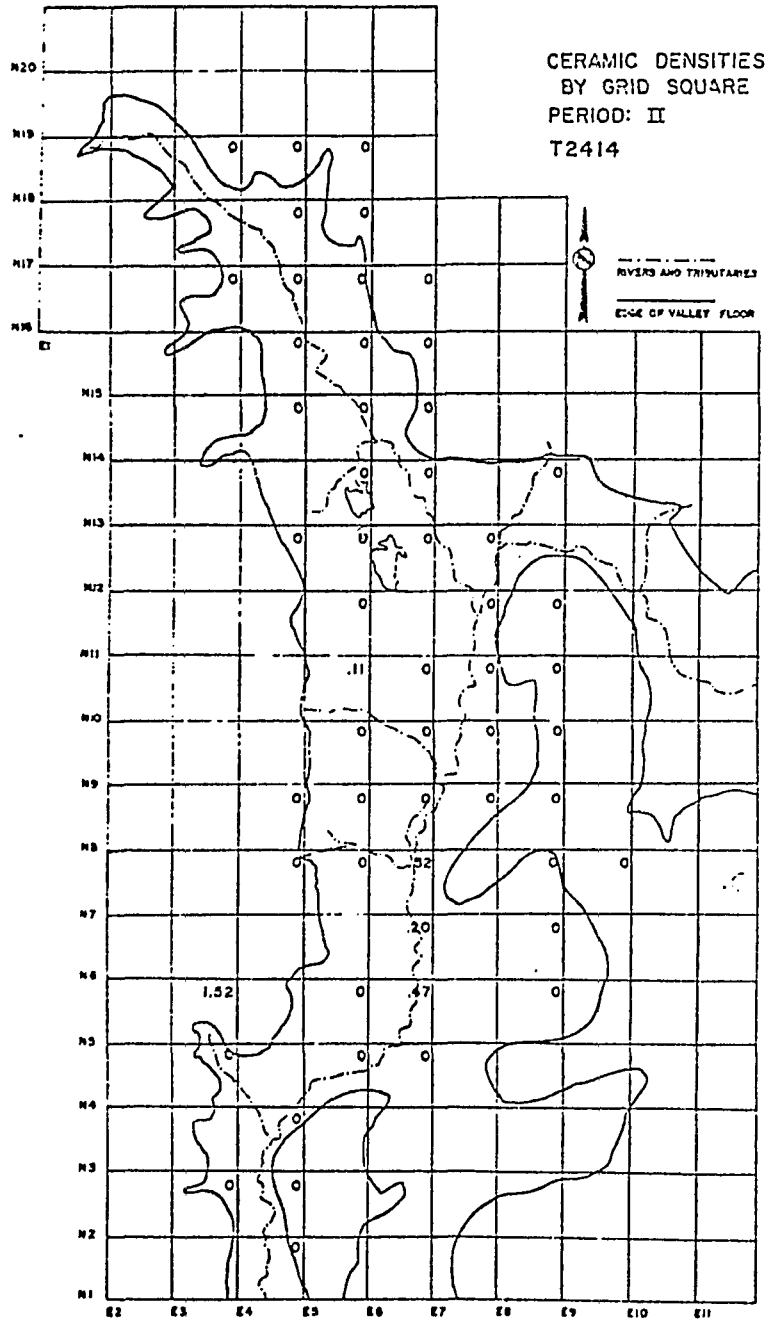

Fig. 20--Ceramic Densities by Grid Square
Period: II T2414

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distributions in the survey area, however, do suggest that these types were produced at several distinct locations. Although a specific production location cannot yet be identified, it seems likely that period II amarillo pottery was also made in the Etla Arm. The amarillo sherds collected in Etla had a different paste color than did the amarillo pottery collected in the Valle Grande. Most of the Etla amarillos were beige (7.5 YR 7/4) while those in the Valle Grande had a more pinkish paste color (5 YR 7/6). Both amarillo varieties were found in the Monte Albán collections.

D. Ceramic Production Sites: Monte Albán IIIA

1. 2-8-23 (N11E7): At this site (Figure 21), the collection area 1107405 contained both a kiln waster and a bowl with an oddly formed rim that apparently was caused by a production error. The kiln waster was an outleaned wall G-23 bowl (T1264), which indicated that ceramic manufacture probably occurred at this site during the Early Classic period. Some of the ceramics produced at this site may have been made in amarillo since the sherd with the oddly shaped rim was of that paste. In addition, more carved amarillo bowls (T3410) were collected at this site than at any other Valley site except for Monte Albán (Figure 22). Bevelled rim bowls (T1268) were also relatively abundant in the collections from this site and more generally within the IIIA collections from grid unit 1107. The 24 non-diagnostic

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Fig. 21.--Central Places, Large Sites, Estimated District Boundaries and Production Loci, IIIA

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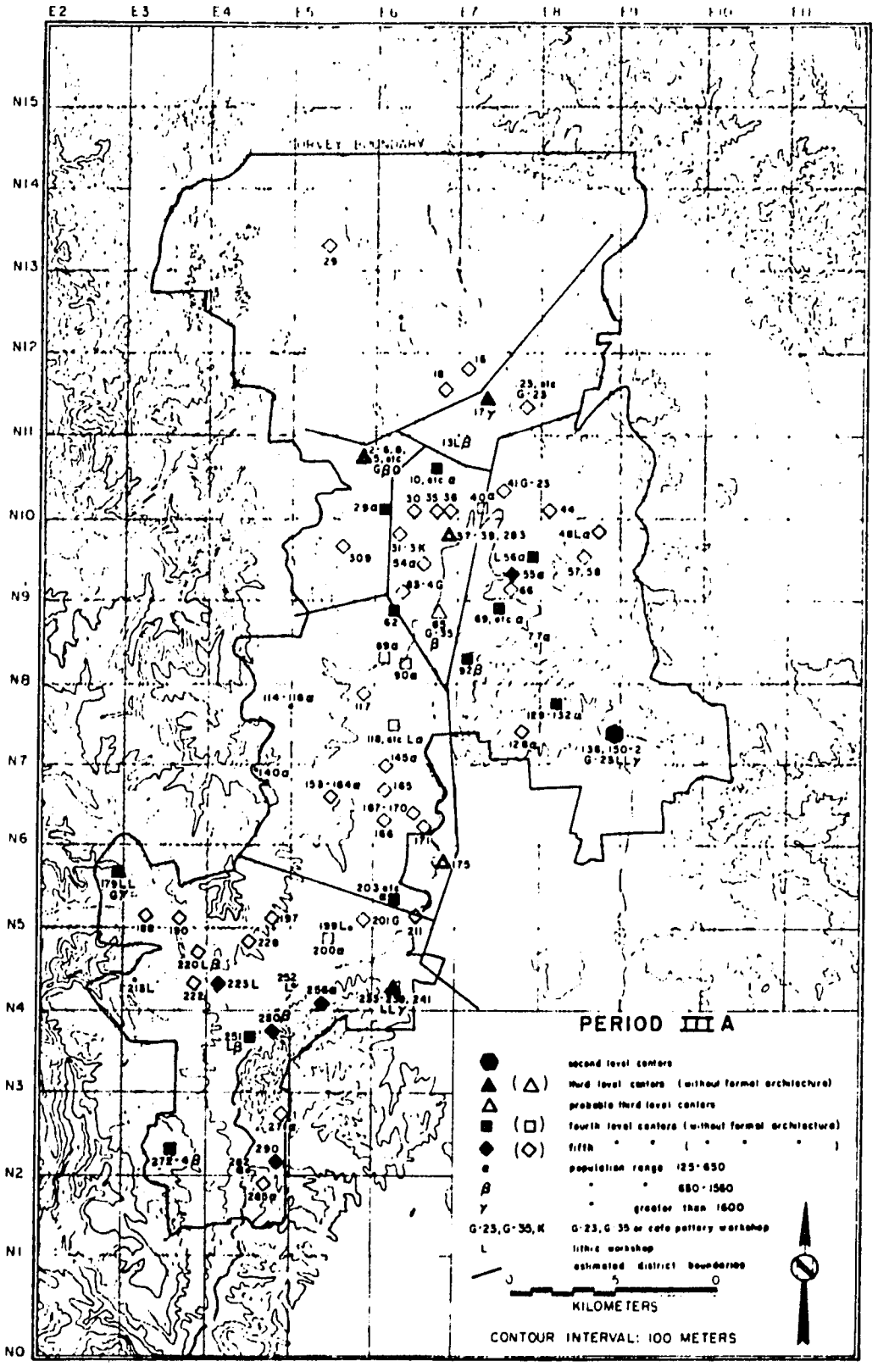

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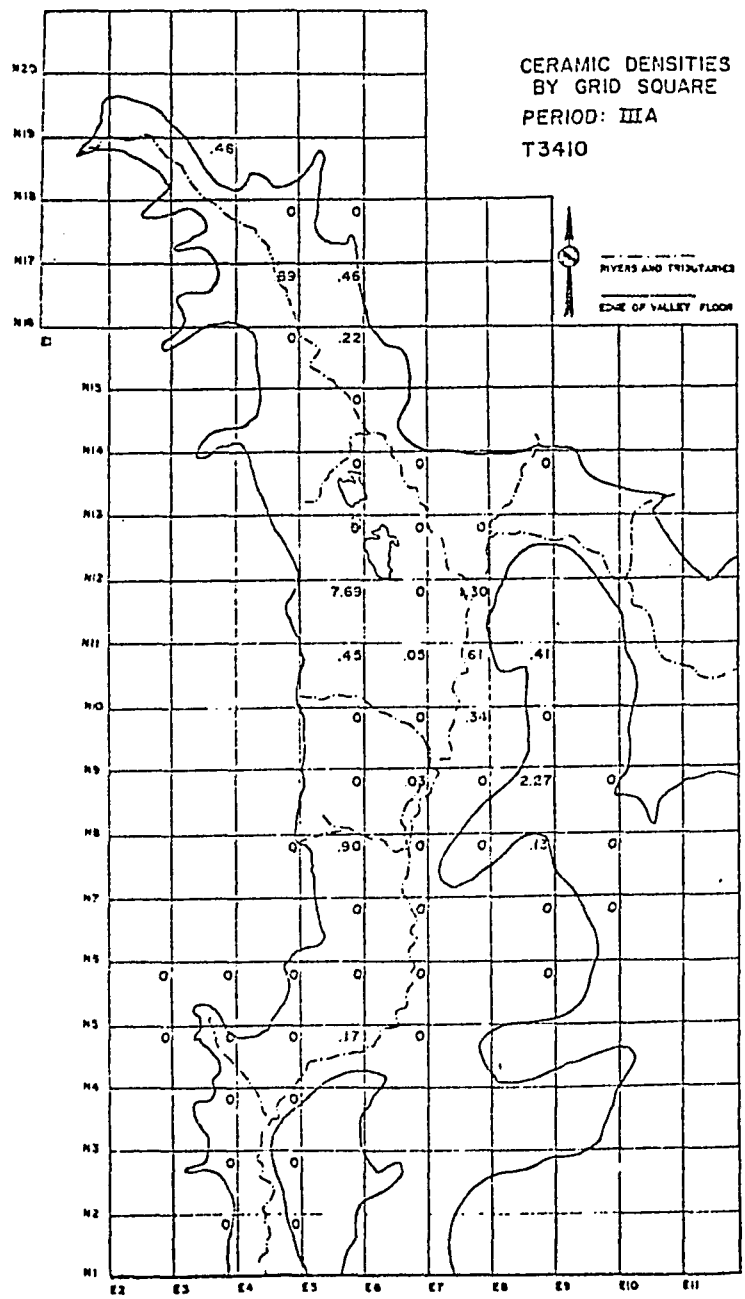

Fig. 22.--Ceramic Densities by Grid Square
Period: IIIA T3410

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gris sherds found in collection area 1107405 also indicated that gris pottery was being produced in a wide variety of forms at this site. Based on comparisons with contemporary pottery making in Oaxaca, this also suggested that gris pottery may have been made here (Hendry, 1957:236-239; Shanson, MS:11).

2. 3-8-2-6 (N10E5): The surface concentrations of ceramics were relatively dense over much of this site, which may have been a locus of ceramic manufacture between periods II and IV. Collection 1005208 contained a single gris waster which, based upon the dating of the diagnostic pottery in the collection, may have been made either in II or IIIA. Further indication of gris production at this locus was suggested by the 48 non-diagnostic gray wares which were picked up in 1005218. Large quantities of non-diagnostic gray wares also were recorded in several other collections, dated to IIIA and made at this site. Several gris ceramic types (T1126, T1265, T1268) were also found in relatively high densities in IIIA collections in grid square 1005, also suggesting local ceramic production.

3. 3-8-31, 32, 33 (N9E6): Café kiln wasters were found in both collections 0906205 and 0906102 at this site. The latter was a single component IIIA collection while the former was dated to several phases including IIIA. This suggested that ceramic manufacturing may have occurred here during the Early Classic period. Eight café raked ollas

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(T2009) were noted in collection 0906102 while four more were found in 0906205. In addition, more (40) of these raked ollas were found in the IIIA collections from grid unit 0906 than from any other grid square, excluding Monte Albán (Figure 23). Another café olla type (T2013A) was also found to be relatively abundant in the IIIA collections from this site (Figure 24). Fifteen examples of this type were picked up in the structure 2 collection (0906105) and this was the largest quantity of this type found in any IIIA collection other than those made at Monte Albán.

4. 3-8-41 (N10E7): This occupation is adjacent to the riverbed where alluvial clays could have been collected. Eight thick fired lumps of unfinished alluvial clay were picked up in the collection from this site (1007401). Five of these lumps were completely oxidized while the other three were gray. If the collections made at three of the Valley's large Early Classic period centers (3-8-136, 150, 152; 3-8-175 and 3-8-233-239, 241) are not included, the collection from this small occupation included the second largest number of outleaned wall, exteriorally carved gris bowls (T1264) picked up in any survey collection. The relative abundance of this decorated Early Classic period type (T1264) at this small site suggested that outleaned wall G-23's were produced here.

5. 3-8-63, 64 (N9E6): A lump of fired gray alluvial clay

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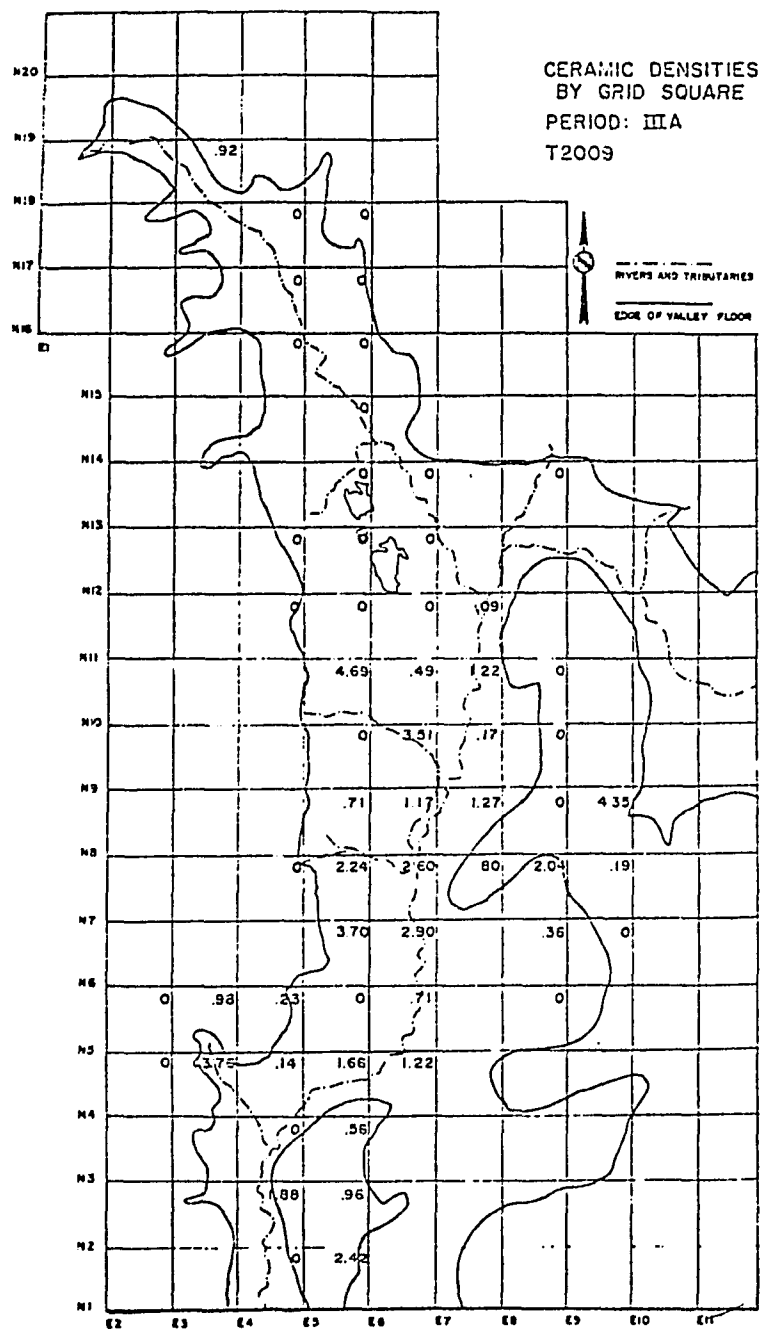

Fig. 23.--Ceramic Densities by Grid Square
Period: IIIA T2009

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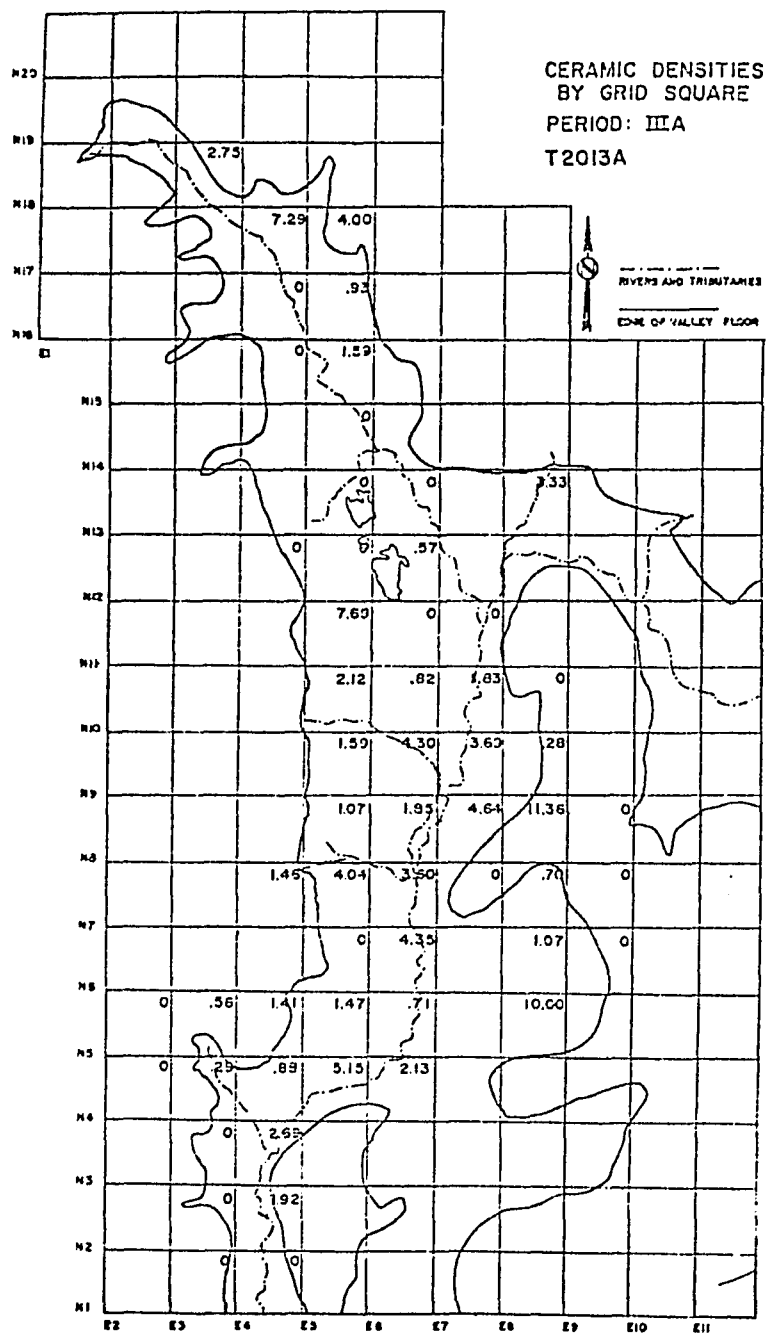

Fig. 24.--Ceramic Densities by Grid Square
Period: IIIA T2013A

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and one IIIA kiln waster were recovered in collection 0906302 at this occupation. In addition, each of the three IIIA collections from this site also contained at least 12 pieces of non-diagnostic gris pottery. Twenty-seven pieces of non-diagnostic gris pottery, much of it probably Classic period in date, were collected in collection area 0906393 alone. When this formal diversity in gris pottery was considered in conjunction with the fired lump and the waster, it was concluded that gris ceramics were produced here.

6. 3-8-65 (N8E6): Gris kiln wasters were found in three different collections at this large Early Classic period site (0806201, 0806202, 0806216). Since two of the collections were single component (IIIA), it seems very likely that gris ceramics were produced here in the Early Classic period. The waster in 0906216 was a conical cajete (T1126); since 41 G-35 bowls (T1126) were collected in 0906216 it seems likely that these omnipresent bowls were one of the types manufactured here. The production of G-35 bowls (T1126) at this site during the Early Classic also is suggested by the presence of more T1126's in the IIIA collections from grid square 0806 than in the IIIA collections from any other grid square, excluding Monte Albán and Jalieza.

7. 3-8-136, 150-152 (Jalieza) (N7E8): It seems apparent that ceramic manufacture was undertaken at this large center during the Early Classic period. Kiln wasters made out of alluvial gray clay were found in two single component IIIA

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collections at this site (0708405 and 0708422). Several types of Early Classic period gris pottery were also very well represented in the collections from here. More outleaned wall carved gray bowls (T1264) were collected at Jalieza than at any other site in the Valley with the exception of Monte Albán. A clay mold, shaped like an ear of corn, also was found here and it probably was used in the manufacture of ceramic urns (Caso and Bernal, 1952).

8. 3-8-201 (N5E5): Some gris ceramic production may have occurred at this site during the Early Classic. Three kiln wasters were found in collection area 0505401. These dated to both IIIA and IIIB. Consequently, this occupation was considered to be a locus of ceramic production in both the Early and Late Classic periods. Although the densities of IIIA gris types in the collections from grid square 0505 were not particularly significant, the densities of several types within the two IIIA collections in sub-square 05054 were quite high. For example, the density of gris bowls with solid supports (T1274) within the Early Classic collections in sub-square 05054 was 11.19 T1274/hectare, which was higher than the density of that type in any grid square except for grid unit 0502 and those grid square containing Monte Albán. Non-diagnostic Classic period gris pottery and gris conical cajetes (T1126) were also relatively abundant in both the collection from this occupation (0505401) and the other collections dated to the Early Classic period

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in this subsquare.

9. 3-8-177-179 (N5E2, N5E3): It seems quite likely that ceramic production was undertaken at this large Early Classic ridgetop center. Gris kiln wasters were found in three separate collections from this site (0502202, 0502205, 0503101). The density of gris conical cajetes (T1126) in IIIA collections was higher in grid square 0502 than in any other grid unit other than 1705 and Monte Albán. The T1126's were also found in comparatively high density in grid square 0503. The densities of plain gris jars (T1120) in IIIA collections in grid squares 0502 and 0504 were also both relatively high as were the densities of gris bowls with both hollow (T1264) and solid supports (T1274).

Monte Albán IIIA: Additional Comments

A gris kiln waster was found at 3-8-220 in collection 0403207 which was dated to several periods including IIIA. The surface ceramic density throughout the site was sparse. An analysis of the distribution of gris ceramic types also did not show any significant evidence of ceramic production for this phase. This site consequently was not identified as a locus of ceramic manufacture.

E. Ceramic Production Sites: Monte Albán IIIB

1. 2-9-20 (N14E5): This site (Figure 25) lies only 250 meters southeast of a clay source for the contemporary potters of Atzompa. The surface ceramic density at the site

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Fig. 25.--Central Places, Large Sites, Estimated District Boundaries and Production Loci, IIIB

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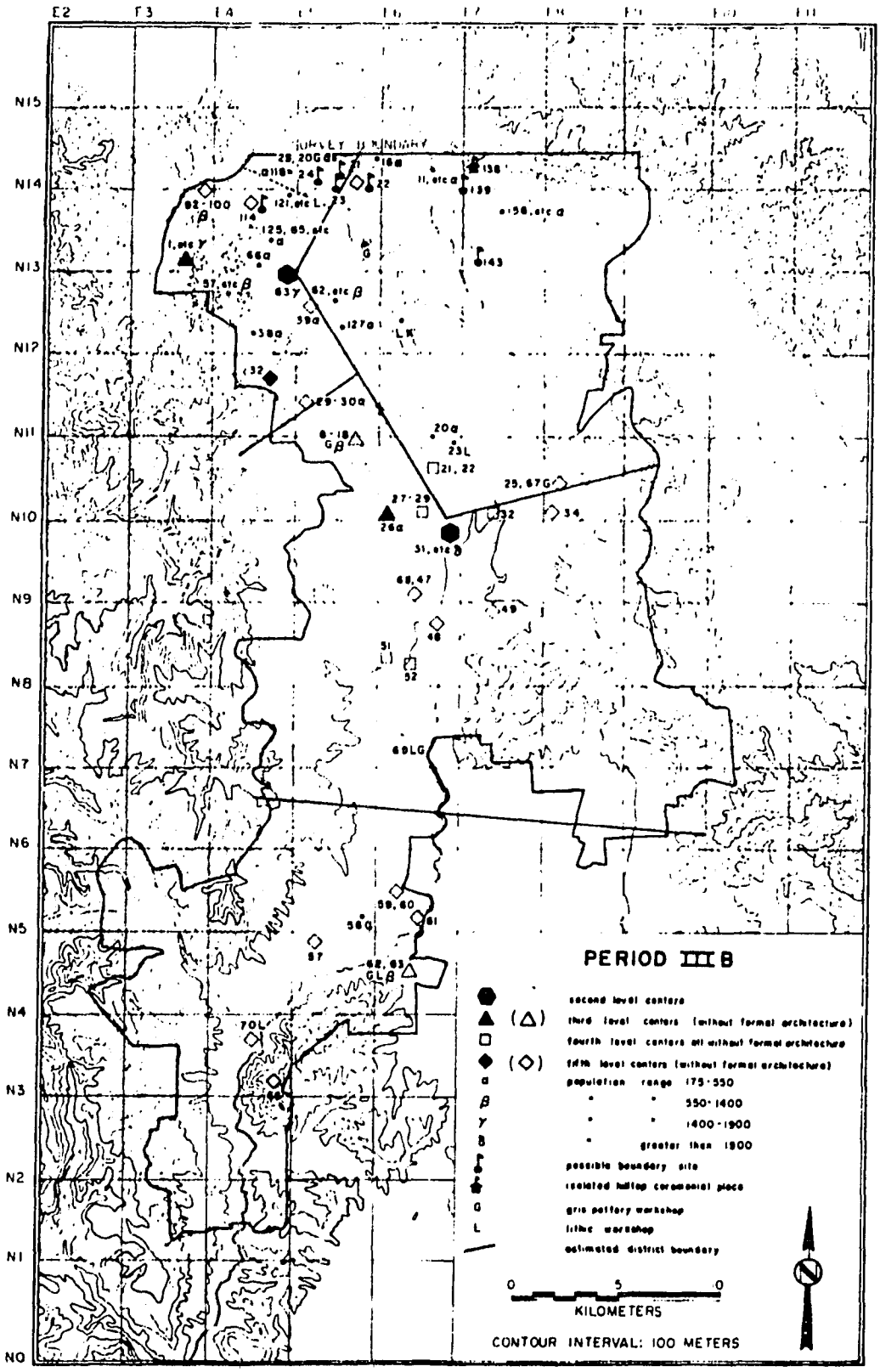

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varied from light through moderate with the heaviest densities noted at the center of the occupation (Kowalewski, 1976:318). An abundance of gris and gris cremosa pottery at the site was noted and these wares were found in an unusual variety of forms (Kowalewski, 1976:318). A hollow sahumador handle that may have been a kiln waster and a mold fragment for Classic period funerary urns were found in collection 1405316. A gris kiln waster also was found in collection area 1405308 at this occupation. The densities of gris types in the IIIB collections in grid square 1405 were not particularly high although the actual count of conical cajetes (T1126) in these IIIB collections was fifth largest for any grid square in the survey area.

2. Monte Albán: Site Subdivision 11 (Atzompa) (N13E5): This subdivision of Monte Albán has a long occupational history but most of its component terraces were only occupied in IIIB at the time when Monte Albán reached its greatest extent (Blanton, 1978:88). Although Blanton (1978:91) noted that a relatively large number of kiln wasters were found in subdivision 11, he argued against the hypothesis that ceramic production was an important activity at prehispanic Atzompa. However, Blanton made his argument before he had the opportunity to compare the collections from Monte Albán with the collections from a large number of other Valley sites. Based on these intra-Valley comparisons one must suggest that at least during the Late Classic period the

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production of ceramics was an important activity in site subdivision 11. On the terraces at Atzompa, many of which were occupied only during the Late Classic period, 34 kiln wasters were found. In contrast, only 63 kiln wasters were noted in all of the collections made at Valley occupations other than Monte Albán. Additional information collected during the Monte Albán survey also suggested that Atzompa may have been an important locus of gris production during the Late Classic period. Various ground stone tools, chipped stone tools, shell objects and Classic period café ware ceramic types (T2086, T2418) were not unusually abundant in site subdivision 11 (Blanton, 1978:78-88). Yet several Classic period gris pottery types (T1125, T1137) as well as gris ceramic funerary urns were found in greater densities upon the collected terraces in site subdivision 11 than in the collected terraces in any other Monte Albán subdivison (Blanton, 1978:80, 90; Kuttruff, 1978:402). In addition, two of the six polishing or burnishing stones identified in the surface collections from Monte Albán were found on Atzompa terraces (Blanton, 1978:95).

3. 3-9-8-18 (N10E5): The surface concentrations of ceramics were relatively dense over much of this site, a possible locus of ceramic production between phases II and IV. At this site two multi-component collections (1005202, 1005294) that included IIIB components contained single gris kiln wasters. The wasters could not be dated to any one epoch

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and so the possibility that they were Late Classic in date had to be considered. The density of bevelled rim gris bowls (T1268) in period IIIB collections within grid square 1005 was one of the highest in the survey area and this suggests that at least some Late Classic gris pottery was made locally (Figure 26).

4. 3-9-25, 67 (N10E7, N10E8): A gris kiln waster probably dating to the Classic period was found in collection area 1007203 at this site. Another collection area also at this occupation, 1008301, contained unusually high densities of several of the most common Late Classic gris types (T1120, T1126). Consequently, it seemed likely that some gris pottery was made here during the Late Classic period.

5. 3-9-58 (N5E5): Three gris pottery kiln wasters and 17 non-diagnostic gris sherds were noted in collection area 0505491 at this site. The settlement was occupied in both IIIA and IIIB. Ceramic production may have taken place during both phases (see 3-8-201). The densities of several gris ceramic categories (T1140, T1263, T1274) were relatively high in IIIB collections within grid unit 0505 and this tentatively supported the suggestion that ceramic production occurred here during the Late Classic period (Figures 27, 28, 29).

6. 3-9-69 (N7E6): A Classic period gris kiln waster was found in collection area 0706305 at this occupation. In addition, several Classic period gris types (T1120, T1126,

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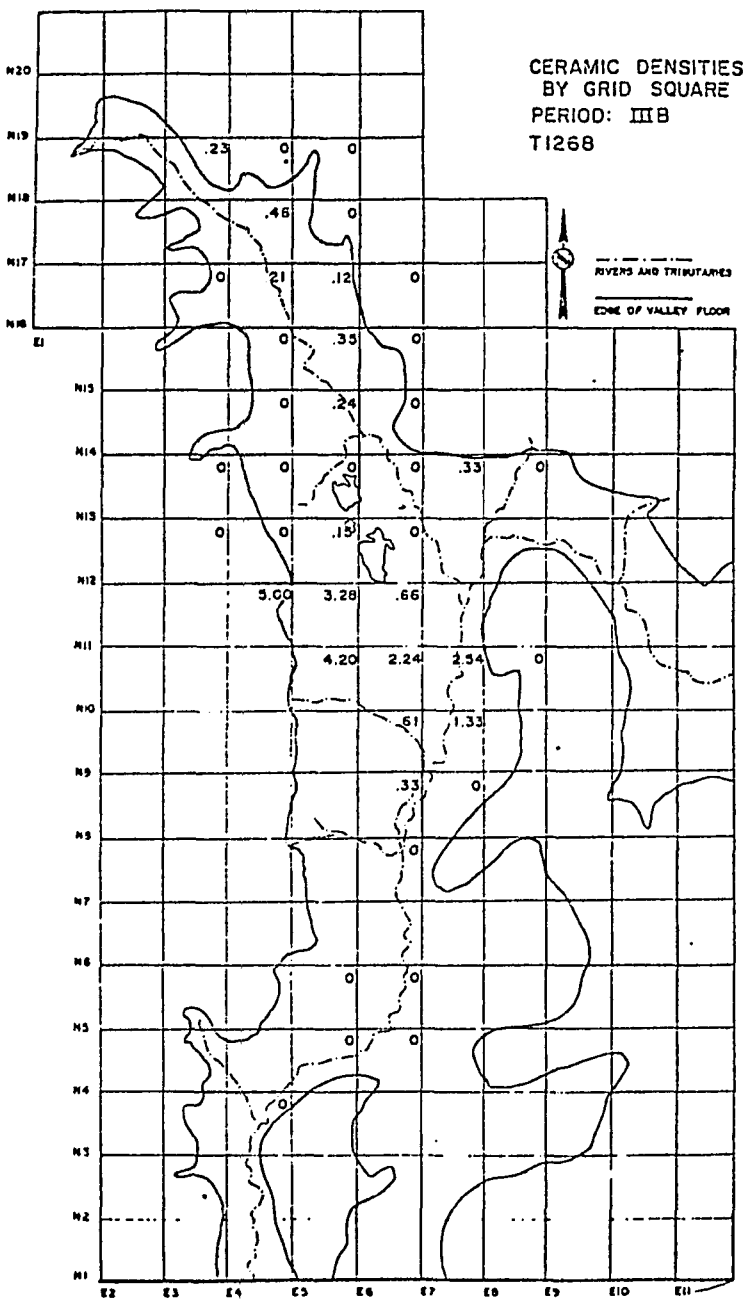

Fig. 26.--Ceramic Densities by Grid Square
Period: IIIB T1268

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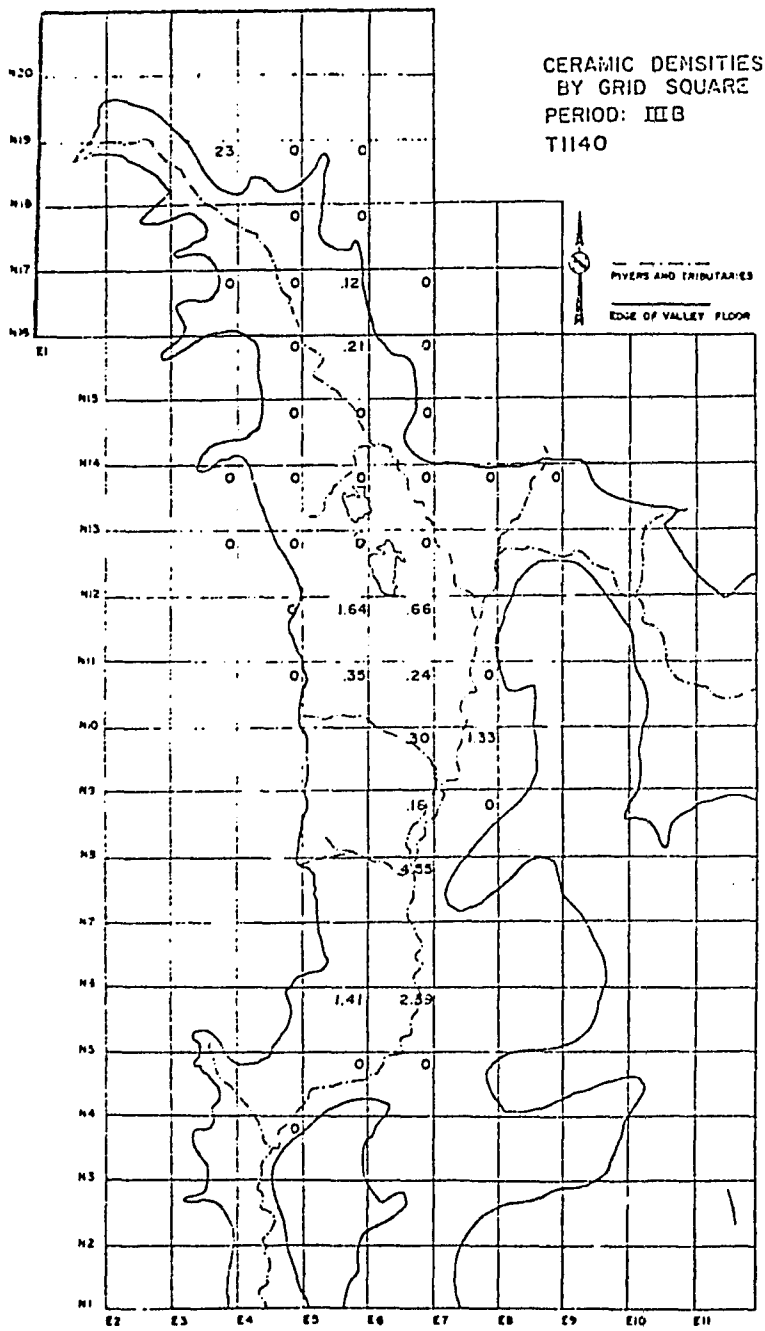

Fig. 27.--Ceramic Densities by Grid Square
Period: IIIB T1140

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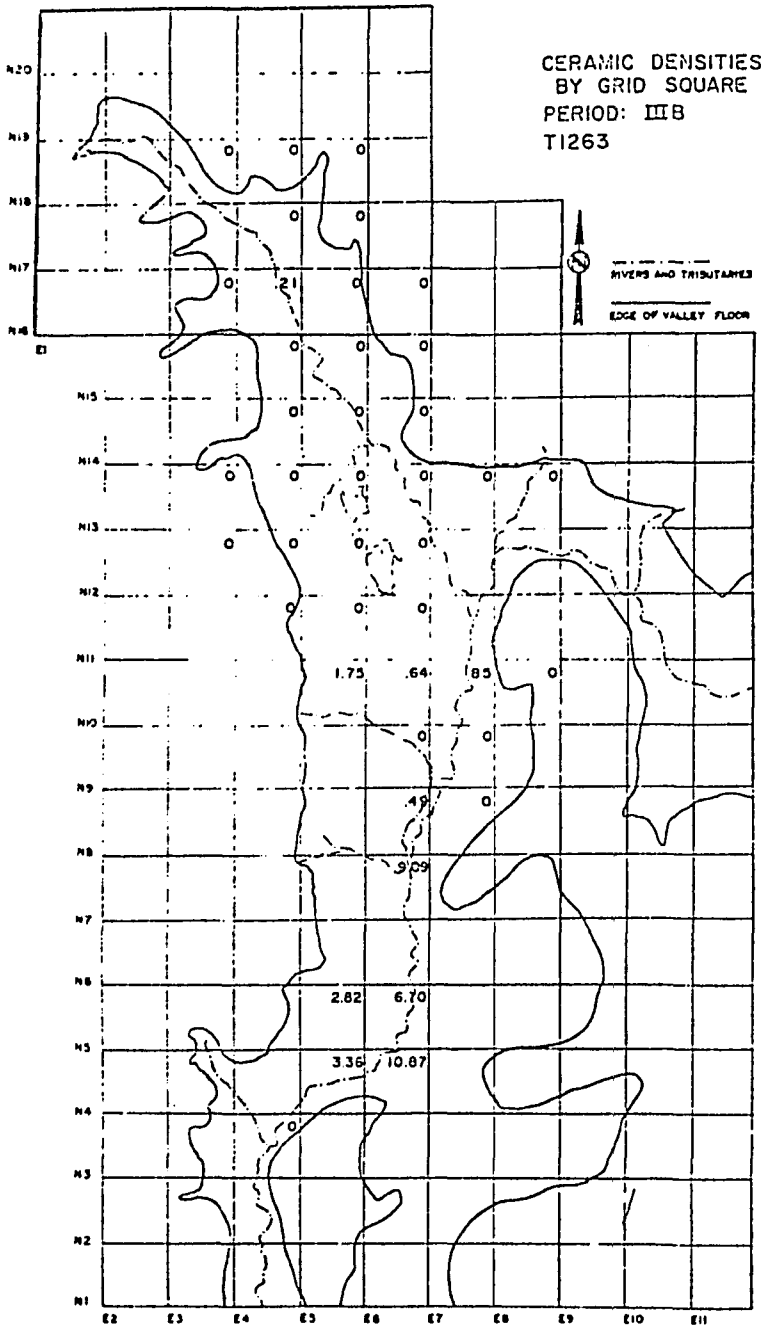

Fig. 28.--Ceramic Densities by Grid Square
Period: IIIB T1263

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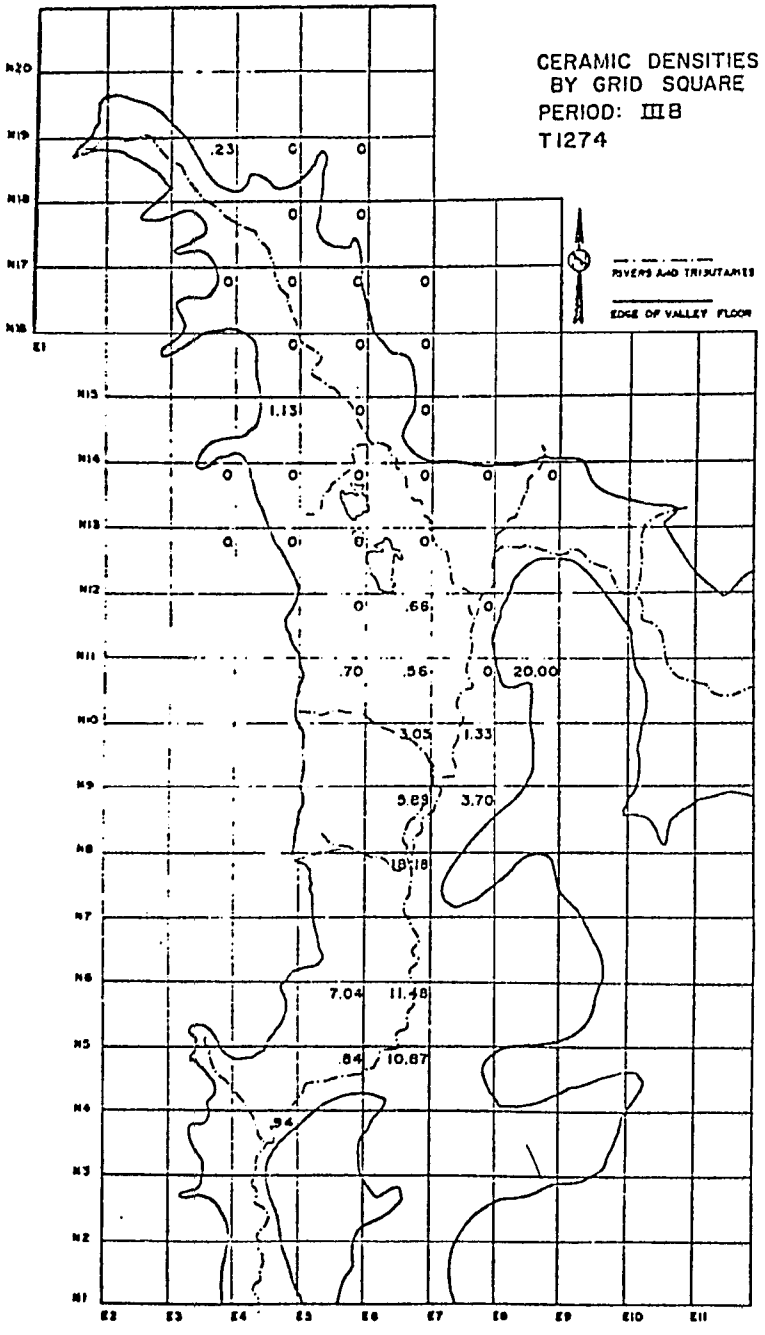

Fig. 29.--Ceramic Densities by Grid Square
Period: IIIB T1274

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T1140, T1263, T1274) were collected in high densities from collection area 0706305, which is the sole IIIB collection in grid square 0706 (Figures 27, 28, 29, 30, 31). Consequently, it is suggested that some ceramic production occurred here during the Late Classic period.

Monte Albán IIIB: Additional Comments

Although it is clear that a small percentage of the pottery used in the Valley of Oaxaca during the Late Classic period was made in café ware (i.e., T2083, T2086, T2418), no specific IIIB café pottery production site can yet be identified. Analysis of the ceramic collections from Monte Albán revealed that the dominant Late Classic comal type, in ten of the 15 site subdivisions that were clustered in the southern and central portions of the site, was made in café ware (T2418) (Blanton, 1978:88). Only seven of the comals (T2418) were found in IIIB collections from the rest of the Valley, but all of these seven examples were collected at sites within ten kilometers of Monte Albán. The second relatively common Late Classic café type, a conical cajete (T2086), apparently had a somewhat broader distribution. Yet, 91 out of the 113 examples of this type found in IIIB collections came from either Monte Albán or from sites within ten kilometers of Monte Albán. The largest percentage of both of these types (T2418, T2086) found outside Monte Albán were collected in grid square 1006. Consequently, I

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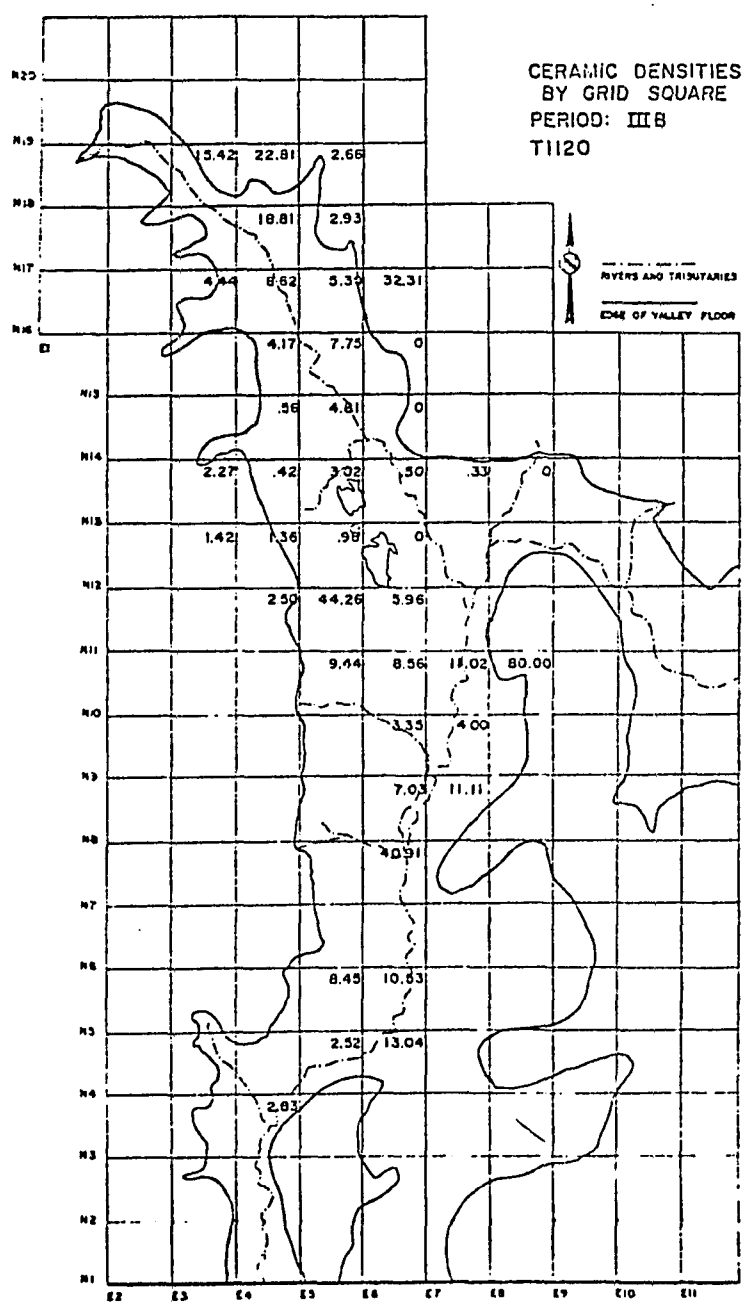

Fig. 30.--Ceramic Densities by Grid Square
Period: IIIB T1120

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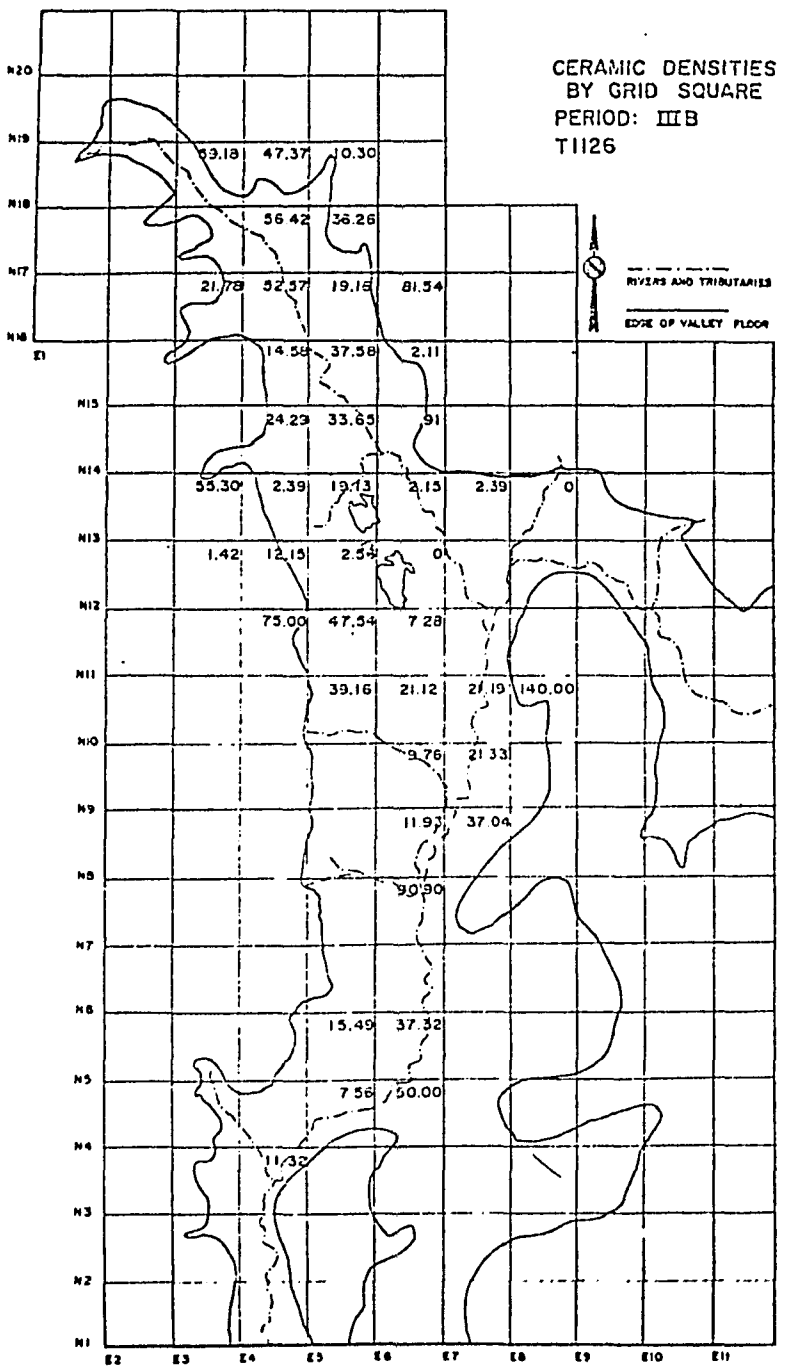

Fig. 31.--Ceramic Densities by Grid Square
Period: IIIB T1126

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would argue that at least some of the Late Classic café pottery was made either at Monte Albán and/or at some location in grid square 1006 (3-9-26?). A more specific identification awaits additional research.

Excavations near Terrace 634 (site subdivision 10) (Blanton, 1978:88; Winter and Payne, 1976) have provided some additional evidence for ceramic manufacturing at Monte Albán. Two small features were discovered and interpreted to have been ceramic kilns (Winter and Payne, 1976). The kilns were dated to Monte Albán IIIB-IV.

The paste of most of the gris pottery collected at the site of Rancho Tejas (3-8-233-239, 241; 3-9-62, 63) was somewhat distinct from the gris pottery collected in other parts of the Valley. A large amount of the gris pottery from the Tejas site had a greenish-gray color which was different from the ordinary gris pottery found at other sites in the Valley of Oaxaca. Based on this observation, it seems quite likely that some gris ceramic production occurred at or near Rancho Tejas during both the Early and Late Classic periods. The specific location, however, remains unknown.

Similarly, it seems likely that some Classic period gris pottery also was manufactured at a location(s) in the northern half of the Etla Arm of the Valley. Classic period gris pottery collected in the Etla Arm, south of the modern town of Etla, was tempered with diorite and was very similar to the gris pottery found at the Classic period occupation

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of Atzompa. The altered diorite temper in this Classic period occupation from Atzompa was probably obtained from a mine just northwest of the modern village of Santa Maria Atzompa (Shepard, 1967:477-478; 1977). Given the similarity in form and temper between the Atzompa pottery and the pottery from the southern half of the Etla Arm, one might postulate, subject to further investigation, that the pottery collected in the southern half of the Etla Arm was produced largely at Atzompa. Most of the Classic gris pottery collected in the northern half of the Etla Arm, however, though formally similar to the pottery from Atzompa, was sand rather than diorite tempered. Consequently one might suggest that at least one unidentified location produced sand-tempered gris pottery in the northern half of the Etla Arm during the Classic period.

F. Ceramic Production Sites: Monte Albán IV

1. 2-10-2, 4 (N12E8): This site (Figure 32) at the western edge of the Tlacolula Arm of the Valley has been described as having surface densities of pottery that range from sparse to heavy (Kowalewski, 1976:489). One gris waster was recovered in collection area 1208302 which is a single component IV collection. In addition, the density of gris bevelled rim bowls (T1268) was relatively high in the IV collections in grid square 1208 (Figure 33).

2. 3-10-2 (N10E5): Surface concentrations of ceramics

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Fig. 32.--Central Places, Large Sites, Estimated District Boundaries and Production Loci, IV

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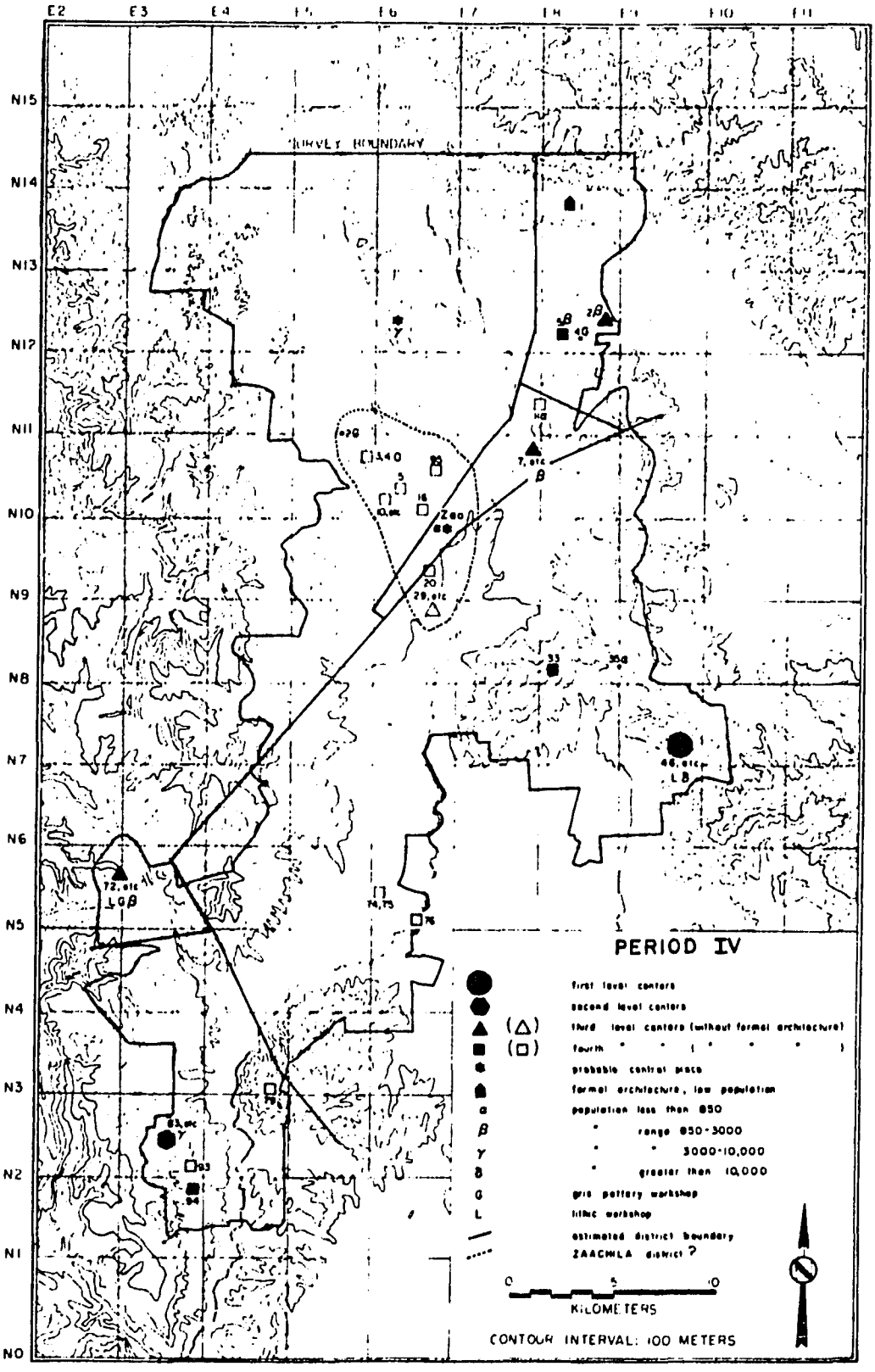

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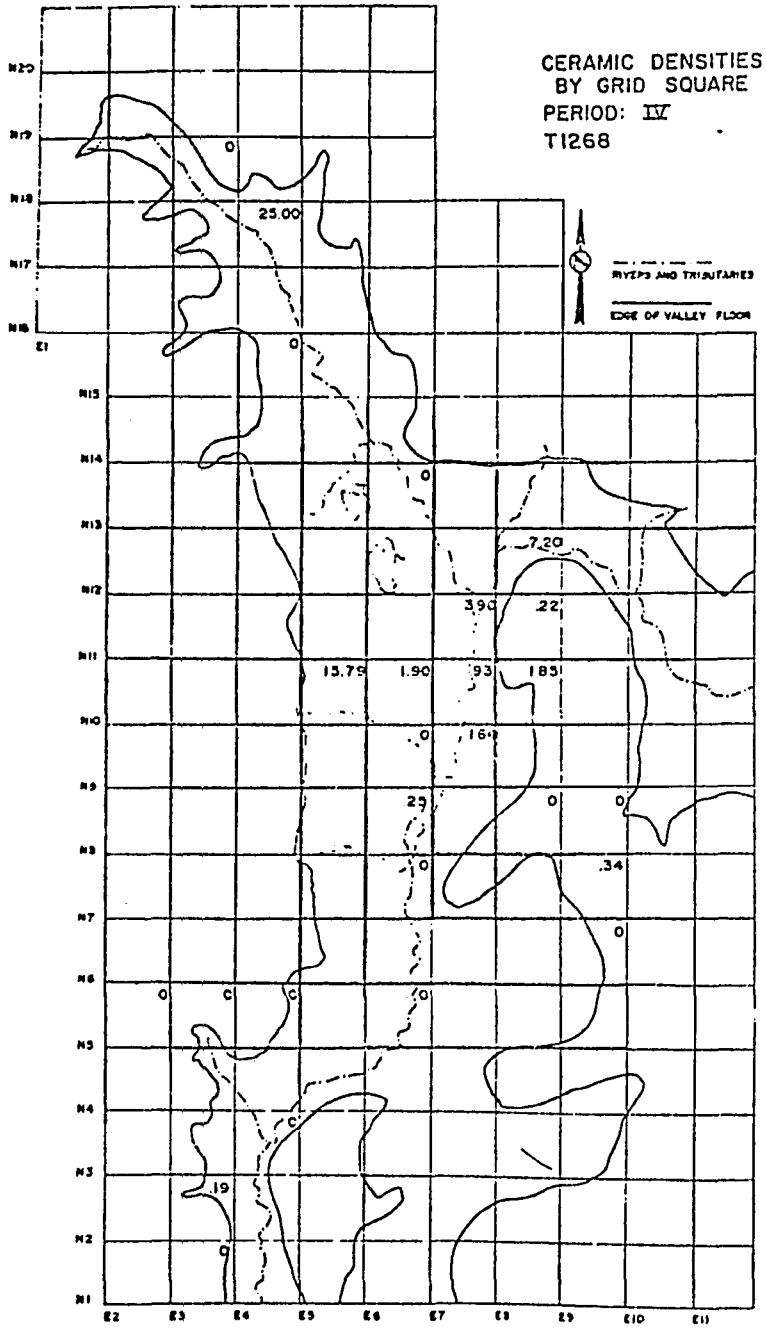

Fig. 33.--Ceramic Densities by Grid Square
Period: IV T1268

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were relatively dense over much of this site. One multi-component collection (1005202) that included a IV component contained a single gris waster which may have dated to the Early Postclassic. Additionally, the densities of most gris types (T1120, T1126, T1268, T1277) that were found in the IV collections within grid square 1005 were quite high relative to the rest of the surveyed area (Figures 33, 34, 35, 36). This suggested that production may have occurred in this area.

3. 3-10-67-72 (N5E2): One undiagnostic gris kiln waster was found in collection area 0502205 at this large hilltop settlement dated to both IIIA and IV. The possibility that this waster dated to IV cannot be dismissed. In addition, one gris type (T1274) was found at a higher density in the period IV collections in 0502 than in any other Valley grid square excluding Monte Albán. Consequently, although the evidence is not overwhelming, phase IV gris production may have occurred at this site.

Monte Albán IV: Additional Comments

The period IV occupation 3-10-6-9, was coded initially as a ceramic production site. Upon further analysis, this identification could not be substantiated. No kiln wasters were found in the collections from the site and the densities of period IV types were not unusually high in the two grid squares (1007 and 1008) which contain this site. The site collections also do not contain unusually large

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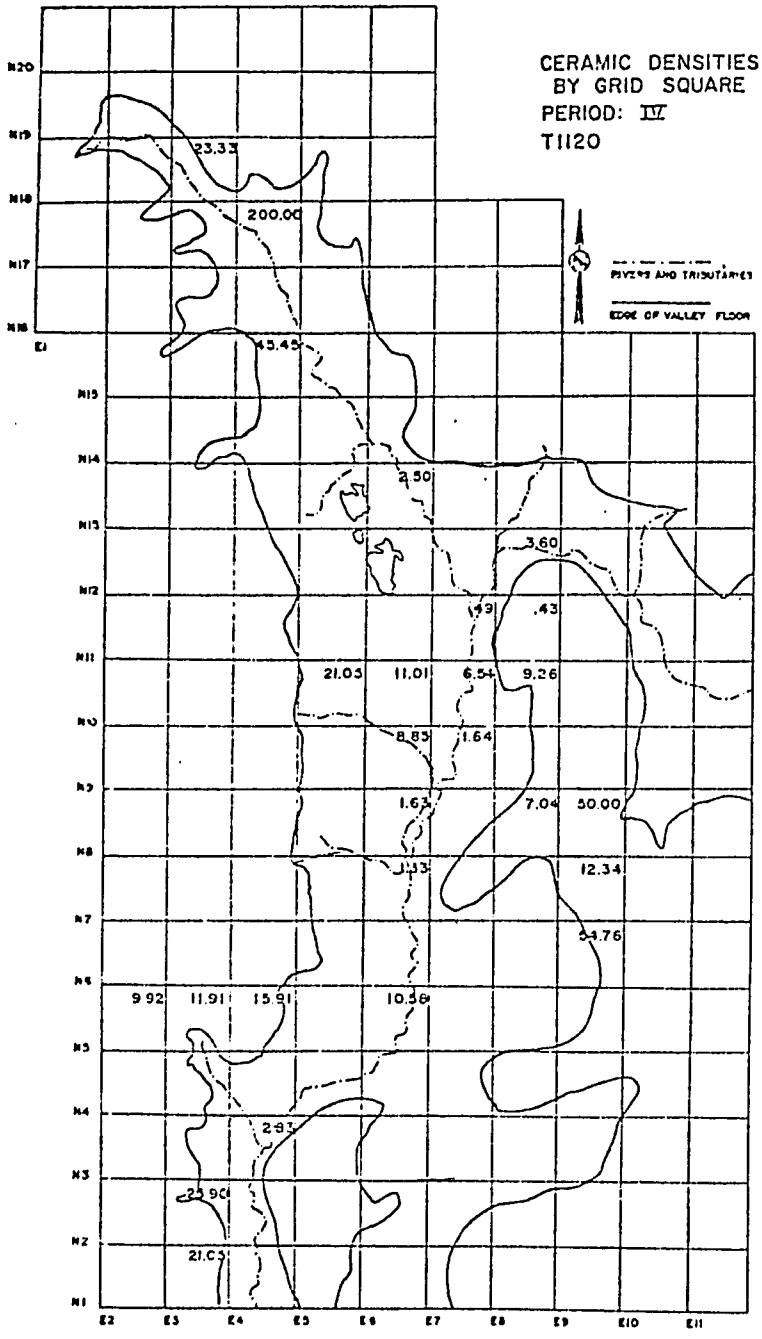

Fig. 34.--Ceramic Densities by Grid Square
Period: IV T1120

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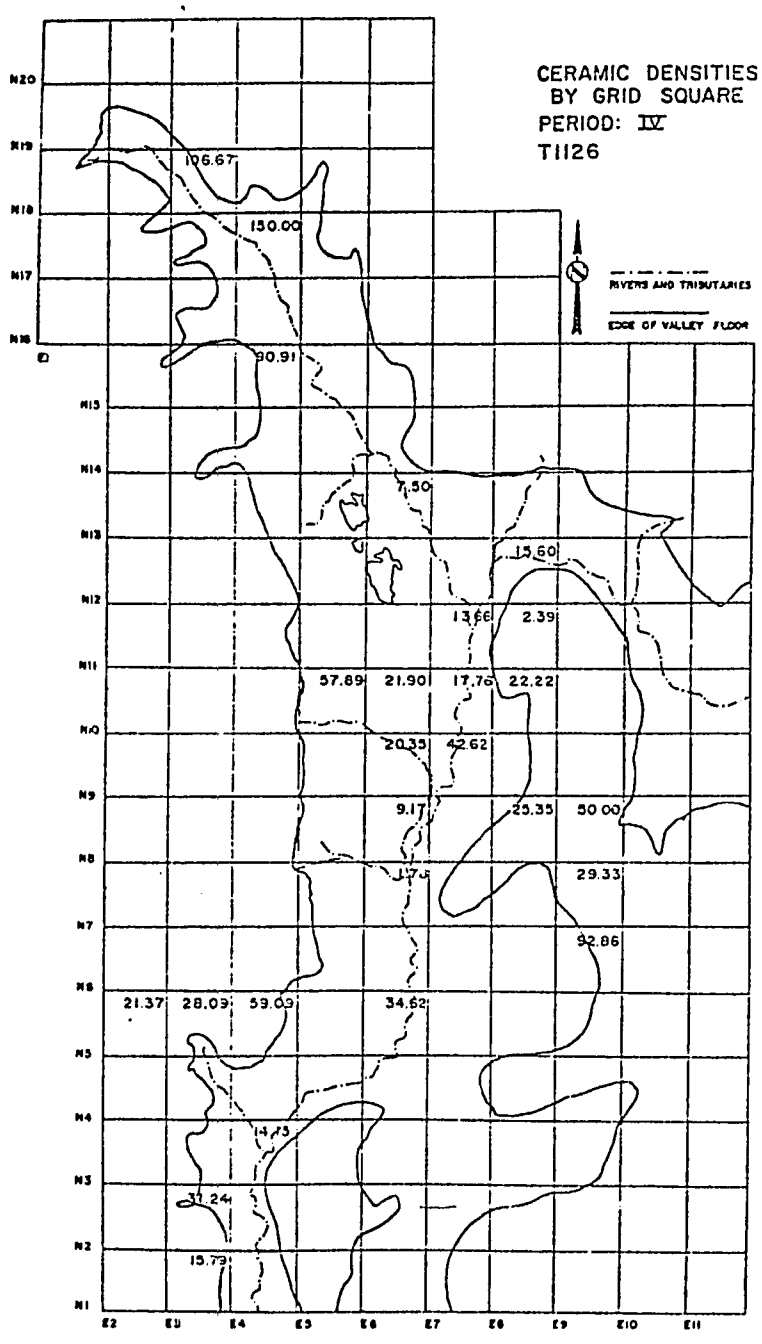

Fig. 35.--Ceramic Densities by Grid Square
Period: IV T1126

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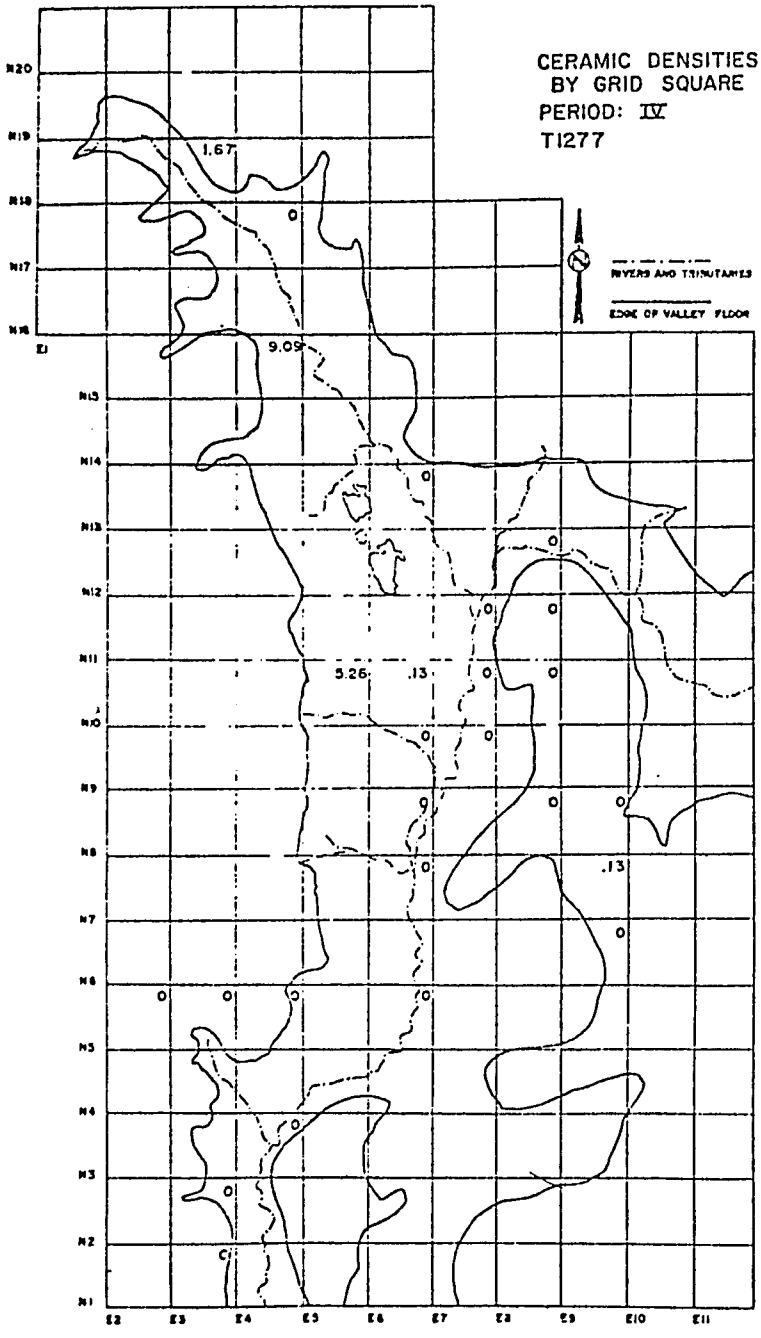

Fig. 36.--Ceramic Densities by Grid Square
Period: IV T1277

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quantities of IV ceramic types.

Lambityeco, a large site in the unsurveyed Tlacolula Arm of the Valley, apparently had a large Early Postclassic period occupation (Monte Albán IV). Clay beds exist in a low-lying area only several hundred meters from mounded architectural construction at the site. This clay deposit was apparently mined in the past (Paddock, Mogor and Lind, 1968; Payne, 1970). In addition, Payne (1970) was able to very accurately duplicate the prehispanic IV ceramics from Lambityeco using clay mined from these deposits. Therefore, it is easy to understand why several scholars have concluded already that this site was a principal locus of IV ceramic manufacturing (Paddock, Motor and Lind, 1968; Payne, 1970; Swasey, 1973).

Although four café ware ceramic types (T2014, T2083, T2086, T2418) have been dated to IV, we have not yet located a ceramic production site for café pottery in IV. One café bowl type (T2086) was found in relatively equal quantities in several grid squares that are rather widely dispersed. This suggested that some café pottery may have been produced at several different IV settlements within the Valley.

Although we did not find any kiln wasters in the period IV collections at 3-10-38 (Jalieza), it is quite possible that IV pottery was produced at or near this site. The pottery in the IV collections from this site was

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somewhat distinctive from the pottery in IV collections found in other parts of the Valley. A fairly large amount of the period IV pottery from 3-10-38 was made of alluvial clay and was tan or light grey-brown. Thus, it was quite distinct from the usual grises that were found in most IV survey collections.

G. Ceramic Production Sites: Monte Albán V

1. 3-11-57-59, 84-88, 117-132 (N10E8, N9E8): This V settlement (Figure 37) includes two areas that seem to have been loci of gris ceramic production. Collection area 1008203 (3-11-57) contained two period V gris wasters. Three additional V kiln wasters were found in collection area 0908401 (3-11-130). One of these latter wasters was a composite silhouette bowl (T1105). Another waster was a hollow support (T1102) while a third was a G3M bowl (Caso, Bernal, and Acosta, 1967:447-56) of indeterminate form. Collection area 0908401 also contained 12 composite silhouette bowls (T1105) and 17 hemispherical G3M bowls with incurved rims (T1104). Another collection at this site, 0908201, included 24 examples of T1104, which was one of the largest quantities of that type found in a single collection area.

2. 3-11-64-69 (N10E6): Collection area 1006302 at this occupation included two period V gris wasters. The collection area also included 11 pieces of polychrome (T5007) pottery which was the second largest quantity of polychrome ware found in any collection excluding the Monte Albán

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Fig. 37.--Central Places, Large Sites, Estimated District Boundaries and Production Loci, V

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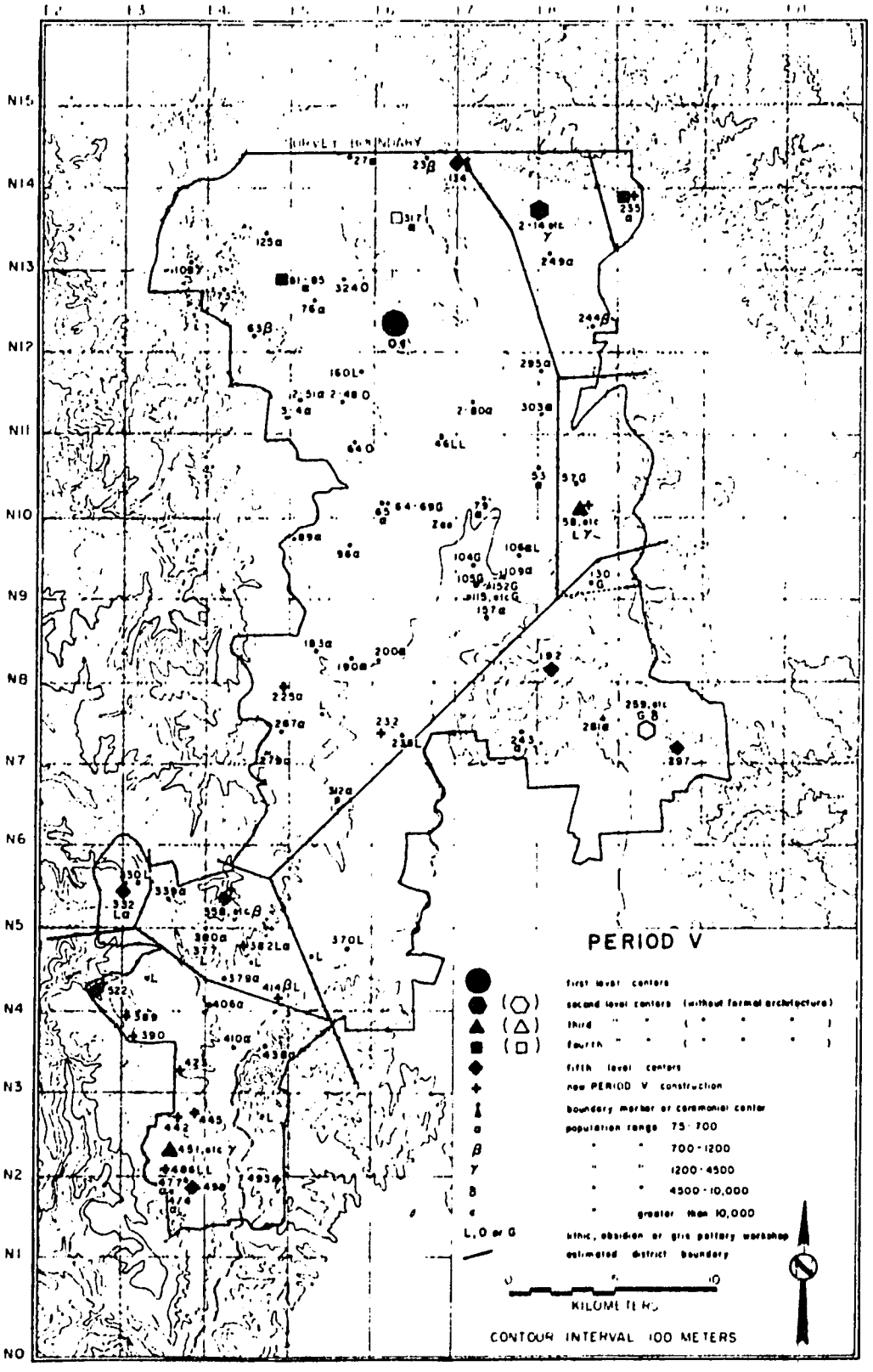

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collections. Since the paste of most of the polychrome pottery picked up during Valley of Oaxaca survey was similar to the paste of local V *grises* (Caso, Bernal, and Acosta, 1967:465), it was hypothesized that at least some of the polychrome pottery found in Oaxaca was locally produced. This notion was supported tentatively by neutron activation analysis of a single Mixteca-Puebla style polychrome sherd (Abascal, Harbottle and Sayre, 1974:93). This analysis showed that the clay used in the manufacturing of the polychrome sherd did not differ markedly in its trace element composition from the clay used in the manufacturing of Oaxacan style vessels found at sites within the Valley (see also Bernal, 1965). It was also postulated that at least some of the Oaxacan polychromes were made in one of three adjacent grid squares (1105, 1106, 1006) in which large quantities of polychrome pottery were found. Based upon the quantity of T5007's recovered in collection area 1005302, it was very tentatively suggested that some of the locally produced polychrome was made at this occupation. Curiously, the distribution of polychrome pottery in the Oaxaca Valley was quite similar to the distribution of the V *gris* pottery. The largest concentrations of both were found at the Valley's center. This similarity in polychrome and *gris* distributions, when considered along with the similarity in their paste compositions, supports the contention that both the V *grises* and polychromes could have been produced at the same

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locations in the Valley. Of course, it is important also to note that some of the polychrome pottery collected during excavations at Monte Albán were found to have fine café paste (Caso, Bernal, and Acosta, 1967:465-475). Polychromes made in this paste very possibly could have been produced outside the Valley.

3. 3-11-104 (N9E7): This small site was only 200 meters from the Rio Atoyac where alluvial clay is available. The surface of the site was covered almost exclusively with period V gray wares. Thirty hemispherical G3M's with incurved rims (T1104) were collected at the site while very few other types were found in the collection (0907302). Several kiln wasters were noted at the site by the survey crew that mapped the occupation and one gris waster was included in the collection.

4. 3-11-105 (N9E7): This site was very similar to 3-11-104, another period V settlement in the same subsquare (09073). This occupation lies just off the Rio Atoyac where alluvial clay is available. Four kiln wasters of period V gris hemispherical bowls were gathered in collection 0907301. Thirty-six hemispherical G3M bowls (T1104) were collected in 0907301, and this represented the largest quantity of this type in any collection excluding those made at Monte Albán. As with 3-11-104, very few ceramic categories other than hemispherical G3M's were either observed on the site surface or included in collection from this occupation. In

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addition, two thick, broken, semi-circular gris objects, plate-like in form, were found at this site. These objects were "warped" so that they could not have laid flat upon a horizontal surface. Interestingly, these objects closely re[illegible]mble the concave molds or moldes which are used in present-day ceramic production at San Bartolo Coyotepec in the Valley of Oaxaca (Foster, 1955:5-6, 1959; Shepard, 1977; Van de Velde and Van de Velde, 1939). The modern Coyotepec potters use these saucer-shaped moldes in forming canteens and jars, and this production technique may have been important prehistorically as well (Foster, 1955).

5. 3-11-115, 154-165, 514 (N9E7): The collection area (9097304) at this settlement in which evidence of period V gris ceramic production was recorded was in the same subsquare as 3-11-104 and 3-11-105. This collection contained three kiln wasters as well as a lump of gray clay that was nine x nine x five cms and fired only on one side. This site also lies only several hundred meters from the Rio Atoyac and a source of alluvial clay. As with 3-11-104 and 3-11-105, the collection that contained the kiln wasters was composed almost exclusively of gris hemispherical G3M bowls (T1104).

6. 3-11-152 (N9E7): This occupation is also quite similar to 3-11-104 and 3-11-105 which are located in the same subsquare. The collection (0907303) from this site contained two gris wasters, one of which was a poorly fired body sherd with a rounded edge. This latter sherd may have been

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used in ceramic production (Bordaz, 1964:105). This collection also contained a flat gris block of indeterminate use. As with the other pottery production sites in this sub-square, both the ground surface of the site and the collection made at the site contained almost exclusively period V gris pottery.

7. 3-11-245, 259, 286, 288, 289, 291, 296 (N7E9): Two collection areas at this occupation contained direct evidence of V gris ceramic production. Collection area 0709310 contained one gris kiln waster. A second ceramic collection, 0709319, also included a V gray ware waster. In addition, this second collection contained two poorly fired composite silhouette bowls (T1105). Large quantities of hemispherical G3M bowls (T1104) were collected in several collections made at the site. In fact, the total number of these bowls in the V collections in grid square 0709 was the largest amount of these bowls found in any grid unit excluding Monte Albán. The density of these hemispherical bowls (T1104) in the V collections in grid square 0709 was also relatively high in relation to the other grid squares in the Central and Valle Grande Survey Areas.

Monte Albán V: Additional Comments

The presence of a kiln waster was noted in the field notes made at 3-11-377. The site consequently was initially coded as a period V ceramic production locus. This waster,

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however, was apparently Classic period in date, and the collection area in which it was found contained no V pottery. The site therefore was deleted from the list of V ceramic production sites.

All of the ceramic production sites that were identified for Monte Albán V were loci of gris ceramic manufacturing. This included the evidence for gris olla manufacturing in the Late Postclassic from a dry cave near Mitla (Christopher Moser: personal communication). No locus of either café or sandy-cream ware production was found. Yet it is suggested that the Late Postclassic sandy-cream (T0423, T0424, T5425) and café (T2221, T2222, T2223, T2224) vessels also were probably manufactured locally in the Valley of Oaxaca.

All of these V sandy-cream and café types were far more abundant in the Valley survey collections than were the known exotic types. Aztec Fine Orange pottery (T5000), for example, did not appear in any of the surface collections that were made outside the limits of Monte Albán, and at Monte Albán only 13 examples of this ware were recovered. In comparison, 106 examples of Huitzo Red-on-Cream (T5425) and 63 examples of Graphite-on-Orange (T2223) were found in the V collections without even including those from the Monte Albán collections. The sandy-cream (T0423) and the café (T2221, T2222) utility jar categories were even more abundant than were the two painted period V types (T5425,

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T2223). In fact, in certain sections of the Valley, the V sandy-cream and café ware utility jar types were significantly more numerous than were the gris jars (T1109). In our collections from the southern half of the Valle Grande Survey Area, and especially in grid squares 0503, 0504, and 0404, the café jars significantly outnumber the gris jars. In the survey collections from the grid squares just west of Monte Albán (i.e., 1303, 1304, 1203, 1205), the number of sandy-cream utility jars was much greater than the number of gris jars. Since these café and sandy-cream ware utility jars were the most numerous period V jar types in certain parts of the Valley, it seems likely that at least in these parts of the Valley these jars would have been an integral part of each household's ceramic assemblage. If this proposition is accepted, it would seem rather unlikely that these types would have been made outside the Valley. The transportation of utilitarian pottery over the mountains into the Valley without mechanized transportation would have been an extremely costly proposition. Also, what we do know about ceramic production in the Valley of Oaxaca suggests that, during every phase between the Tierras Largas and the present, the utilitarian pottery was made locally. There is no obvious reason why this should not have been the case during the Late Postclassic as well. In fact, historical information that we do have about the Postclassic period suggests that relatively little pottery was exchanged over long distances

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(Bordaz, 1964: 271-278).

The two V café bowl types (T2223, T2224) were distributed throughout the Valley in a pattern which closely matched the distribution of period V raked café ollas (T2221). All three of these café types were found to be most numerous in grid square 0503, and to be comparatively abundant in grid unit 0504 as well. If it is accepted that the raked ollas were made locally, it would seem likely that these two other cafe types would also have been manufactured within the Valley (Figures 38, 39, 40). Although a specific location of production for these three types is unknown, one possible site is 3-11-356-359. The largest quantity (12) of raked café ollas (T2221) found in any one collection area came from 0504307 at this site. Two collection areas here (0504301 and 0504307) also contained five café V bowls (T2224), the largest quantity of this vessel type found in any single collection. Finally, with the exception of Monte Albán the greatest quantity (12 examples) of Graphite-on-Orange pottery collected at any one site came from 3-11-356-359.

The mica café ollas (T2222) which were most numerous in grid square 0404 may have been made at 3-11-380, 523 (Figure 41). More than 25% of the total quantity of this type from survey collections was collected at this site. Furthermore, the mica used as a tempering material in the production of this type would have been readily available

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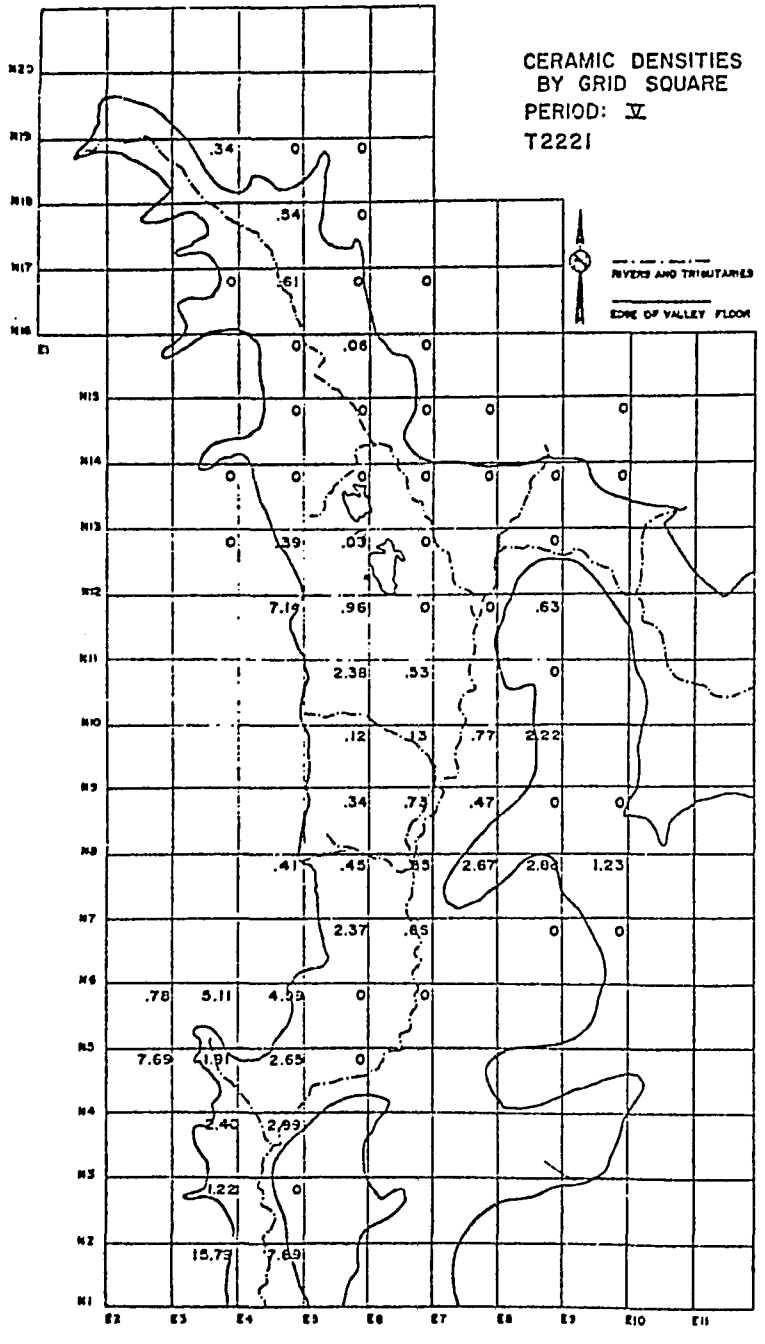

Fig. 38.--Ceramic Densities by Grid Square
Period: V T2221

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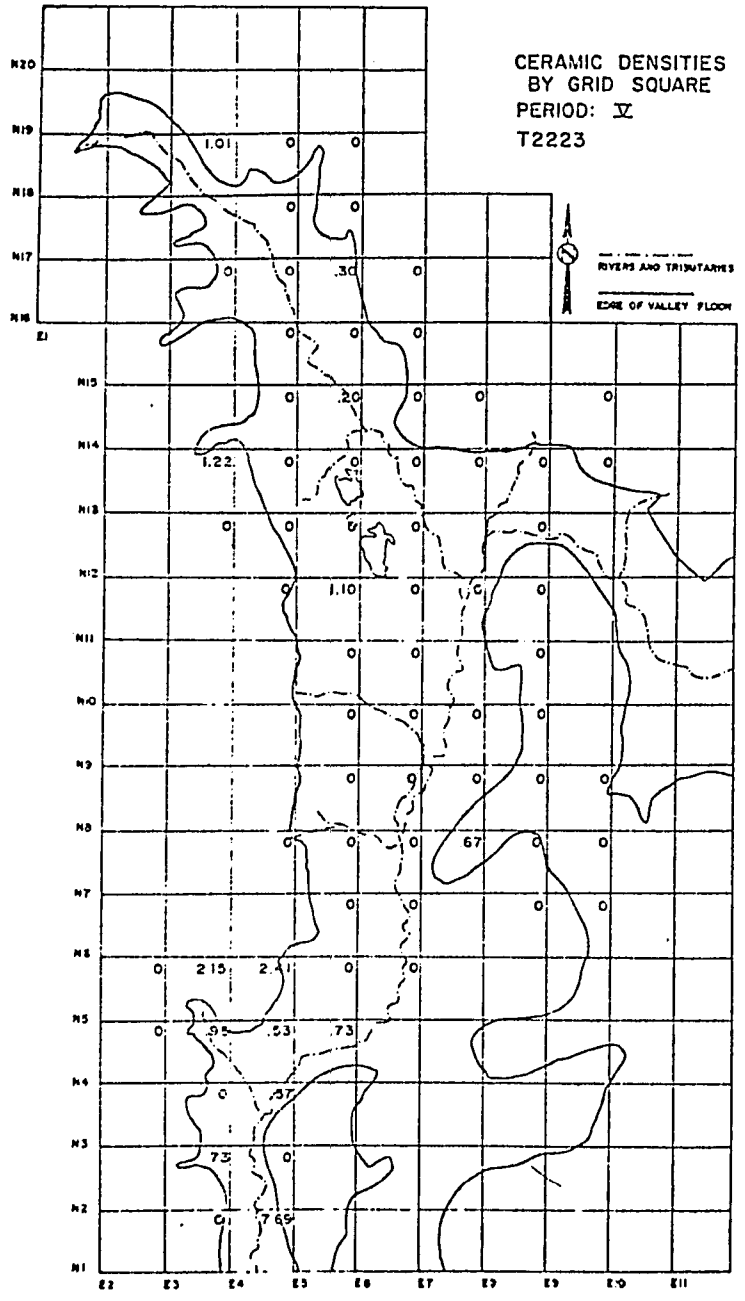

Fig. 39.--Ceramic Densities by Grid Square
Period: V T2223

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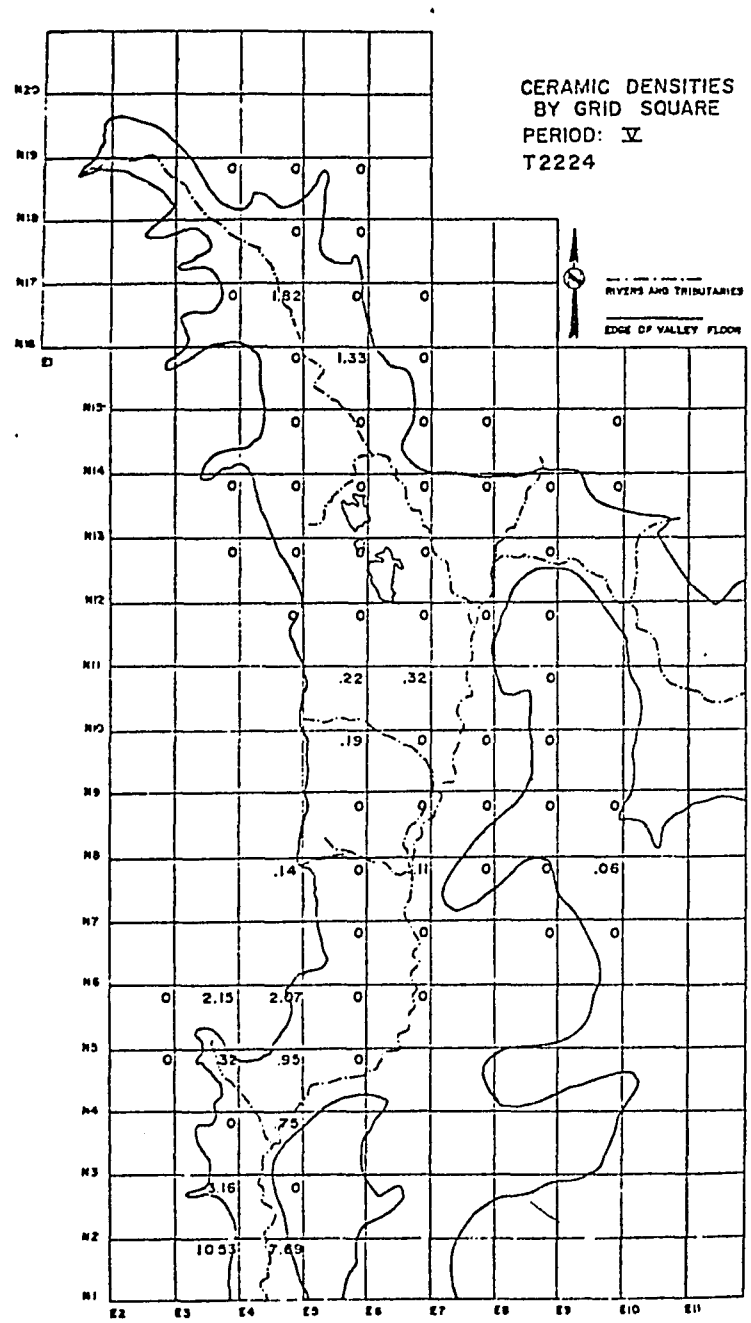

Fig. 40.--Ceramic Densities by Grid Square
Period: V T2224

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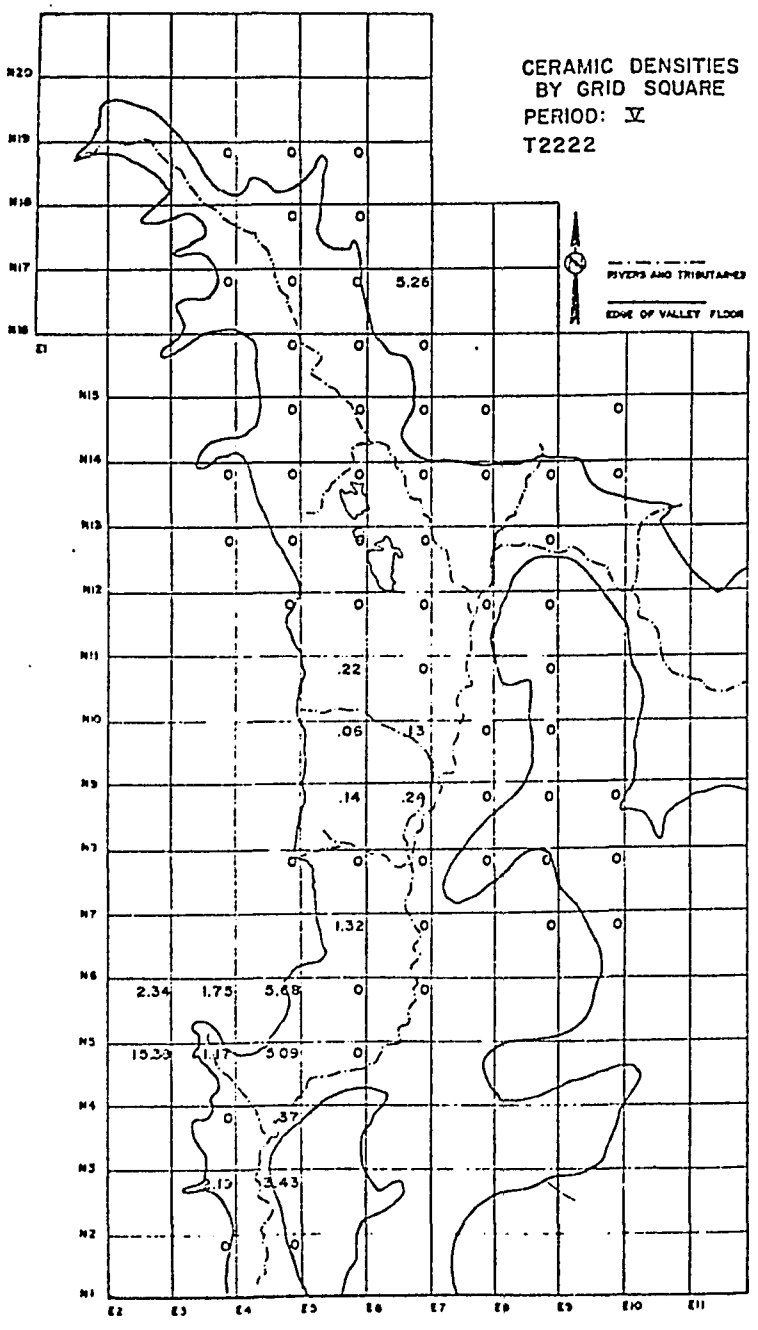

Fig. 41.--Ceramic Densities by Grid Square
Period: V T2222

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from outcrops not too far from this settlement.

The distribution of the sandy-cream ware bowls (T0424) closely resembles that of the sandy-cream ware ollas (T0423) (Figures 42, 43). Both of these types were found to be abundant in adjacent grid units (1303, 1304, 1203, 1204). The sandy-cream ware ollas were the overwhelmingly predominant period V jar type within these four grid units. If one accepts that the sandy-cream ollas were made locally, it would seem likely given the similarity in distributions that the sandy-cream bowls also were made in the Valley. The specific location of sandy-cream plain ware production is unknown. The largest quantities of both of these types were found in the collections from 2-11-1-13, 90-112, 120, yet Kowalewski (personal communication) found no other basis on which to suggest ceramic production at this occupation in the Central Valley Survey Area.

The distribution of Huitzo Red-on-Cream (T5425) in our collections was similar to that of the plain sandy-cream ware ollas (T0423) in that they both occur most frequently in the areas immediately west and north of Monte Albán (Figure 44). Yet Huitzo Red-on-Cream was distributed somewhat more evenly than the plain sandy-cream ware types in the grid squares on the northern third of the Valley. The highest density of this type in our period V collections was found in grid square 1303, which also contained the highest densities of the two sandy-cream

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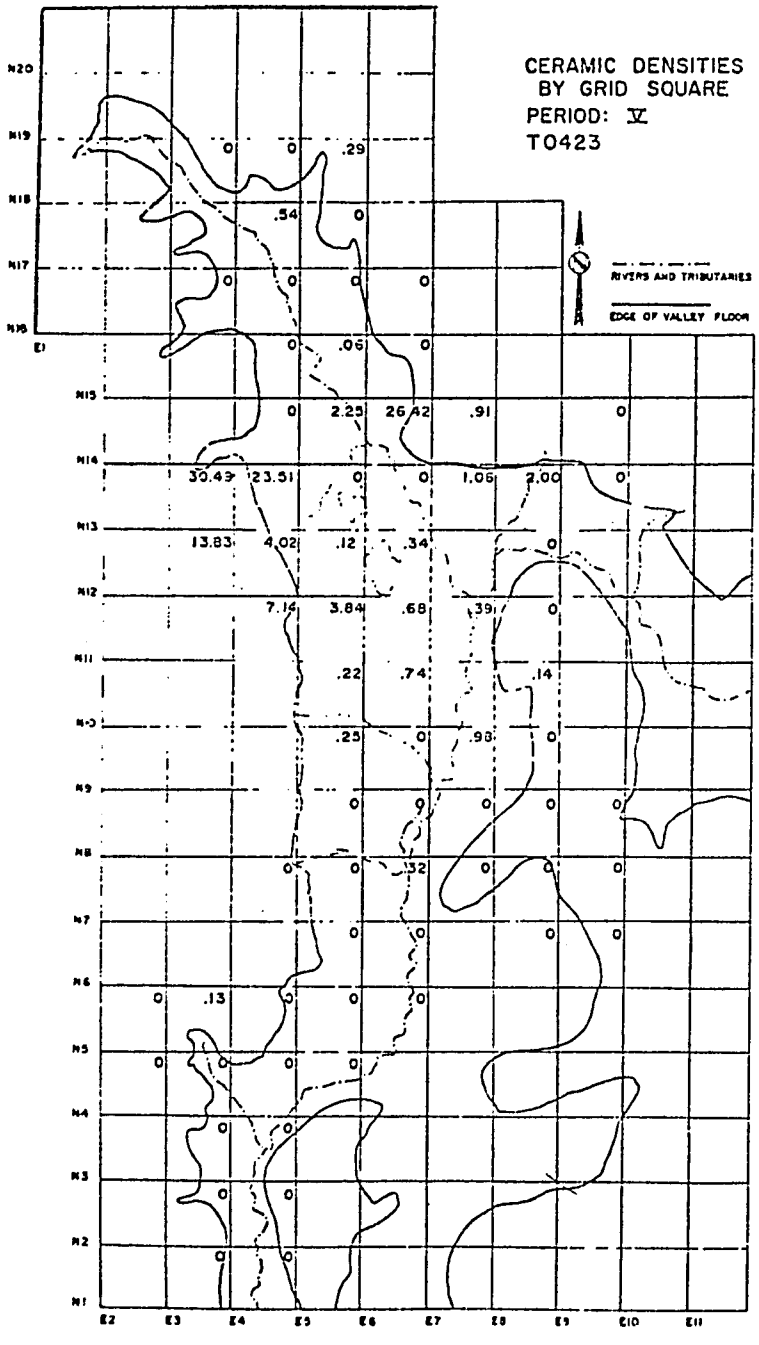

Fig. 42.--Ceramic Densities by Grid Square
Period: V T0423

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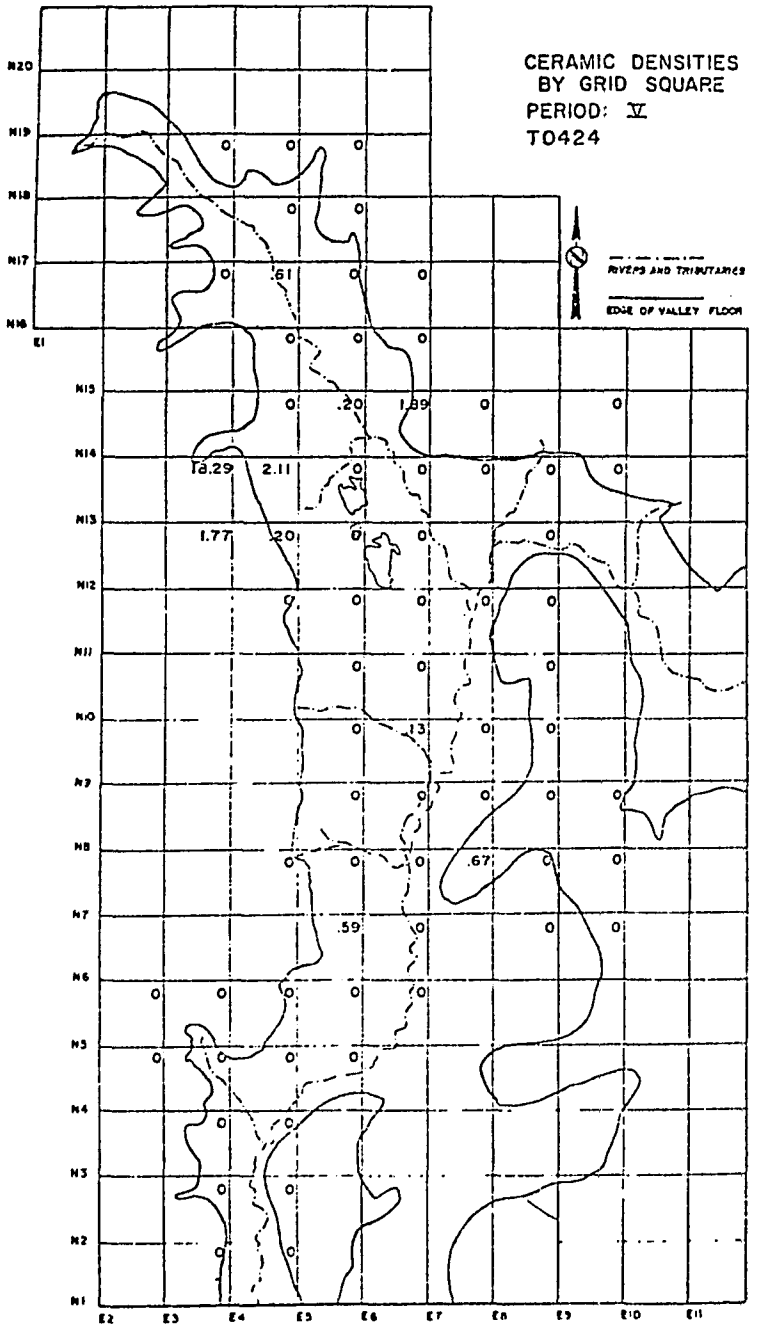

Fig. 43.--Ceramic Densities by Grid Square
Period: V T0424

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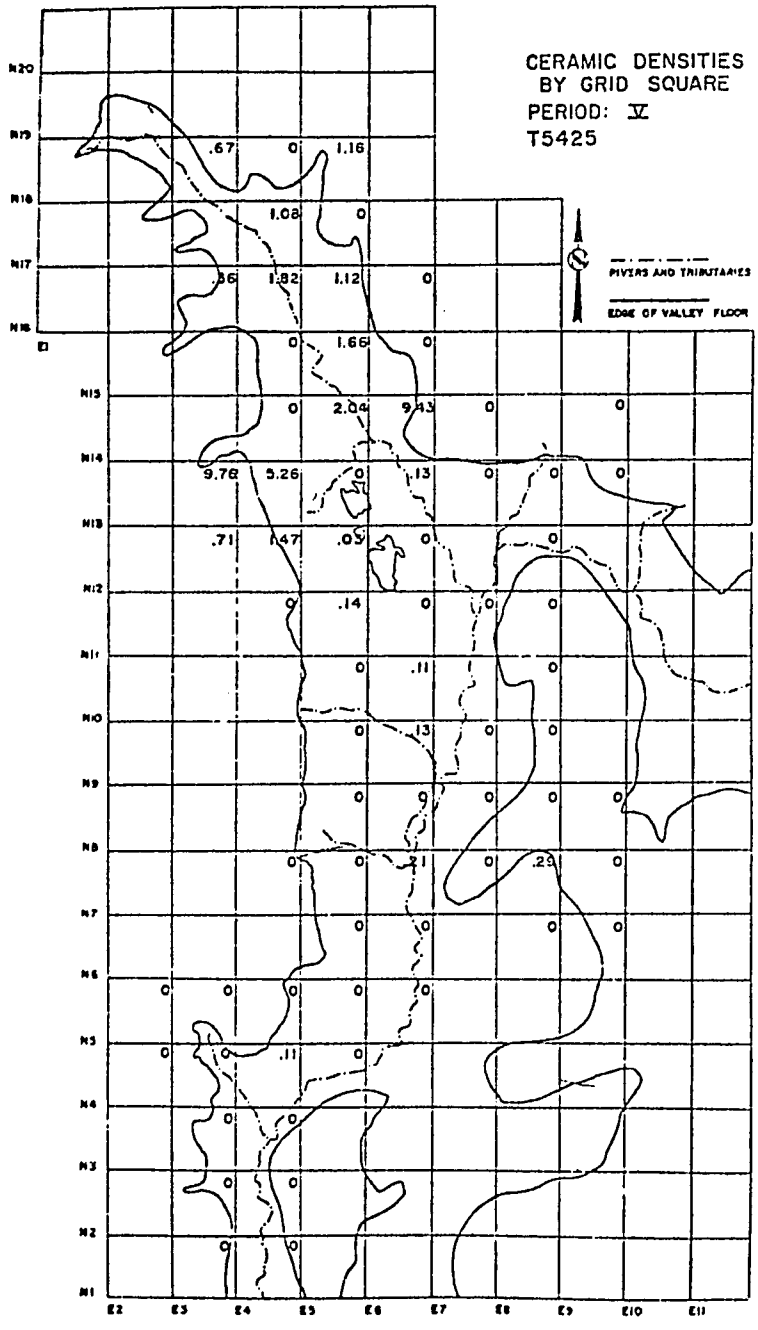

Fig. 44.--Ceramic Densities by Grid Square
Period: V T5425

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utility types. But the largest quantity of Huitzo Red-on-Cream bowls was found in grid square 1505 and only one example of sandy-cream utility ware was collected in that grid unit. Consequently, it remains unclear where the Huitzo Red-on-Cream were made. Although rather similar to the Yanhuitlán Red-on-Creams that Spores (1972:30-33) found in the Nochixtlán Valley, I would suggest that most of our examples of Huitzo Red-on-Cream were made locally within the northern third of the Valley of Oaxaca. The relative abundance of Huitzo Red-on-Cream in our collections and the stylistic differences between the Yanhuitlán and Huitzo Red-on-Creams suggest that the Oaxacan Red-on-Cream was not made in the Mixteca Alta.

III. Summary

In this chapter a series of criteria have been proposed for the identification of ceramic production locations. These criteria were designed to be utilized in the interpretation of data derived from surface surveys and they were employed in the analysis of information collected by the Valley of Oaxaca Settlement Pattern Project. A series of ceramic production sites were thus identified for each of the last seven prehispanic phases in the Oaxaca sequence.

Based on an examination of these locations (Tables 2-8), two observations can be made. First, most ceramic production loci were identified in settlements in which

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TABLE 2

MONTE ALBÁN EARLY I: CERAMIC PRODUCTION LOCI

IN THE CENTRAL AND SOUTHERN AREAS

Site	Ware Produced	Specific Form(s) or Type(s) Produced	Administrative Architecture	Estimated Mean Population
2-5-3	crema	unpainted bowls	no	17
2-5-14	crema		no	17
2-5-33	gris	incised bowls	yes	179
3-5-26, 62	café		no	23
3-5-27	café	plain bowls	yes*	255
3-5-45	café	T2079	no	41

*Note: There was a small amount of mounded architectural construction at this site which was located on a batholith near Zimatlán. Based upon its location in relation to other contemporary centers, the nature of the site's mounded construction, and the considerable surface evidence for specialized ceramic and lithic working, the settlement was hypothesized (Blanton, et al., MS) to have been a market center and not an important settlement in the administrative hierarchy of the region.

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TABLE 3

MONTE ALBÁN LATE I: CERAMIC PRODUCTION LOCI

IN THE CENTRAL AND SOUTHERN AREAS

Site	Ware Produced	Specific Form(s) or Type(s) Produced	Administrative Architecture	Estimated Mean Population
2-6-136-139	gris	T1207	yes	658
3-6-33	café	T2009	yes	64
3-6-51	gris	T1207, T1297	yes	605
3-6-80	café	T2013A, T2013B	no	7
3-6-83	café	plain bowls	yes*	256

*Note: There was a small amount of mounded architectural construction at this site which was located on a batholith near Zimatlán. Based upon its location in relation to other contemporary centers, the nature of the site's mounded construction and the considerable surface evidence for specialized ceramic and lithic working, the settlement was hypothesized (Blanton, et al., MS) to have been a market center and not an important settlement in the administrative hierarchy of the region.

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TABLE 4

MONTE ALBÁN II: CERAMIC PRODUCTION LOCI

IN THE CENTRAL AND SOUTHERN AREAS

Site	Ware Produced	Specific Form(s) or Type(s) Produced	Administrative Architecture	Estimated Mean Population
3-7-1-5,7	gris, crema	T1419	yes	423
3-7-15, 16	café	T2013A	yes	105
3-7-29,30,37	gris	T1194, T1207	yes	83
3-7-1	amarillo	T3408	yes	121
3-7-55,56	café	unpainted ollas and bowls	no	29

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TABLE 5

MONTE ALBÁN IIIA: CERAMIC PRODUCTION LOCI

IN THE CENTRAL AND SOUTHERN AREAS

Site	Ware Produced	Specific Form(s) or Type(s) Produced	Administrative Architecture	Estimated Mean Population
2-8-23	gris amarillo	T1264 T1268 T3410	yes	47
3-8-2-6	gris	T1126 T1265 T1268	yes	803
3-8-31-33	café	T2009 T2013A	yes	64
3-8-41	gris	T1264	yes	17
3-8-63,64	gris		yes	81
3-8-65	gris	T1126	yes	1,265
3-8-136,150-152	gris	T1264 Urns	yes	12,835
3-8-201	gris	T1126 T1274	yes	42
3-8-177-179	gris	T1120 T1126 T1263 T1274	yes	3,219

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TABLE 6

MONTE ALBÁN IIIB: CERAMIC PRODUCTION LOCI

IN THE CENTRAL AND SOUTHERN AREAS

Site	Ware Produced	Specific Form(s) or Type(s) Produced	Administrative Architecture	Estimated Mean Population
2-9-25	gris	urns, sahumadors	no	385
Monte Albán (Atzompa)	gris	most IIIB grayware types	yes	24,189
3-9-8-18	gris	T1268	yes	839
3-9-25,67	gris	T1120 T1126	yes	59
3-9-58	gris	T1140 T1274 T1263	no	17
3-9-69	gris	T1120 T1126 T1140 T1263 T1274	no	7

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TABLE 7

MONTE ALBÁN IV: CERAMIC PRODUCTION LOCI

IN THE CENTRAL AND SOUTHERN AREAS

Site	Ware Produced	Specific Form(s) or Type(s) Produced	Administrative Architecture	Estimated Mean Population
2-10-2,4	gris	T1268	yes	1,929
3-10-2	gris	T1120 T1126 T1268 T1277	no	17
3-10-67-72	gris	T1274	yes	1,501

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TABLE 8

MONTE ALBÁN V: CERAMIC PRODUCTION LOCI

IN THE CENTRAL AND SOUTHERN AREAS

Site	Ware Produced	Specific Form(s) or Type(s) Produced	Administrative Architecture	Estimated Mean Population
3-11-56-59, 84-88, 117-132	gris	T1102 T1104 T1105	yes	1,939
3-11-64-69	gris polychrome(?)	T5007	no	172
3-11-104	gris	T1104	no	31
3-11-105	gris	T1104	no	25
3-11-115, 154-164, 514	gris	T1104	no	585
3-11-152	gris		no	7
3-11-245, 259, 286, 288, 289, 291-296	gris	T1104 T1105	yes	6,649

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mounded architectural construction was also present. Although this observation alone does not mean that much, it does suggest that the administrators and/or elites who were associated with mounded architectural construction could have easily influenced or controlled the production of ceramics. Only in Early I and V were the majority of identified ceramic production loci not situated in settlements in which mounded architecture was present. A somewhat different organization of ceramic production might then be expected for these two phases as compared to the five others.

The second observation is that the great majority of ceramic making locations were loci of gris manufacturing. This, of course, was to be expected given that gris pottery has been found to be most abundant in both the survey and excavated ceramic collections that have been made at Valley settlements occupied after the foundation of Monte Albán. Yet, the predominance of the gris production loci was even more pronounced than expected. Within the Central, Valle Grande and Monte Albán Survey Areas the combined number of crema and café production places was less than half the total number of gris production loci. Two factors may have combined to account for this abundance of identified gris ceramic production places. First, if it is granted that large scale ceramic manufacturing workshops would be more easily identified from surface remains than would small household scale ceramic production places, it might be

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suggested that the production loci for gris pottery were identified so much more frequently because they tended to be larger scale operations. Although this interpretation cannot yet be tested adequately, it does make sense given the nature of post-Monte Albán Early I gris pottery. During these phases, the major utilitarian pottery vessels, which were for the most part minimally decorated, poorly finished and relatively uniform throughout the Valley, were almost exclusively made in gray ware. Second, since gris pottery was primarily a utility ware, it might be expected that ceramic users would have utilized these vessels even if they were slightly misfired or imperfectly shaped. Thus, gris ceramic vessels with minor imperfections may have been more widely distributed from their loci of production than were the more highly decorated crema or café serving vessels. These latter vessels were more "costly" and may have only been used if they were made properly. Consequently, we would have been more likely to have noted and/or recovered imperfect gris vessels than imperfect crema or café vessels at sites where they had not been made. Thus, our population of gris production places is apt to have been slightly inflated relative to our population of café or crema production loci. However since the mere presence of a single kiln waster or misshapened vessel was not considered sufficient information to classify a site as a ceramic production place, it is unlikely that many sites were identified incorrectly as gris pottery making locations.

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CHAPTER IV

THE RELATIONSHIP BETWEEN REGIONAL ADMINISTRATIVE ORGANIZATION AND CERAMIC PRODUCTION

I. Introduction: Assumptions, Theoretical Framework and Problem Orientation

This chapter will examine the organization of the ceramic production and distribution system in the prehispanic Valley of Oaxaca, Mexico. The research strategy for this investigation is based upon three premises. The initial premise follows directly from the work of Anna O. Shepard (1977:16). She argued that broad regional reconnaissance and not single site excavation was necessary if the organization of ceramic production was to be understood (cf. Johnson, 1977; Skinner, 1964, 1965, 1977a, 1977b; C. Smith, 1975; C. Smith (ed.), 1976). The second tenet is that the organization of ceramic production and distribution within a region is likely to change through time. Therefore, one should not expect this organization at any one point in time (e.g., the present) to approximate the organization in other phases (Charlton, 1976:146). The third premise suggests that although ceramic production industries can be examined as if they had an independent linear trajectory of their own (e.g., Rice, 1979); it is more useful to view changes in ceramic production and distribution within

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the broader context of shifts in the organization of exchange, agricultural production, administration and population (Van der Leeuw, 1976).

The theoretical basis for this research has been derived from studies of regional system organization (Blanton, 1976a; Christaller, 1966; Johnson, 1970; Johnson, 1977; Skinner, 1964, 1965; C. Smith, 1976a, 1976b; Steponaitis, 1978). These studies outline a continuum in the cross-culturally observed pattern of articulation between economic and administrative institutions. At one end of the continuum are regional systems in which there is a considerable degree of overlap between administrative and economic channels of interaction. The administrative hierarchies in these systems often extend a certain degree of control over economic institutions. Competition is therefore limited and consumers as well as small-scale, rural producers have few economic choices (Blanton, 1976a; Johnson, 1970; Kelley, 1976; C. Smith, 1976a:30-31). At the other end of the continuum are regional systems marked by the segregation of administrative and economic networks. In these systems economic transactions and/or market exchanges are relatively autonomous of administrative institutions. Political boundaries therefore tend not to limit or constrain economic choices and consequently competition is more developed in the regional system (Blanton, 1976a:258-261; Skinner, 1976:359).

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Based on this theoretical continuum of regional organization, a set of expectations can be generated about the organization of ceramic production-distribution systems. It is expected that as the extent of administrative control over economic transactions increases, the extent of such control over production, including ceramic production, should also increase. Ceramic manufacturing was one of the principal craft industries in prehispanic Mesoamerica (Durán, 1971:278; Millon, 1976:232). Therefore, the monopolistic control over the production and distribution of these craft products would have provided a potentially rich source of revenue and coercive power for administrative officials (Davies, 1973:137; Soustelle, 1961:68-69).

It is predicted that a high degree of administrative control over ceramic manufacturing influenced the ceramic production industry in several ways:

1) The spatial concentration of ceramic production would have been encouraged in order to take advantage of the economies of scale. A centralized, politically controlled ceramic production industry could have employed the large scale production techniques that small decentralized producers could not have used efficiently.
2) The large scale production loci would have been concentrated in political centers so that the costs of administering these production loci

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could have been minimized.

3) The adoption of specialized, large scale production techniques would have resulted in a more standardized ceramic production process (Balfet, 1965; David and Hennig, 1972:25; Irwin, 1978:300). This relationship has been noted by Irwin (1978:300) who, based on his study of prehistoric pottery production in coastal Papua, has argued that:

> the work of specialists reflects a firm unity leading to standardization of production methods, shapes, sizes and decoration. ... (t)he Mailu Islanders held a pottery-making monopoly in the region and the industry at that time was technologically and stylistically homogeneous.

4) In an area like the Valley of Oaxaca within which pottery clay is readily available throughout the region (S. Plog, 1976), an increase in the spatial concentration of potters would have led to a reduction in the number of different clay types or sources that were being utilized.

5) In an administratively controlled economic system, the reduced amount of competition between craft producers (including potters) (Blanton, 1976a; Johnson, 1970; Skinner,

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> 1964; C. Smith, 1976a:30-31) along with the increased scale of the production process would have resulted in the reduction in the amount of energy expended in the production of each craft item (e.g., pot) (Van der Leeuw, 1976:402). This expectation is based upon several ethnographic studies of contemporary ceramic producers (Fontana, et al.,1962:53; Foster, 1965:52-56) which have implied that potters will decrease the amount of energy that they will expend in the preparation of a single ceramic vessel when the competition between these potters is diminished. Alternatively, increased competition between potters has been shown to result most frequently in the production of a wide variety of ceramic vessels which often require a large expenditure of energy to produce (Birmingham, 1975:381-382; Foster, 1965: 52-56).

This relationship is perhaps best expressed by Foster (1965: 55) who has argued that:

> The negative fashion in which the market may act to maintain traditional forms is through the absence of a competitive situation. That is, where a market is essentially non-competitive, there is no particular stimulus pushing potters to come up with a new or better product.

In summary, it is then expected that when pottery is produced

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in the context of reduced competition and increased concentration, the ceramic complex would be expected to exhibit greater standardization and a comparatively small amount of energy input per vessel.

This analysis is designed specifically to examine the relationship between changes in the nature of regional administrative organization and shifts in the ceramic production-distribution system. In order to assess this relationship both settlement and ceramic distributions from the last seven temporal phases of the prehispanic sequence in the Valley of Oaxaca will be studied. The analysis has been designed to focus on ceramic production as opposed to other craft production industries, for three reasons. 1) Ceramics are comparatively well preserved and can easily be collected during survey in the large quantities necessary for analysis. 2) Ceramics can be dated and therefore certain changes in their production process can be noted and compared through time; lithics, which are also readily available on site surfaces, are more difficult to date securely. 3) Clay beds are present throughout the Valley (S. Plog, 1976:263). Clay can be procured from the river beds as well as from parts of the piedmont zone (Shepard, 1967). Thus for any given time, the size and location of ceramic production loci are most likely functions of the nature of the economic and political organization of the Valley, not the differential distribution of clay resources.

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In this study, four sets of related problems will be addressed. Initially, certain aspects of the settlement pattern analysis will be briefly summarized and some additional insights into the changing patterns of settlement in the Valley will be made using ceramic data. Secondly, additional ceramic analysis will be utilized to construct a preliminary interpretation of the shifting organizational structure of ceramic production in the prehispanic Valley of Oaxaca. The third aspect of this investigation will compare through time the changing administrative organization of the Valley to the recognized shifts in the ceramic production-distribution system. This comparison will permit an evaluation of the hypothesized relationships between these two systemic components. Finally, the research focus will be broadened and the diachronic interrelationship between administrative organization and ceramic production will be interpreted in relation to changes in other components of the prehispanic Oaxacan system. Long-term shifts in long-distance exchange connections, population distributions, and agricultural production strategies will be examined in order to understand better the trajectory of economic and political change in prehispanic Oaxaca.

II. Analytical Framework: Variables, Measures, and Indices

In order to evaluate the long-term interrelationships

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between ceramic production and administrative organization in the Valley of Oaxaca, a series of analytical indices, measurements and relationships was devised and examined to structure the data collected in the settlement pattern study (Blanton, 1978; Kowalewski, 1976; Kowalewski, Spencer and Redmond, 1976; see Appendix II). These analytical procedures were designed to compare the nature of either the regional political organization or the nature of ceramic production-distribution through time. The description of these procedures, including some discussion of their expected pattern of variation, will begin with those procedures utilized to interpret the structure of the Valley political organization through time.

A. Regional Organization

For each of the last seven temporal phases in the Oaxacan sequence, interpretations of Valleywide economic and political organization have been reconstructed (Blanton, et al., in press, MS). Settlement distributions for each phase were interpreted using a set of theories and analytical techniques derived initially from economic geography. This diachronic settlement pattern analysis focused upon:

1) Changes in the spatial distribution of the Valley's population;
2) Changes in the spatial distribution of mounded architecture; and
3) Changes in the spatial relationship between

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population and the potential agricultural productivity of the Valley (Curran, 1978; Kirkby, 1973; Kowalewski, MSa).

The interpretations also considered the analyses of the available epigraphic material (Marcus, 1976; MS) as well as evidence that the position of the Oaxaca Valley in the larger Mesoamerican system changed through time (Appel, 1978; Bernal, 1965; Feinman, 1978; Marcus, 1976, MS; Paddock (ed.), 1966; Elsa Redmond and Charles Spencer, personal communications; Zeitlin, 1978).

Originally, this study (Feinman, 1977) was designed to evaluate the rank-size distributions (Berry, 1961; Haggett, 1966:101-103; Hodder and Orton, 1976:64-73; Zipf, 1949) for each temporal component as the principal means for estimating the relative degree of overlap between economic and administrative networks through time. Following Blanton (1976a) and C. Smith (1976a), it was expected that primate (concave) rank-size distributions would be characteristic of highly administered economic networks. Alternatively, rank-size distributions ranging from linear to convex were expected for those regional systems that were characterized by economic networks and institutions that were relatively disembedded from administrative institutions. However, as Johnson (1977) has pointed out, similar rank-size distributions can be caused by different systemic processes. For example, systemic primacy seems to be

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characteristic of highly administered economic networks (Blanton, 1976a; Johnson, 1977; C. Smith, 1976a). But, primacy also is characteristic of settlement systems in which the largest settlement is more intensively articulated with settlements outside the local system (Johnson, 1977:498; Skinner, 1977a:238; C. Smith, 1976a:31-32; Vapnarsky, 1969:585). Thus, an analysis of rank-size distributions alone will not provide an adequate indicator of the relative degree of administrative control over economic transactions.

The pattern of rank-size distributions also is significantly influenced by the scale at which the analysis is conducted (Johnson, 1977:597). Since the completed survey area of the Valley of Oaxaca Settlement Pattern Project currently does not represent either a viable physiographic or nodal region (Haggett, 1966:242), uncritical reliance upon the rank-size distributions constructed with data from the surveyed area would be a mistake. However, as mentioned previously, this study did examine and give interpretive significance to certain shifts in the relative sizes and distributions of Valley centers through time. In order to better understand the considerable size differential which existed between the largest Valley centers throughout much of the prehispanic period, this analysis also examined the changing role of the Oaxaca Valley in the larger Mesoamerican system. The participation of the Valley in

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inter-regional exchange and tribute networks during certain prehispanic phases (i.e., Monte Albán II) could partially account for the concentration of population and administrative architecture at Monte Albán during these times. Yet, the intense concentration of population and mounded architectural construction at Monte Albán during the Late Classic may be due principally to the agglomeration of much of the Valley's administrative and productive activities at that center. For during the Late Classic period, the Valley was largely isolated from the rest of Mesoamerica (Bernal, 1965:805; Feinman, 1978).

Two ceramic analytic measures were utilized to examine the changes in the relative degree of overlap between administrative and economic institutions. These measures were utilized to evaluate the interpretations derived from the settlement analysis. The initial measure compared the location of ceramic production sites through time. For each phase, the number of such sites in locations with mounded construction was contrasted with the number identified in locations without mounded architecture. The presence of pyramid mounds, in the absence of ceramic wall cones (Johnson, 1973) and other administrative artifacts (Wright, 1977), was taken to be our best evidence of administrative decision-making. In Oaxaca these features have been shown for the most part to have been public or administrative buildings (Acosta, 1965; Flannery and Marcus, 1976). Some of this architectural construction may have also functioned as religious buildings. However, given

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the close isomorphism of ecclesiastical and administrative activities in primitive states, it seems unlikely that this distinction presents a serious problem for the above assumption (cf. Webster, 1976; Blanton, et al., MS).

Another potential problem was the possibility that some mounded architecture functioned as residences of an elite who had access to labor and resources for construction projects, but who had no direct role in regional decision-making. Yet, here I would argue that in primitive states there was very little distinction between the elite class and societal administrators. I would concur with Elman Service's conclusion that:

> All the archaic civilizations, and the ethnographically known primitive states...did have strata: basically there were two, the governors and the governed...The difference was in political and religious power... (1975:32) (cf. Claessen and Skalnik (eds.) 1978; Webster, 1976).

Therefore, it was expected that in those phases in which there was relatively more administrative control over production a larger percentage of the ceramic production loci would be located in those settlements which contained evidence of mounded architectural construction.

The second measure was designed to examine the structure of the ceramic distribution system for each chronological phase. This measure compared the mean number of ceramic types found at administrative sites (sites with evidence of occupied mounded architectural construction)

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with the mean number of ceramic types found at non-administrative sites (Table 9). It was presumed that the number of contemporary types found in the collections from a given site was reflective of the relative access that site had to a variety of ceramic products during that phase. The larger the number of contemporaneous types, the greater the access to ceramic products. We hardly expect a perfect ordering of the number of types per site versus site function or importance, given the somewhat opportunistic nature of our ceramic collections. Individual cases might not mean very much in themselves, but the broad pattern, if we are right in our basic political-economic hypotheses, should hold for each phase, and especially, the cross-phase patterns should conform to our expectations.

The differentials between administrative and non-administrative sites were expected to be greatest during those phases when economic networks were isomorphic with administrative networks. Alternatively, it was predicted that the differences in the mean number of types found at the two classes of sites would be reduced in those phases when the production and distribution of ceramics was relatively segregated from administrative activities. These predictions were based on the expectation that in highly administered economies the flow of goods would closely follow administrative channels and so administrative centers would have had access to a far wider assortment of

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TABLE 9

MEAN NUMBERS OF TYPES/SITE

Phase	Total Number of Types	Mean Number of Types: All Centers Excluding Monte Albán	Mean Number of Types: All Non-administrative Settlements	Mean Number of Types: Non-administrative Sites > 100 people	Mean Number of Types: Non-administrative Sites < 100 people
Early I	85	11.8	5.6	10.2	5.3
Late I	88	16.0	5.8	9.3	5.3
II	53	15.6	7.2	8.0	6.8
IIIA	33	11.8	4.8	11.8	4.3
IIIB	22	6.4	3.5	4.0	3.2
IV	19	7.0[a]	3.6	---	3.6
V	20	7.0[b]	4.8	7.7	4.0

a includes Jalieza

b includes Cuilapan-Monte Albán

goods than would have been available in non-administrative settlements (Skinner, 1977a:23-26; Twitchett, 1966). Whereas, in regional systems in which the political and economic hierarchies were more segregated, one would expect that the flow of goods would follow channels that were in part independent of administrative channels. Thus, the access to economic goods at non-administrative sites would have been relatively greater than it was during those phases when political and economic channels were isomorphic. Consequently, the differential in the number of ceramic types found at administrative versus non-administrative sites would not be expected to have been as great.

B. Ceramic Production-Distribution

The organization of ceramic production-distribution was examined diachronically through an analysis of five indices: 1) the number and size of the identified ceramic production locations; 2) the differential distributions of specific ceramic categories and wares; 3) a preliminary analysis of the production techniques that were used in the construction of specific ceramic vessels (Van der Leeuw, 1976); 4) a contingency table analysis that was designed to examine the relative homogeneity-heterogeneity of each complex's distribution across the survey region; and 5) a mean production step index that was calculated for each ceramic complex.

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It was expected that ceramics would be produced in fewer locations during these periods when production was administratively controlled. It was also hypothesized that when production occurred at fewer sites, ceramic manufacturing would show more evidence of mass production. During those phases when ceramic production was highly centralized, greater homogeneity in the ceramic complex was also expected. That is, fewer clay sources and pigments should have been utilized. In addition, for those phases we expected to find very little variation in the ceramic categories present in different parts of the survey region. At this point it is necessary to mention that the analysis of ceramic distributions and the contingency table analysis, which will be discussed below, included the data from the ceramic collections that were made during the survey of the Etla area. The analyses of the ceramic production locations and of the number of types per site were restricted to the data from Central and Valle Grande Survey Areas. These analyses were limited because the settlement pattern analysis of the Etla area has not been completed. The ceramic distributional analyses which did not consider either settlement size or rank could utilize the data from the Etla area.

Very little needs to be discussed or explained about the first three variables since they are all straightforward. The ceramic distributions were analyzed as sherd densities per hectare of surface collected area. These calculations

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were made for each grid unit in the Central, Valle Grande and Etla Survey Areas. Densities were analyzed in order to account for the differences in the size of the area collected per grid square. Less than one percent (10) of the ceramic collections that were made were not included in these analyses. These ten collections had the lowest total sherd densities (less than two sherds per collected hectare) and so their inclusion in the analysis severely skewed the density calculations for the grid units in which they were located. The last two measures (the contingency table and production step analyses) are less conventional and will be discussed in more depth.

The contingency table analysis was designed to examine the relative homogeneity-heterogeneity of the distribution of each ceramic complex across the survey region. This measure was devised to supplement the distributional analyses of specific ceramic categories and wares. It was expected that certain phases would be characterized by a greater quantity of spatially discrete ceramic distributions across the survey region than were found in other phases. This indeed proved to be the case. Yet, focusing upon only the distributions of a few ceramic categories per phase does not necessarily present a representational picture of changes in ceramic variation across the Valley through time. Thus, this contingency table analysis was devised in order to examine and compare the spatial

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distribution of each entire complex across the survey area (see Tables 10-16).

The rows in these contingency tables were composed of each bowl or jar category that was represented by a minimum of 15 samples in the collections dated to a particular phase. The four columns in the tables represented the four horizontal segments into which the survey area was divided for this analysis. Each cell in the table, therefore, represented the total number of sherds of a given type that were found in the collections dated to a particular phase within one of the four east-west sections of the survey area. The collections from the Monte Albán survey (Blanton, 1978) were not included in this analysis because the collection procedure used there differed slightly from that employed throughout the rest of the survey region.

A phi coefficient (ϕ^2) was used to measure the relative homogeneity of each assemblage's distribution. The phi coefficient was used instead of chi square, because unlike the latter it has been rendered independent of sample size (Thomas, 1976:419). This consideration was important because of the large and variable sizes of the samples examined in the contingency table analyses. The chi square statistics calculated for these contingency tables were significant for all phases and the chi square values were more reflective of the variability in the sample sizes than of the variability in the ceramic distributions.

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TABLE 10

CONTINGENCY TABLE: EARLY I

Observed:

	Ceramic Categories					
Grid Squares	0016	0038	0121	0122	0374	3075
15 - 18	3	13	93	128	61	30
12 - 14	20	1	67	62	47	35
6 - 11	3	1	22	8	14	26
1 - 5	0	0	2	1	1	2
Total	26	15	184	199	123	93

Expected:

	Ceramic Categories					
Grid Squares	0016	0038	0121	0122	0374	0375
15 - 18	10.2	5.9	72.2	78.1	48.3	36.5
12 - 14	6.0	3.5	47.7	46.2	28.5	21.6
6 - 11	7.9	4.5	55.7	60.2	37.2	28.1
1 - 5	1.9	1.1	13.4	14.5	9.0	6.8

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TABLE 10 (continued)

0376	0384	0385	0387	0390	0403	1143	1332
30	38	5	13	6	19	3	4
25	21	9	22	25	12	4	2
12	9	0	13	3	35	14	9
0	1	3	1	2	7	4	2
67	69	17	49	36	73	25	17

0376	0384	0385	0387	0390	0403	1143	1332
26.3	27.1	6.7	19.2	14.1	28.6	9.8	6.7
15.5	16.0	3.9	11.4	8.4	16.9	5.8	3.9
20.3	20.9	5.1	14.8	10.9	22.1	7.6	5.1
4.9	5.0	1.2	3.6	2.6	5.3	1.8	1.2

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TABLE 10 (continued)

1338	1341	1343	1345	1360	1370	1511	1513
3	115	7	6	4	5	9	0
5	26	6	0	0	3	2	4
11	103	19	8	12	11	25	11
1	29	5	2	3	1	2	0
20	273	37	16	19	20	38	15

1338	1341	1343	1345	1360	1370	1511	1513
7.8	107.1	14.5	6.3	7.5	7.8	14.9	5.9
4.6	63.3	8.6	3.7	4.4	4.6	8.8	3.5
6.1	82.6	11.2	4.8	5.7	6.1	11.5	4.5
1.5	19.9	2.7	1.2	1.4	1.5	2.8	1.1

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TABLE 10 (continued)

1517	1518	1519	2052	2079	2085	Total
26	23	3	55	86	7	795
18	37	9	5	3	0	470
22	77	13	30	85	17	613
4	3	2	17	45	8	148
70	140	27	107	219	32	2026

1517	1518	1519	2052	2079	2085
27.5	54.9	10.6	42.0	85.9	12.6
16.2	32.5	6.3	24.8	50.8	7.4
21.2	42.4	8.2	32.4	66.3	9.7
5.1	10.2	2.0	7.8	16.0	2.3

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TABLE 11

CONTINGENCY TABLE: LATE I

Observed:

	Ceramic Categories					
Grid Squares	0016	0038	0057	0121	0122	0374
15 - 18	3	13	39	177	149	98
12 - 14	19	1	20	87	52	56
6 - 11	3	1	46	60	7	44
0 - 5	0	2	8	6	1	3
Total	25	17	113	330	209	201

Expected:

	Ceramic Categories					
Grid Squares	0016	0038	0057	0121	0122	0374
15 - 18	8.4	5.7	37.8	110.3	69.8	67.2
12 - 14	3.4	2.3	15.3	44.7	28.3	27.2
6 - 11	9.9	6.7	44.7	130.5	82.7	79.5
1 - 5	3.4	2.3	15.3	44.5	28.2	27.1

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TABLE 11 (continued)

0375	0376	0380	0384	0385	0390	0403	1141
49	55	6	54	4	6	35	14
46	23	1	33	9	18	17	3
37	34	8	15	0	2	46	11
2	1	0	1	3	2	10	0
134	113	15	103	16	28	108	28

0375	0376	0380	0384	0385	0390	0403	1141
44.8	37.8	5.0	34.4	5.3	9.4	36.1	9.4
18.1	15.3	2.0	13.9	2.2	3.8	14.6	3.8
53.0	44.7	5.9	40.7	6.3	11.1	42.7	11.1
18.1	15.3	2.0	13.9	2.2	3.8	14.6	3.8

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TABLE 11 (continued)

1143	1207	1227	1241	1258	1268	1341	1345
14	430	19	43	47	9	126	11
10	197	19	5	10	5	18	2
37	656	78	47	35	76	93	11
15	235	28	20	18	2	28	7
76	1518	144	115	110	92	265	31

1143	1207	1227	1241	1258	1268	1341	1345
25.4	507.2	48.1	38.4	36.8	30.7	88.5	10.4
10.3	205.5	19.5	15.6	14.9	12.5	35.9	4.2
30.1	600.5	57.0	45.5	43.5	36.4	104.8	12.3
10.3	204.9	19.4	15.5	15.2	12.4	33.8	4.2

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TABLE 11 (continued)

1360	1510	1519	2009	2013A	2013B	2013C	2052
3	8	3	2	98	1	0	96
0	11	14	1	16	0	3	12
11	6	27	103	353	14	34	47
2	3	3	25	169	1	5	22
16	28	47	131	636	16	42	177

1360	1510	1519	2009	2013A	2013B	2013C	2052
5.3	9.4	15.7	43.8	212.5	5.3	14.0	59.1
2.2	3.8	6.4	17.7	86.1	2.2	5.7	24.0
6.3	11.1	18.6	51.8	251.6	6.3	16.6	70.0
2.2	3.8	6.3	17.7	85.8	2.2	5.7	23.9

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TABLE 11 (continued)

2064	2078	2079	2085	3033	Total
4	11	116	10	2	1755
1	0	2	0	0	711
9	4	86	22	15	2078
11	2	50	24	0	709
25	17	254	56	17	5253

2064	2078	2079	2085	3033
8.4	5.7	84.9	18.7	5.7
3.4	2.3	34.3	7.6	2.3
9.9	6.7	100.5	22.2	6.7
3.4	2.3	34.3	7.6	2.3

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TABLE 12

CONTINGENCY TABLE: II

Observed:

	Ceramic Categories					
Grid Squares	0001	0002	0004	0057	0375	0376
15 - 18	38	28	17	51	43	49
12 - 14	7	16	2	29	25	20
6 - 11	36	35	7	61	38	40
0 - 5	13	8	1	9	1	1
Total	94	87	27	150	107	110

Expected:
Expected:

	Ceramic Categories					
Grid Squares	0001	0002	0004	0057	0375	0376
15 - 18	25.9	24.0	7.4	41.3	37.8	29.5
12 - 14	7.7	7.1	2.2	12.2	11.2	8.7
6 - 11	48.5	44.8	13.9	77.3	70.6	55.2
0 - 5	12.0	11.1	3.4	19.1	17.5	13.6

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TABLE 12 (continued)

0380	0403	0407	1141	1143	1194	1207	1227
8	35	7	8	9	42	350	14
1	11	1	2	4	18	97	7
8	63	13	7	36	84	397	59
0	12	4	1	8	15	174	12
17	121	25	18	57	159	1018	92

0380	0403	0407	1141	1143	1194	1207	1227
30.3	4.7	33.3	6.9	5.0	15.7	43.8	280.6
9.0	1.4	9.9	2.0	1.5	4.6	13.0	82,9
56.7	8.8	62.4	12.9	9.3	29.4	82.0	524.7
14.0	2.2	15.4	3.2	2.3	7.3	20.3	129.8

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TABLE 12 (continued)

1241	1258	1268	2009	2013A	2013B	2013C	2052
30	37	4	2	79	1	1	85
3	2	3	0	12	0	1	9
39	24	56	158	307	26	65	47
7	11	0	26	78	2	19	11
79	74	63	186	476	29	86	152

1241	1258	1268	2009	2013A	2013B	2013C	2052
25.4	21.8	20.4	17.7	51.3	131.2	23.7	41.9
7.5	6.4	6.0	5.1	15.2	38.8	7.0	12.4
47.4	40.7	38.1	32.5	95.9	245.4	44.3	78.4
11.7	10.1	9.4	8.0	23.7	60.7	11.0	19.4

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TABLE 12 (continued)

2078	2085	2416	3066	3408	Total
8	12	1	1	4	1025
2	1	0	0	0	303
12	34	17	13	190	1917
2	11	12	2	33	474
24	58	58	16	227	3719

2078	2985	2416	3066	3408
6.6	16.0	8.3	4.4	62.6
2.0	4.7	2.4	1.3	18.5
12.4	29.9	15.5	8.2	117.0
3.1	7.4	3.8	2.0	28.9

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TABLE 13

CONTINGENCY TABLE: IIIA

Observed:

	Ceramic Categories					
Grid Squares	0057	1120	1126	1137	1140	1141
15 - 18	25	61	466	0	1	4
12 - 14	13	10	168	2	0	0
6 - 11	51	550	1993	21	44	31
1 - 5	9	302	775	2	12	1
Total	98	923	3402	25	57	36

Expected:

	Ceramic Categories					
Grid Squares	0057	1120	1126	1137	1140	1141
15 - 18	10.1	94.8	349.4	2.6	5.9	3.7
12 - 14	3.7	34.7	127.9	0.9	2.1	1.4
6 - 11	60.0	565.1	2082.9	15.3	34.9	22.0
1 - 5	24.2	228.4	841.7	6.2	14.1	8.9

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TABLE 13 (continued)

1143	1194	1207	1241	1258	1263	1264	1265
3	17	151	18	25	1	10	11
4	3	86	0	2	0	4	11
46	62	553	42	26	91	302	99
15	12	209	14	15	83	106	20
68	94	999	74	68	175	422	141

Ceramic Categories

1143	1194	1207	1241	1258	1263	1264	1265
7.0	9.7	102.6	7.6	7.0	18.0	43.3	14.5
2.6	3.5	37.6	2.8	2.6	6.6	15.9	5.3
41.6	57.6	611.7	45.3	45.3	107.1	258.4	86.3
16.8	23.3	247.2	18.3	18.3	43.3	104.4	34.9

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TABLE 13 (continued)

1268	1274	1508	2009	2013A	2013B	2013C	2086
2	0	0	2	38	0	0	3
2	0	0	0	2	0	0	0
169	172	30	238	317	21	85	58
3	138	60	61	116	3	30	46
176	310	90	301	473	24	115	107

1268	1274	1508	2009	2013A	2013B	2013C	2086
18.1	31.8	9.2	30.9	48.6	2.5	11.8	11.0
6.6	11.7	3.4	11.3	17.8	0.9	4.3	4.0
107.8	189.8	55.1	184.3	289.6	14.7	70.4	65.5
43.5	76.7	22.3	74.5	117,0	5.9	28.5	26.5

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TABLE 13 (continued)

3410	Total
6	844
2	309
30	5031
1	2033
39	8217

3410
4.0
1.5
23.9
9.6

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TABLE 14

CONTINGENCY TABLE: IIIB

Observed:

	Ceramic Categories						
Grid Squares	1120	1122	1126	1140	1141	1143	1259
15 - 18	382	248	1638	5	18	16	25
12 - 14	142	142	716	0	9	15	4
6 - 11	256	11	639	10	10	9	2
1 - 5	40	0	133	6	1	3	0
Total	820	401	3126	21	38	43	31

Expected:

	Ceramic Categories						
Grid Squares	1120	1122	1126	1140	1141	1143	1259
15 - 18	403.6	197.4	1538.5	10.3	18.7	21.2	15.3
12 - 14	179.7	87.9	685.2	4.6	8.3	9.4	6.8
6 - 11	193.8	94.8	738.5	5.0	9.0	10.2	7.3
1 - 5	42.9	21.0	163.5	1.1	2.0	2.2	1.6

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TABLE 14 (continued)

1263	1268	1274	2086	Total
1	9	1	10	2353
0	11	2	7	1048
19	80	64	30	1130
25	0	36	6	250
45	100	103	53	4781

1263	1268	1274	2086
22.1	49.2	50.7	26.1
9.9	21.9	22.6	11.6
10.6	23.6	24.3	12.5
2.4	5.2	5.4	2.8

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TABLE 15

CONTINGENCY TABLE: IV

Observed:

	Ceramic Categories					
Grid Squares	1120	1126	1143	1263	1268	1274
15 - 18	27	80	0	1	1	0
12 - 14	19	42	1	1	18	0
6 - 11	354	882	14	89	37	56
1 - 5	202	338	3	32	1	46
Total	602	1342	18	123	57	102

Expected:

	Ceramic Categories					
Grid Squares	1120	1126	1143	1263	1368	1274
15 - 18	30.8	68.7	0.9	6.3	2.9	5.2
12 - 14	20.6	46.0	0.6	4.2	2.0	3.5
6 - 11	382.2	560.0	11.4	78.1	36.2	64.8
1 - 5	168.3	375.2	5.0	34.4	15.9	28.5

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TABLE 15 (continued)

1508	2086	Total
0	12	121
0	0	81
35	34	1501
15	24	661
50	70	2364

1508	2086
2.6	3.6
1.7	2.4
31.7	44.4
14.0	19.6

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TABLE 16

CONTINGENCY TABLE: V

Observed:

	Ceramic Categories					
Grid Squares	0423	0424	1102	1104	1105	1106
15 - 18	3	1	33	167	93	23
12 - 14	212	30	35	385	216	96
6 - 11	72	3	162	1018	391	125
1 - 5	1	0	21	270	57	8
Total	288	34	251	1840	757	252

Expected:

	Ceramic Categories					
Grid Squares	0423	0424	1102	1104	1105	1106
15 - 18	35.5	4.2	31.0	227.3	93.5	31.1
12 - 14	68.6	8.1	59.8	438.5	180.4	60.1
6 - 11	138.6	16.3	120.8	885.8	364.4	121.3
1 - 5	45.1	5.3	39.3	288.5	118.7	39.5

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TABLE 16 (continued)

1107	1108	1109	1400	2221	2222	2223	2224
172	4	33	6	4	1	7	4
74	2	72	0	5	0	2	0
62	18	220	83	118	9	9	10
5	2	57	18	120	126	44	56
313	26	382	107	247	136	62	70

Categories

1107	1108	1109	1400	2221	2222	2223	2224
38.7	3.2	47.2	13.2	30.5	16.8	7.7	8.6
74.6	6.2	91.0	25.5	58.9	32.4	14.8	16.7
150.7	12.5	183.9	51.5	118.9	65.5	29.8	33.7
49.1	4.1	59.9	16.8	38.7	21.3	9.7	11.0

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TABLE 16 (continued)

5007	5425	Total
36	37	624
18	57	1204
126	6	2432
6	1	792
186	101	5052

5007	5425
23.0	12.5
44.3	24.1
89.5	48.6
29.2	15.8

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The phi coefficients used in these contingency tables have definite value limits, ranging only between 0 and 3. Consequently, the values for each phase provide a relative measure of the distributional homogeneity-heterogeneity of each complex across the survey area. Relatively high coefficients suggested heterogeneity and the likelihood that discrete ceramic style zones existed within the Valley. Comparatively low coefficient values suggested that the ceramic categories that were dated to certain phases were found in relatively uniform distributions across the survey region.

Two steps were taken in order to mininize the number of expected values in the cells of the contingency tables that were smaller than five (Thomas, 1976:298). First, in each table a sample of 15 sherds was chosen as an arbitrary cut-off point for the inclusion of a specific ceramic category in the analysis. Second, each of the 18 grid squares was not treated as a separate cell in the contingency tables. This would have created major sample size problems and the analysis would have had to have been restricted to only the five or six most abundant ceramic categories for each phase. Rather, the survey region was collapsed into four east-west cross-sections. These four sections were chosen because each represents an area that had its own distinct trajectory of settlement pattern change. In addition, the settlement pattern shifts within each of the blocks was relatively

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homogeneous. The northernmost block (grid units 15-18) represents most of the Etla Arm of the Valley. The second section (12-14) includes the area adjacent to and immediately north of Monte Albán. The third block (06-11) is composed of both the southern half of the Central Valley Survey Area and the northern half of the Valle Grande Survey Region, while the southernmost block (01-05) is made up of the southern half of the Valle Grande area.

The production step measure was designed as a rough index of the amount of work imparted per pot. This measure was calculated for each ceramic category that was identified in the classification of pottery from the surface collections (Caso, Bernal, and Acosta, 1967; Kowalewski, Spencer and Redmond, 1978; Appendix I). The measure was calculated in production steps (Van der Leeuw, 1976) because, given the nature of the ethnographic record, it was impossible to determine the absolute time or energy costs involved in the production of a given pot.

The production step measure was based upon a series of ethnographic studies that described the step-by-step manufacturing process used by potters who worked without the wheel (Chapman, 1970; Fontana, et al., 1962; Foster, 1965; Van de Velde and Van de Velde, 1939). The actual ceramic shaping process was not counted as a production step because all vessels undergo this construction process. Unfortunately, the surface sherd collections did not provide

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enough information to determine systematically the specific shaping process utilized in the production of each ceramic vessel. Intelligent postulations regarding the production processes utilized in the manufacturing of certain Oaxacan vessels are possible (Van der Leeuw, personal communication), but these analyses are not complete enough to allow us to integrate these findings into the production step measure calculations. An eventual expansion of the production step measure is intended and hopefully it will better address the recognized variability in vessel formation (Van der Leeuw, 1976).

Painting, slipping, burnishing, smoothing and incising were all counted as production steps (see Table 17). The placement of clay appliqués (supports, everted rims, handles etc.) onto the basic ceramic vessel body also was included as a production step because these ceramic additions are usually added on after a vessel is formed, shaped, and dried an initial time (Van de Velde and Van de Velde, 1939:32). In addition, a production step was added on for those ceramic vessels that were made with fine paste clays. The production of vessels that contain only small amounts of non-plastic substances seem to require a longer time for both firing and drying (Payne, 1970:3-4; Shepard, 1977:13; Stolmaker, 1976:194).

Once each ceramic category received a production step measure (Table 18), two cumulative production step

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TABLE 17

PRODUCTION STEP MEASURE

Attribute	Point
Appliqués	
Handle	1
Flange	1
Shelf	1
Hollow Support	1
Everted Rim	1
Nubbin Support	1
Paste	
Fine	1
Surface Finish	
Wiped, Scraped, Smoothed, Lightly Burnished	1
Burnished (in addition to points awarded for above)	1-2 (by side)
Decoration	
Incision, Carving, Combing or Pattern Burnished	1-2 (by side)
Complex Incision - usually requiring more than one tool (in addition to points awarded for above)	1-2 (by side
Painting or Slipping (1 color)	1-2 (by side)
Painting: Design (in addition to points awarded for above)	1-2 (by side)
Additional Color (per vessel)	1
Differentially Fired Bands	1

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TABLE 18

PRODUCTION STEP MEASURE FOR EACH CERAMIC CATEGORY

Ceramic Category	Present in Phase(s)	Production Step Measure
0001	II	8.5
0002	II	9.5
0003	II	9.0
0004	II	10.0
0005	II	9.5
0006	Not calculated: ceramic description is not detailed sufficiently	
0008	EI, LI	2.5
0016	EI, LI	5.5
0018	EI, LI	7.0
0021	II	9.0
0022	EI, LI	4.0
0023	II	7.0
0031	EI, LI	3.0
0032	EI, LI	4.0
0038	EI, LI	4.0
0056	EI, LI	3.5
0057	LI, II, IIIA	8.0
0121	EI, LI	2.5
0122	EI, LI	2.5
0123	EI, LI	2.5
0374	EI, LI, II	1.5
0375	EI, LI, II	1.5

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TABLE 18 (continued)

Ceramic Category	Present in Phase(s)	Production Step Measure
0376	EI, LI, II	2.0
0377	Not calculated: ceramic description is not detailed sufficiently	
0378	Not calculated: ceramic description is not detailed sufficiently	
0379	EI, LI, II	2.5
0380	EI, LI, II	6.0
0381	EI, LI	4.0
0382	EI, LI	2.5
0383	EI, LI	4.0
0384	EI, LI	2.5
0385	EI, LI	2.5
0386	Not calculated: ceramic description is not detailed sufficiently	
0387	EI	6.5
0388	Not calculated: ceramic description is not detailed sufficiently	
0389	EI, LI	5.5
0390	EI, LI	4.5
0391	EI, LI	4.0
0393	EI, LI	5.0
0394	EI, LI	4.0
0395	Not calculated: ceramic description is not sufficiently detailed	
0396	EI, LI	5.0

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TABLE 18 (continued)

Ceramic Category	Present in Phase(s)	Production Step Measure
0397	EI, LI	3.75
0398	EI, LI	4.5
0399	EI, LI	4.0
0400	EI	6.0
0401	EI, LI	6.0
0402	EI, LI	7.0
0403	EI, LI, II	5.0
0404	LI, II, IIIA	4.5
0405	II, IIIA	8.0
0406	II	8.0
0407	II	7.0
0423	V	3.5
0424	V	5.0
0561	EI, LI	2.5
0610	Not calculated: ceramic description is not detailed sufficiently	
1102	V	7.0
1103	V	7.5
1104	V	5.0
1105	V	5.0
1106	V	5.0
1107	V	6.0
1108	V	5.0
1109	V	4.5

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TABLE 18 (continued)

Ceramic Category	Present in Phase(s)	Production Step Measure
1111	EI, LI, II	4.0
1120	IIIA, IIIB, IV	2.5
1122	IIIB	2.5
1123	IIIA, IIIB, IV	2.5
1125	IIIB	2.5
1126	IIIA, IIIB, IV	2.25
1137	IIIB, IV	2.5
1138	IIIA, IIIB, IV	2.25
1140	IIIA, IIIB, IV	4.0
1141	EI, LI, II, IIIA, IIIB, IV	1.5
1143	EI, LI, II, IIIA, IIIB, IV	2.5
1144	Not calculated - unknown periodization	
1194	II, IIIA	4.0
1207	LI, II, IIIA	4.0
1227	LI, II	5.0
1241	LI, II, IIIA	5.0
1258	LI, II, IIIA	5.0
1259	IIIB	3.0
1262	EI, LI	4.0
1263	IIIA, IIIB, IV	3.25
1264	IIIA	5.0
1265	IIIA	5.5
1268	LI, II, IIIA, IIIB, IV	2.0

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TABLE 18 (continued)

Ceramic Category	Present in Phase(s)	Production Step Measure
1274	IIIA, IIIB, IV	3.25
1275	Not calculated - unknown periodization	
1277	IIIA, IIIB, IV	1.0
1297	LI	4.0
1312	IIIA	4.0
1319	EI, LI	6.0
1320	Not calculated: ceramic description is not detailed sufficiently	
1330	Not calculated: ceramic description is not detailed sufficiently	
1332	EI	6.0
1338	EI	5.0
1341	EI, LI	4.0
1343	EI	7.0
1345	EI, LI	5.5
1348	EI	6.0
1349	EI	6.5
1358	EI	6.0
1359	EI, LI	4.5
1360	EI, LI	6.0
1366	LI	4.5
1370	EI	5.0
1372	EI, LI	5.5
1373	EI	6.0
1400	V	5.0

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TABLE 18 (continued)

Ceramic Category	Present in Phase(s)	Production Step Measure
1419	II	5.0
1420	II	6.0
1421	IIIA	7.0
1422	IIIB, IV	1.0
1507	II, IIIA	5.0
1508	IIIA, IIIB, IV	2.0
1509	EI, LI	4.5
1510	LI	5.0
1511	EI	4.5
1512	Not calculated: ceramic description is not detailed sufficiently	
1513	EI	5.0
1514	EI, LI	6.0
1515	EI, LI	6.0
1516	EI	4.5
1517	EI	4.83
1518	EI	5.83
1519	EI, LI	5.0
2009	LI, II, IIIA	2.5
2010	EI, LI	5.0
2011	LI, II	1.5
2013	LI, II, IIIA	1.5
2014	IV, V	2.5
2015	Not calculated: Periodization unknown	

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TABLE 18 (continued)

Ceramic Category	Present in Phase(s)	Production Step Measure
2040	LI, II	1.5
2042	LI	6.5
2052	EI, LI, II	3.0
2061	II	5.0
2064	LI	6.0
2065	Not calculated: ceramic description is not detailed sufficiently	
2072	EI, LI	2.5
2073	EI, LI, II	3.0
2076	EI, LI	3.0
2077	EI, LI	4.0
2078	LI, II	3.0
2079	EI, LI	3.0
2080	Not calculated: ceramic description is not detailed sufficiently	
2083	IIIB, IV	1.0
2085	EI, LI, II	3.5
2086	IIIA, IIIB, IV	1.5
2220	Not calculated: ceramic description is not detailed sufficiently	
2221	V	2.5
2222	V	1.5
2223	V	6.0
2224	V	3.0
2411	EI	4.0

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TABLE 18 (continued)

Ceramic Category	Present in Phase(s)	Production Step Measure
2412	EI	5.0
2413	EI, LI, II	5.0
2414	LI, II	4.5
2415	EI, LI	5.5
2416	II	5.0
2417	II	4.0
2418	IIIB, IV	3.5
3030	IIIB, IV	5.5
3033	EI, LI, II	6.5
3035	IIIA	7.0
3066	LI, II	5.5
3408	II	6.0
3409	II	8.0
3410	IIIA	7.0
3411	Not calculated: exotically produced	
5000	Not calculated: exotically produced	
5007	V	10.5
5425	V	8.0

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indices were calculated for each temporal component (Table 19). One index calculated a mean production step measure for all but a few of the ceramic vessel categories that were present in each phase. This index was devised by simply adding the production step measures for each category dated to a particular phase and then dividing this sum by the number of categories present in that phase. Only those few categories that were devised for miscellaneous and unidentifiable sherds were not included in this mean production step index. A second index calculated the mean production step measure for all the categories of ceramic bowls that were present in each phase. This second index was created in order to minimize the role of size and functional variability in the production step measure calculations. The extent of the temporal variation in the production process was best expressed with the latter measure because bowls were the most highly decorated form in the prehispanic Oaxacan ceramic complex. It must be pointed out, however, that all Oaxacan vessels, including bowls, were much more highly decorated in certain phases than in others.

It was expected that the mean production step measures would co-vary inversely with the degree of administrative control over ceramic production-distribution. To recapitulate, it was expected that when administrative control over production was extensive, the ceramics would have been

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TABLE 19

MEAN PRODUCTION STEP MEASURE BY PHASE

Phase	All Types	All Bowls	Rank
Early I	4.39	4.80	3
Late I	4.10	4.54	4
II	5.09	5.56	2
IIIA	3.85	4.11	5
IIIB	2.68	2.90	6
IV	2.45	2.58	7
V	5.14	5.88	1

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mass-produced and relatively little energy would have been expended in the production of each vessel. Alternatively, it was predicted that the mean production step indices would be high for those phases when production was relatively independent from administrative institutions. During these times, a considerable degree of competition was expected between a comparatively large number of decentralized ceramic producers (Foster, 1965:52-55) and thus more work input per vessel was predicted.

The above expectations were based on the assumption that the nature of the variability associated with each ceramic complex was largely the function of changes in the systems of production and exchange. This assumption is somewhat problematical because it implies that the social uses of ceramics were constant through time. In reality, the extent of the ceramic variability as well as the spatial distribution of that variability must have been partially due to the different ways in which ceramics were used to define and signal the identity of different sub-regional populations, social classes, and political groups (Hodder, 1979; Wobst, 1977). Decoration on pottery is easy to see and it could have been effectively used to identify the user as a member in a specific social group. Consequently, in evaluating ceramic variability through time, it will also be necessary to consider these factors as well.

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III. Analysis, Interpretations, and Results

The results of these analyses are presented diachronically. Interpretive emphasis has been placed on a comparison of the observable patterns of change in the set of analytical measures that were described above. The changing relationships between these measures were not all expected to conform to the specified predictions. The organization of a regional system is too complex to expect that it should change in an easily predictable or strictly repeatable fashion (Wallerstein, 1974:3-11). Obviously, each phase was characterized by very important differences in the spatial organization of land utilization, population, craft production, administration and exchange. Yet, certain general regularities have been observed in the relationships between these variables and it is these regularities that are focused upon here.

A. Rosario Phase

Rosario phase political organization and ceramic production were both structured differently than they were in the succeeding prehispanic phases. Therefore, it is important to have some notion of the organization of the Oaxacan population in the Rosario phase so that the magnitude of the changes that occurred during period I can be understood. The large Valley hilltop capital at Monte Albán (Blanton, 1976b; 1978) was not occupied during the Rosario

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phase. San José Mogote was the largest settlement in the region at this time and most of the Valley's known Rosario phase mounded construction was concentrated there (Blanton, et al., in press; Fisch, 1978; Flannery (ed), 1976; Flannery and Marcus, 1976). San José Mogote was located in the Etla Arm of the Valley and was several times larger than any other Valley settlement. Below San José Mogote, a single tier of settlements containing some Rosario phase non-domestic architectural construction was identified (Flannery and Marcus, 1976; Whalen, 1976; Winter, 1976). Several scholars (Drennan, 1976b; Fisch, 1978; Flannery, 1967) have suggested that the population of the Valley was organized into pre-state chiefdom level polities (Earle, 1978; Pebbles and Kus, 1977; Service, 1962; Steponaitis, 1978) during the Rosario phase. Although very little information exists, it also appears that ceramic production was more decentralized in the Early and Middle Formative periods than it was in the later Monte Albán phases. Excavations (Flannery and Winter, 1976) have provided evidence of the specialized production of certain tools and ornaments but not of pottery during the pre-Monte Albán periods. The survey analysis has not identified any ceramic production locus for the prior Tierras Largas, San José or Guadalupe phases. Consequently, ceramic production during these phases is assumed to have occurred at small and dispersed locations.

Two Rosario phase sites in the Central Valley Survey

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Area (Kowalewski, 1976:28-30) and one in the Valle Grande may have been loci of ceramic production, however the evidence for this is not overwhelming. One of the sites (2-4-1) was occupied during several phases, including the Rosario phase. It does seem to have been a locus of ceramic production. But, the dating of the production activities at the site is uncertain at best (Kowalewski, 1976:29, 46). I argued in chapter three that the production activities at the site also date to Early I (2-5-3).

The second possible Rosario phase ceramic production site (2-4-2) was a single component occupation, however Kowalewski (1976:30) was unable to date it securely to either the Rosario phase or to Monte Albán Early I.

> The dating for this site is insecure. The sherds in the collections could be either Rosario or Monte Albán Early I, but because of the lack of diagnostics found frequently at Monte Albán, the site is tentatively dated to the Rosario phase (Kowalewski, 1976:30).

Whatever the dating, cremas were produced at this site which was small and contained no evidence of mounded construction (Kowalewski, 1976:30-31). A Valle Grande production locus (3-4-44) manufactured café ware ceramics, but the ceramics collected suggest that it was probably an Early I and not a Rosario phase manufacturing location.

Three preliminary observations can be drawn regarding ceramic production in the Rosario phase.

1) Only three possible ceramic production locations

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have been identified, and the scale of ceramic production at these sites does not appear to have been as massive as it was at certain later production locations.

2) If village specialization of ceramic manufacturing did occur in the Rosario phase, it occurred at several small settlements, all of which lack evidence of mounded architectural construction.

3) Although the evidence is meager, it seems likely that an initial transition to more specialized strategies of ceramic production did take place during the Rosario phase.

The nature of ceramic complexes of the Early and Middle Formative periods also suggests that pottery was produced in a more decentralized, less standardized manner at this time (S. Plog, 1976:262). Great variability has been noted in the plastic decoration which was applied to this early pottery (Drennan, 1976a; S. Plog, 1976; Pyne, 1976). This variability even made the construction of an adequate typology for surface collected ceramics somewhat difficult. Few problems of this kind were encountered in constructing the ceramic categorization (Kowalewski, Spencer and Redmond, 1978) for any of the Monte Albán phases. Using paste and surface decoration as the principal attributes, it was not difficult to identify a series of easily distinguishable ceramic types in these later phases. The

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ceramics from the Monte Alban phases were, in general, far more standardized. Consequently it appears that whereas the pottery of the Monte Albán phases may have been made in large part by specialized ceramic producers, the pre-Rosario phase pottery may have been made locally at most villages. The great variation and the lack of standardization in the pre-Monte Albán pottery may have been a consequence of the large number of dispersed, decentralized ceramic producers (Van der Leeuw, 1976:400-404). The fact that these producers probably made their pottery only intermittently throughout the year, also probably enhanced the likelihood that the ceramics from each production event would have been quite variable (Balfet, 1965). This, too, then would have lessened the degree of standardization in the Early and Middle Formative period complexes.

Interestingly, as compared to prior phase complexes, the variation in the Rosario phase ceramics did seem to reflect greater standardization. All 1977 field crews noted fewer problems in identifying the Rosario phase pottery types as compared to the ceramics from the earlier phases. Additionally, Drennan (1976a:67-69) has pointed out that the Oaxacan ceramic assemblage underwent a relatively rapid transformation between the end of the Guadalupe phase and the outset of period I. Both of these observations, coupled with the evidence for Rosario phase ceramic production loci, permit me to speculate that the transition from individual

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household ceramic production to a more specialized pottery producing industry may have been initiated in the Rosario phase. However, it also seems clear that by Early I the evidence for this change is much more convincing (Winter, 1974; Feinman, 1979).

B. Monte Albán Early I

The regional political and economic organization of the Oaxaca Valley changed significantly during Early I (Blanton, 1978; Blanton, et al., in press; Flannery, et al., 1967). Monte Albán was founded on a hilltop at the center of the Valley's three arms (Blanton, 1976b, 1978). The site was the largest in the Valley from this initial occupational period. Blanton (1978:34) has suggested a mean Early I population estimate of 5,250 for the site.

In addition to the establishment of Monte Albán, the settlement pattern changed significantly in three other ways.

1) The total population of the combined Monte Albán, Central and Valle Grande regions increased markedly (Figure 45).

2) The proportion of the population residing in the more marginal piedmont zone expanded substantially (Drennan, 1976a:143; Flannery, et al., 1967; Kirkby, 1973. Kowalewski, MSa).

3) The administrative organization of the Valley

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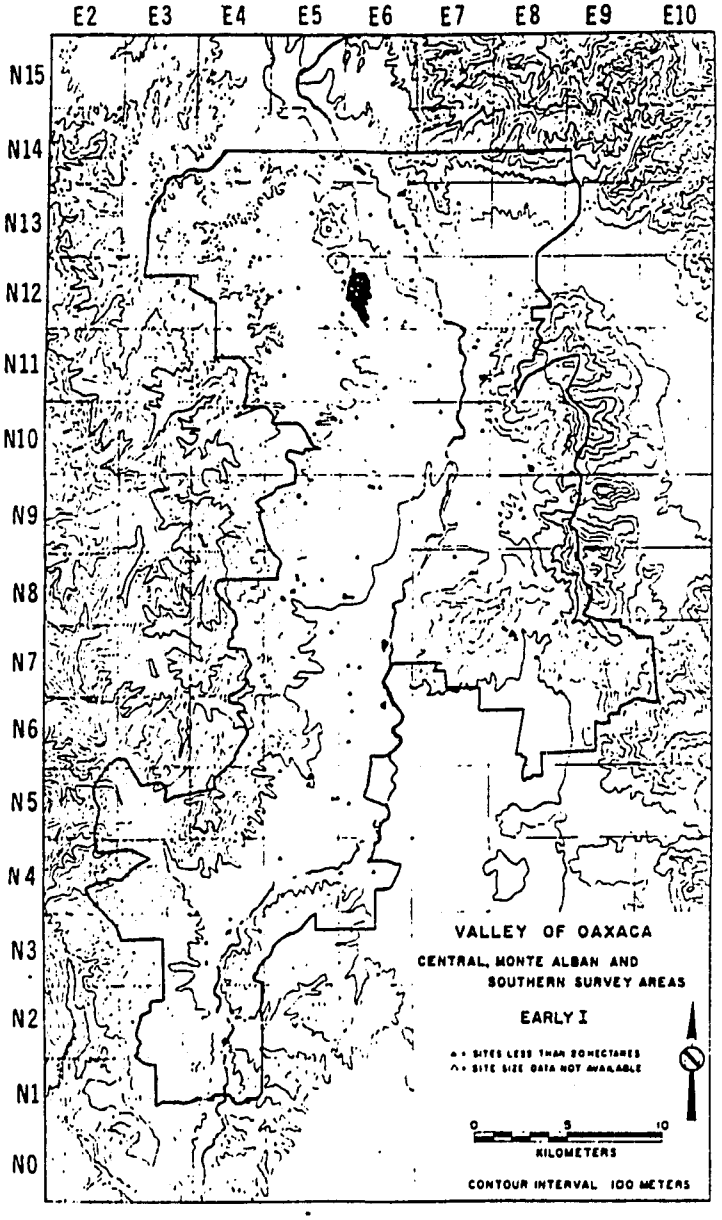

Fig. 45.--Early I Settlement Pattern

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increased in hierarchical complexity. This last change is reflected in the more pronounced differences which arose in both site size and architectural complexity during Early I.

In Early I, important changes also occurred in both the intra-regional exchange system and the organization of ceramic production in the Valley. A study of the Early I ceramic complex and a distributional analysis of that complex across the Valley allow me to examine these changes. Two principal points will be made in this discussion:

1) Specialized village ceramic production increased in importance during Early I.

2) Although the evidence for specialized village ceramic production was greater in Early I than for any of the pre-Monte Albán phases, the Early I system of ceramic production appears to have been less centralized and freer of administrative control than were the ceramic production industries in all the other Monte Albán phases (perhaps excluding Monte Albán V). Since the regional economic and political institutions appear to have been relatively segregated in Early I, the relationship between ceramic production and regional organization seems to conform to the expectations outlined in the initial section of this chapter.

In Early I, the organization of ceramic production

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in the Valley clearly continued to shift in the direction that it had begun to change in the Rosario phase. Six loci of ceramic production were identified in the Central and Valle Grande Survey Areas. An additional location was found in the Etla area (Table 20). Unlike the Rosario phase production loci, the majority of these seven sites were clearly locations where ceramics were produced in quantity during Early I. Several other factors also suggest that ceramic production was more specialized at this time. The very variable plastic decoration which was commonly found on the utilitarian pottery from the pre-Monte Albán phases, was found only on a small proportion of the Early I ceramic utility ware (Drennan, 1976a). This greater standardization is reflected in the fact that the Early I pottery was easier to categorize into discrete ceramic types than was the pottery from the pre-Monte Albán phases.

Each ceramic production location appeared to produce pottery of only one ware. Three sites in the Valle Grande made café vessels. Two settlements in the Central area and one site in Etla produced crema pottery. And the one identified gray ware producing site was in the Central area. The fact that each of these sites only produced ceramics of one ware also suggests that ceramic production was a specialized craft in period I (cf. Winter, 1974:13). For although each production location made pottery of only one ware, the great majority of Early I occupations had surface

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TABLE 20

PRODUCTION LOCATIONS

Phase	Number of Identified Production Locations in Surveyed Region	Additional Locations Identified in Etla Area	Additional Locations Identified in the Tlacolula Arm	Total Number of Identified Ceramic Production Locations	Number Located in Places with Mounded Architectural Construction
Early I	6	1	0	7	3
Late I	5	1	0	6	5
II	5	0	0	5	4
IIIA	9	0	0	9	9
IIIB	6	0	0	6	3
IV	3	0	1	4	3
V	7	0	1	8	2

pottery of at least two and often all three wares. Thus, it appears that the "consumers" of ceramics had access to the pottery from more than one production location. In addition, no evidence of period I ceramic production was found at Monte Albán (Blanton, 1978; Winter, 1974). Thus, it seems that Monte Albán must have imported at least some of its pottery in Early I. This, again, suggests that by Early I at least a portion of the ceramic assemblage was produced by specialists for consumers outside the places of production.

Although in the Valley of Oaxaca, Early I was marked by the development of a more complex socio-political organization, the Valley's political and economic hierarchies appear to have been more segregated than they were in many of the later phases. The Valley was apparently consolidated under Monte Albán as one administrative polity (Blanton, 1976b, 1978; Blanton, et al., MS) at this time, yet the economic organization of the region was still rather dissected. The regional political centrality of Monte Albán seems clear given: 1) the unique positioning of the site on a hilltop at the intersection of the three Valley arms; 2) the large size of the settlement relative to any other Early I occupations; and 3) the exceptional nature of both the period I architecture and carved stone monuments at the site (Blanton, 1976b, 1978; Marcus, 1976).

Economically, the Valley was not consolidated in

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Early I. The Early I ceramic assemblage was heterogeneously distributed throughout the Valley. Unlike most of the later phases, no single category of ceramic vessel was found in collections from most of the grid squares within the Valley. Of the 50 grid squares which had evidence of Early I occupation, the most well dispersed category of bowl (T2052) was only found in 27 squares. In comparison, the Late I G-12 bowl (T1207) was collected from 57 of the 63 squares that were occupied in that later phase (Table 21). Based on his diachronic study of man/land relationships in the Valley, Kowalewski (MSa) has independently supported this argument. He suggested that in Early I (as in Monte Albán II and V), local exchanges within sub-areas of the Valley were probably more important than were broad, Valley-wide movements of goods. The latter exchanges, perhaps manipulated by regional administrators, were necessary in LI, IIIA and IIIB in order to buffer sub-regional periodic man-subsistence resource imbalances. Such imbalances were probably less severe in Early I and most likely were evened out through local exchanges alone.

The relative segregation of political and economic networks in Early I was also suggested by the fact that the differential in the mean number of types per site between administrative and non-administrative places was less in Early I than it was in Late I, II or IIIA (Table 9). This indicated that the access to ceramic goods was not solely

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TABLE 21

DISTRIBUTION OF WELL-DISPERSED VESSEL CATEGORIES

Phase	Number of Occupied Grid Squares in Which Collections Were Made*	Most Well-distributed Bowl Category	Number of Squares Containing Bowl Category	Percentage of Total	Most Well-Distributed Olla Category	Number of Squares Containing Olla Category	Percentage of Total
EI	50	T2052	27	54%	T0121	32	64%
LI	63	T1207	57	90%	T2013A	44	70%
II	56	T1207	51	91%	T2013A	39	70%
IIIA	57	T1126	57	100%	T1120	45	79%
IIIB	42	T1126	40	95%	T1120	38	90%
IV	26	T1126	26	100%	T1120	26	100%
V	71	T1104	66	93%	T1109	56	79%

*In the Valle Grande, Central and Etla Survey Areas

a function of the level of a particular settlement in the administrative hierarchy. In addition, non-administrative settlements with estimated populations larger than 100 had access to almost as many types as were found at administrative centers (Table 9).

As predicted given the structure of the regional organization of the Valley in Early I, ceramic production appears to have been relatively free of administrative control at this time. Of the seven production locations, only three were located in settlements that had mounded architecture (Table 20). The production step (Table 19) and contingency table analyses (Table 22) also suggested that, relative to the other Monte Albán phases (excluding V), the production of Early I ceramics was free of administrative control. The mean production step measures indicated that a relatively large amount of energy was put into the production of the rather costly Early I ceramic complex. Only the pottery from Monte Albán II and V had higher mean production step measures than the Early I complex. While the results of the contingency table analysis suggest that the Early I complex was distributed relatively heterogeneously across the Valley. More specifically, crema ware ceramic vessels were most abundant in the Etla Arm (Table 10; Figures 4-9). Alternatively, café pottery was found somewhat more frequently

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TABLE 22

CONTINGENCY TABLE ANALYSIS BY PHASE

Phase	ϕ^2 Value	Rank
Early I	.419	2
Late I	.308	3
II	.200	6
IIIA	.111	7
IIIB	.222	5
IV	.295	4
V	.533	1

ϕ^2 value ranges from a minimum of zero to a maximum of three.

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in the southern part of the Valley (Table 10; Figure 12). On the other hand, the highly decorated Early I gray ware bowls (T1111, T1332, T1338, T1343, T1345, T1348, T1349, T1358, T1370, T1372, T1509, T1513, T1514, T1515, T1516, T1517, T1518, T1519) (Figure 10) were comparatively underrepresented in the Valle Grande.

Finally, although two of the six crema and café production locations were situated in settlements with mounded architecture neither was found in a settlement at either of the top two levels of the Early I administrative hierarchy (Blanton, et al., MS). The only known Early I gris production locus, however, was found in a large second ranked administrative center located near Monte Albán. Gray ware pottery was the most elaborately decorated segment of the Early I complex. The mean production measure for Early I gris bowls was higher (5.2) than was the mean production step measure for Early I crema (4.6) or café (3.9) bowls. Thus, it is suggested that Early I gris pottery was produced largely for elite consumption. This is supported tentatively by the far wider variety and much greater proportion of Early I grises that were found at Monte Albán relative to other Valley sites (Blanton, 1978; see chapter two). Interestingly, by the next phase, Late I, the gray ware ceramics were less elaborately decorated and more widely distributed. This change appears to have been tied to the increased control and/or influence that the political

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administration had over ceramic production in Late I relative to prior phases.

C. Monte Albań Late I

The transition from Monte Albán Early I to Late I in the Valley of Oaxaca was marked by major increases in the amount of mounded construction and the numbers of people within the region. Monte Albán continued as the Valley's primate center with a population roughly three times the size of its Early I population (17,242) and several times the size of the second largest settlement in the region. Massive amounts of architectural construction also occurred at the site at this time (Caso, Bernal, and Acosta, 1967) and the amount of Late I construction far exceeded the volume of architecture at any contemporaneous community.

During Late I the population of the Valley also increased considerably (Figures 46, 47). The growth, however, was not evenly distributed. The rate of population growth at settlements with administrative architecture was more than twice as rapid as the growth at settlements lacking mounded construction. These differential growth rates can lead to several interesting interpretations if the assumption that the population size of a settlement is roughly proportional to the functional size of that settlement is accepted. Since this assumption has been supported by the work of several anthropologists and geographers (Ackerman, 1978;

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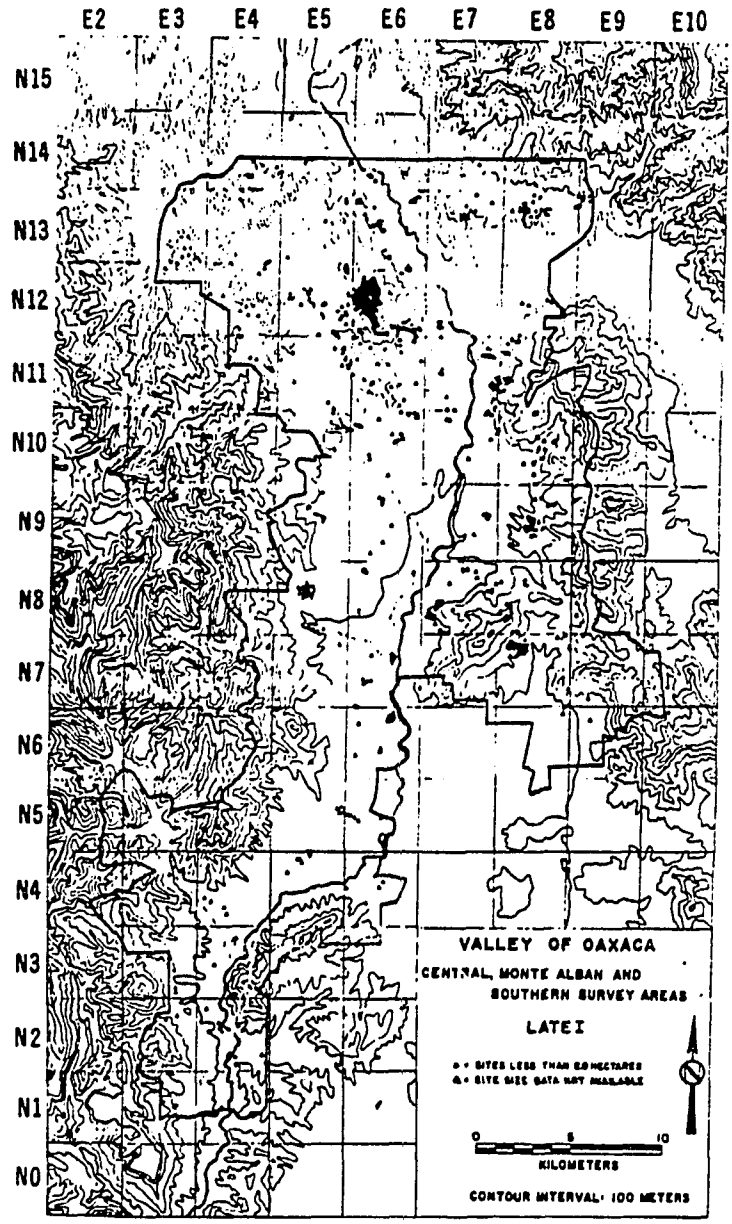

Fig. 46.--Late I Settlement Pattern

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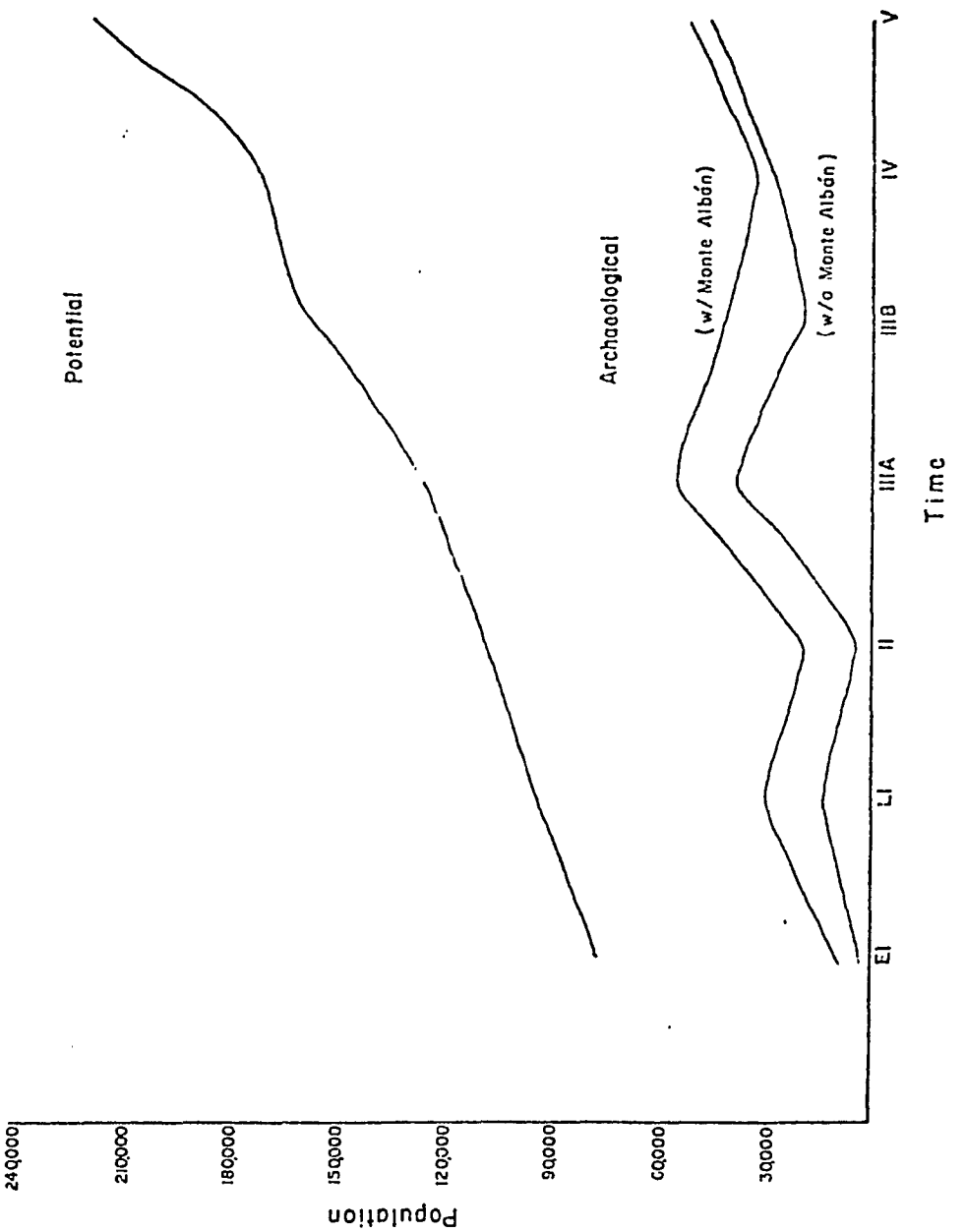

Fig. 47.--Total Survey Area Population Through Time

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Berry, 1967; Callen, 1976; Haggett, 1966; Johnson, 1977; Webber, 1972), I feel that it is a reasonable one to make. The more rapid growth of administrative as opposed to non-administrative places suggests that the former loci were becoming increasingly important in Late I. This suggests that in Late I either the number of functions that were controlled administratively was expanded and/or the degree of control over those functions that were already administered was increased. The interpretation is also supported by the large increase in the quantity of mounded construction that was utilized in the Valley during Late I. Whereas slightly more than three hundred thousand (301,366) cubic meters of mounded architecture were occupied in Early I, well over nine hundred thousand (978, 685) were occupied in Late I (Table 23).

Given the increase in administrative activity in the Valley during Late I, the extent of administrative influence over production and exchange was most likely expanded. Evidence of increased isomorphism between administrative and economic channels therefore was expected. Compared to Early I, greater standardization of the Late I ceramic complex was also predicted as was a more homogenous distribution of the Late I complex across the Valley.

The remainder of this section will utilize the ceramic measures outlined previously to support the existence of these expected differences between the Early I and Late I

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TABLE 23

RANK ORDER OF CERTAIN KEY VARIABLES BY PHASE

Phase	% of Total Population in Piedmont and Mountain Zones[a]	Volume (m^3) Occupied Mounded Architecture[a]	Volume (m^3) Occupied Mounded Construction at Monte Alban
EI	7	5	6
LI	4	3	3
II	5	4	4
IIIA	3	1	2
IIIB	2	2	1
IV	1	6	7
V	6	7	5

[a]Includes Valle Grande, Central and Monte Albán Survey Areas

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ceramic production-distribution industries. The Early I-Late I transition will then be examined in a much broader systemic framework in order to understand how the changes in ceramic production and regional organization interrelated with a series of other contemporaneous changes which occurred in the Valley of Oaxaca.

Several measures suggest that relative access to ceramic goods was principally a consequence of administrative function in Late I. Five of the six identified Late I ceramic production places were located in settlements with mounded architecture. This contrasts markedly with the location of production loci in Early I when only three of seven were in settlements with architectural construction. The differential in the mean number of types found at administrative versus non-administrative places was larger in Late I than it was in Early I. Almost three times as many ceramic types were found at administrative places as compared to non-administrative places in Late I. This represented the largest differential noted for any of the seven Monte Albán phases (Table 9). In addition, whereas the mean number (10.2) of pottery types found at the non-administrative places with populations above one hundred was almost as large as the mean number (11.8) found at administrative places in Early I, this was not so for Late I. Late I administrative places had greater access to ceramic products than did the large contemporary occupations that

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did not serve administrative functions (16.0 mean types/ administrative site versus 9.3 mean types/non-administrative site).

As predicted, the increased isomorphism between economic and administrative networks in Late I was associated with greater standardization in the production and distribution of the pottery from that phase (cf. Wright, 1977). The existence of a more standardized ceramic production process in Late I is suggested by several factors. The mean production step measure was lower for the Late I complex than for the Early I complex (Table 19). Yet, the relatively small differential between the Early I and Late I mean measures does not reflect adequately the extent of the differences between the two complexes. In calculating the mean production step indices, the production step measure for each ceramic category was weighted equally. In the Late I complex, however, several gris bowl categories were far more abundant than were the other types dated to this phase. These abundant types were basically those gris bowl categories which were not made in Early I. The mean production step measure for these eight bowl categories was 4.32 as compared to 4.60 for all Late I gris bowls and 4.54 for all Late I bowl types. The most abundant Late I ceramic category (T1207) had a production step measure of 4.00. The great abundance of this single, standardized, relatively plain bowl (T1207) in the Late I complex also marks

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a major difference between the Late I and all earlier Oaxacan ceramic complexes. More specialized, mass production in Late I is also suggested by the fact that there were more than three times as many people per identified ceramic production locus in Late I than there were in Early I.

The distribution of the Late I ceramic complex also was apparently more uniform and spatially homogeneous than was the distribution of the Early I complex. This was shown by the contingency tables for these two phases (Tables 11, 22). In addition, whereas the most widely distributed Early I bowl category (T2052) was found in just over half of the grid units occupied in that phase, the G-12 (T1207) (Figure 48) was found in 57 of the 63 grid squares occupied in Late I. The most widely distributed, Late I olla category (T2013A) (Figure 14) was found in 54 of the 63 occupied grid squares; thus it also was more widely distributed than any Early I olla category (Table 21).

In Late I, cremas were still somewhat more abundant in Etla and cafés were found more frequently in the Valle Grande. But those Late I ceramic categories that were most common were for the most part distributed more evenly across the Valley than were the ceramic categories that were most abundant in Early I (Figures 14, 15, 48-51).

Now that the predicted relationship between a high

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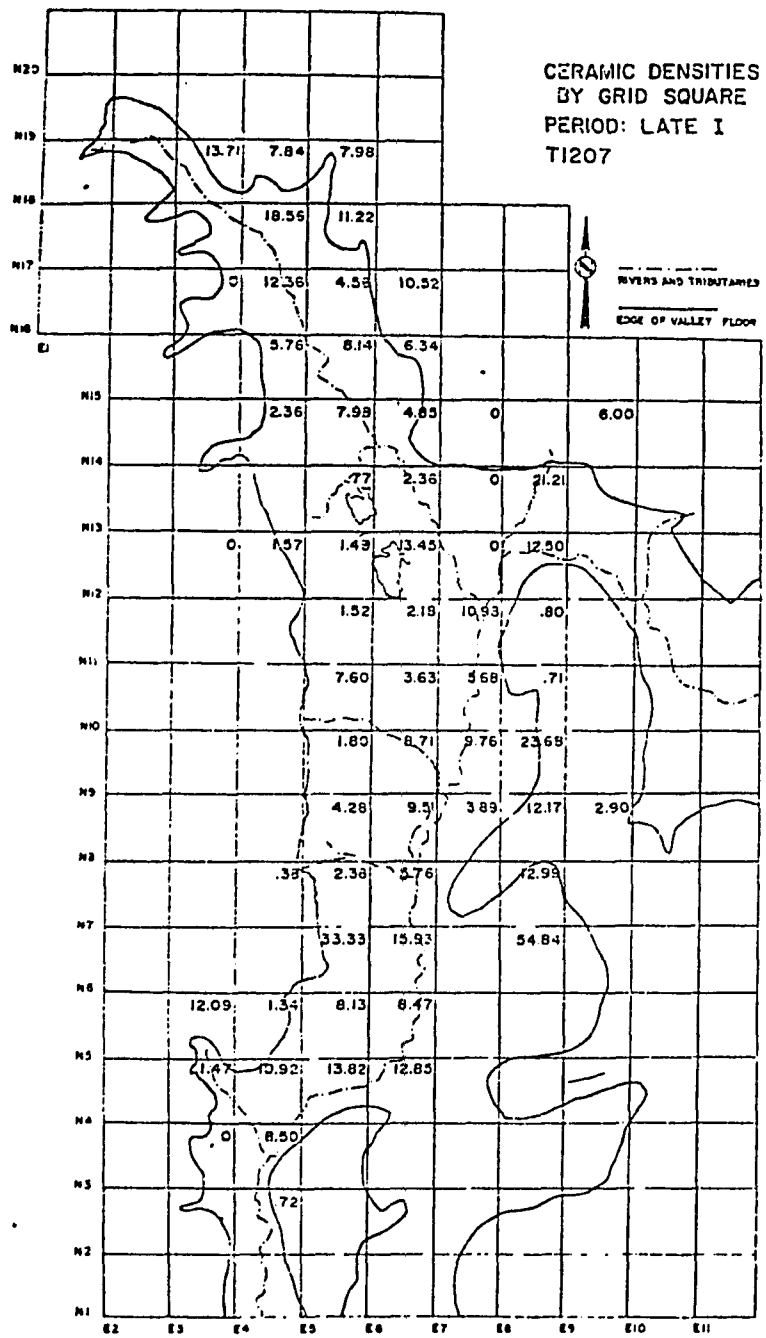

Fig. 48.--Ceramic Densities by Grid Square

Period: Late I T1207

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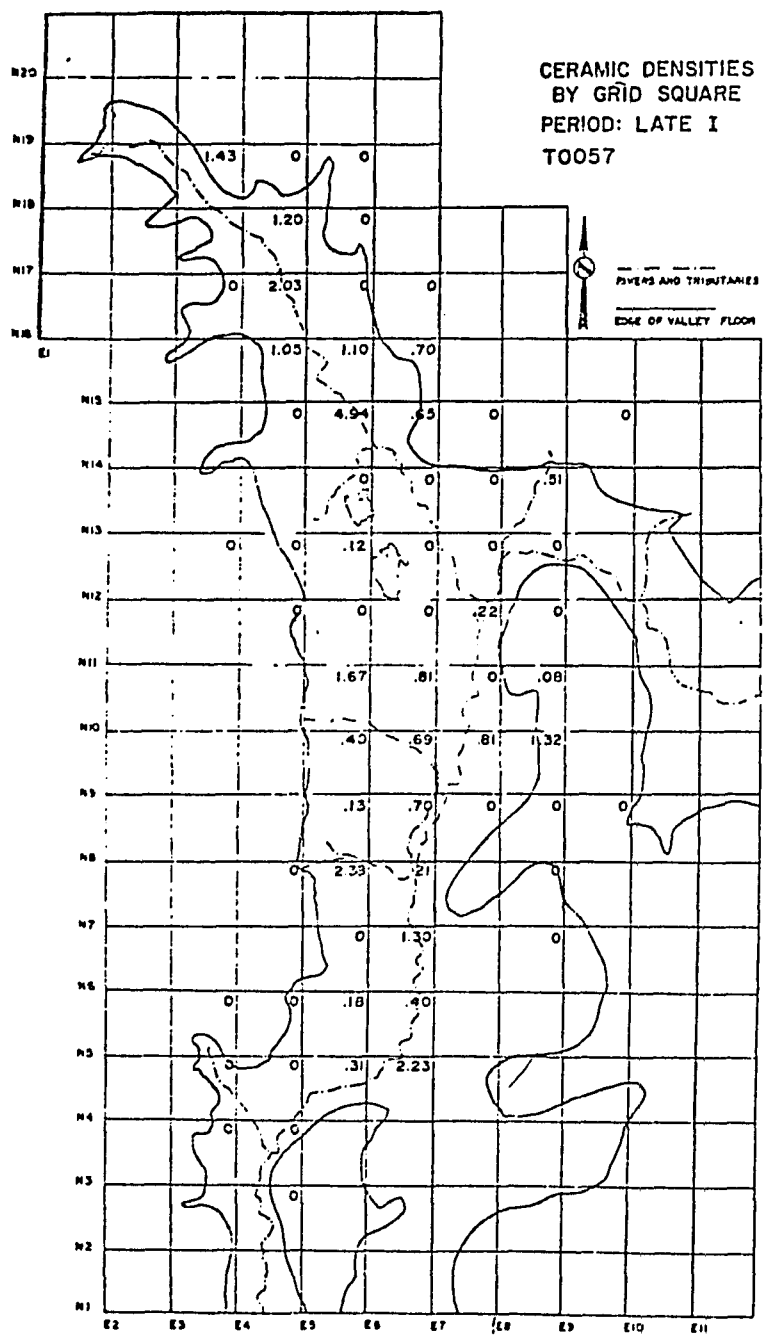

Fig. 49.--Ceramic Densities by Grid Square

Period: Late I T0057

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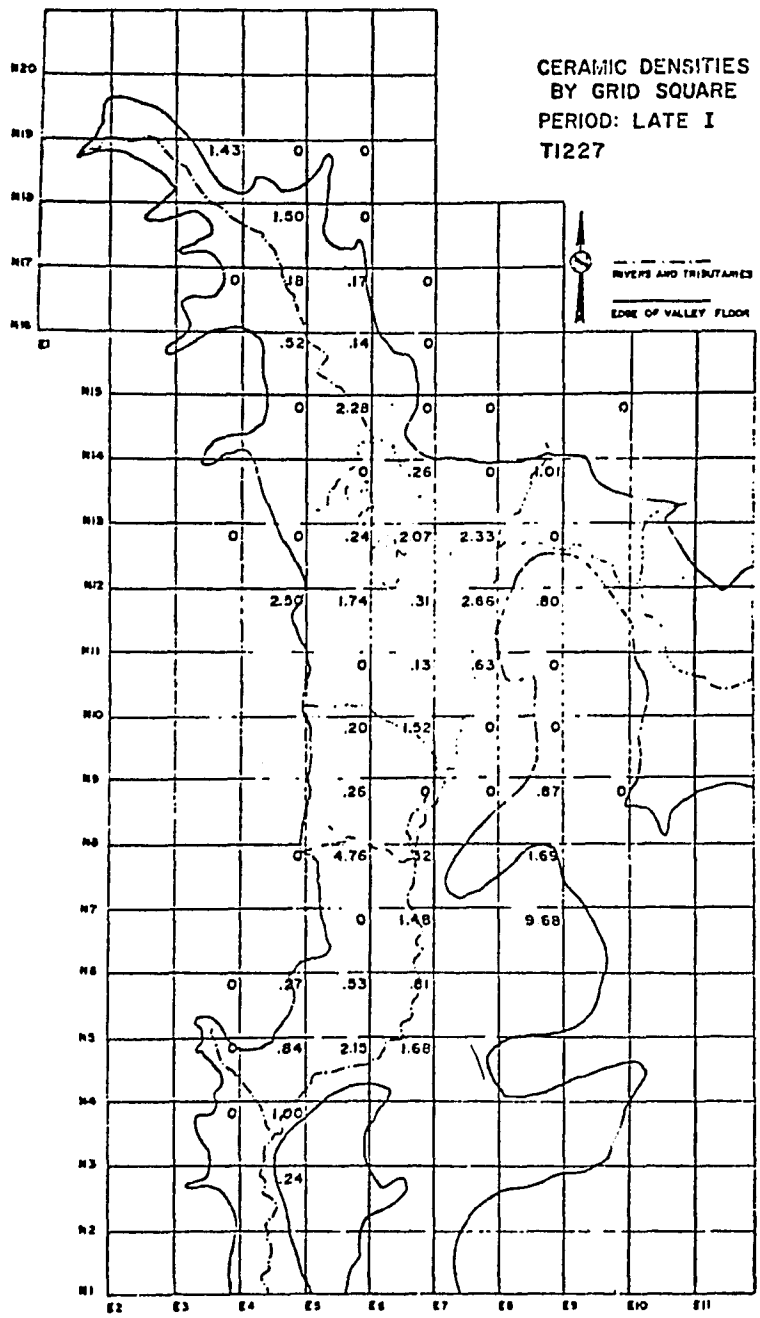

Fig. 50.--Ceramic Densities by Grid Square

Period: Late I T1227

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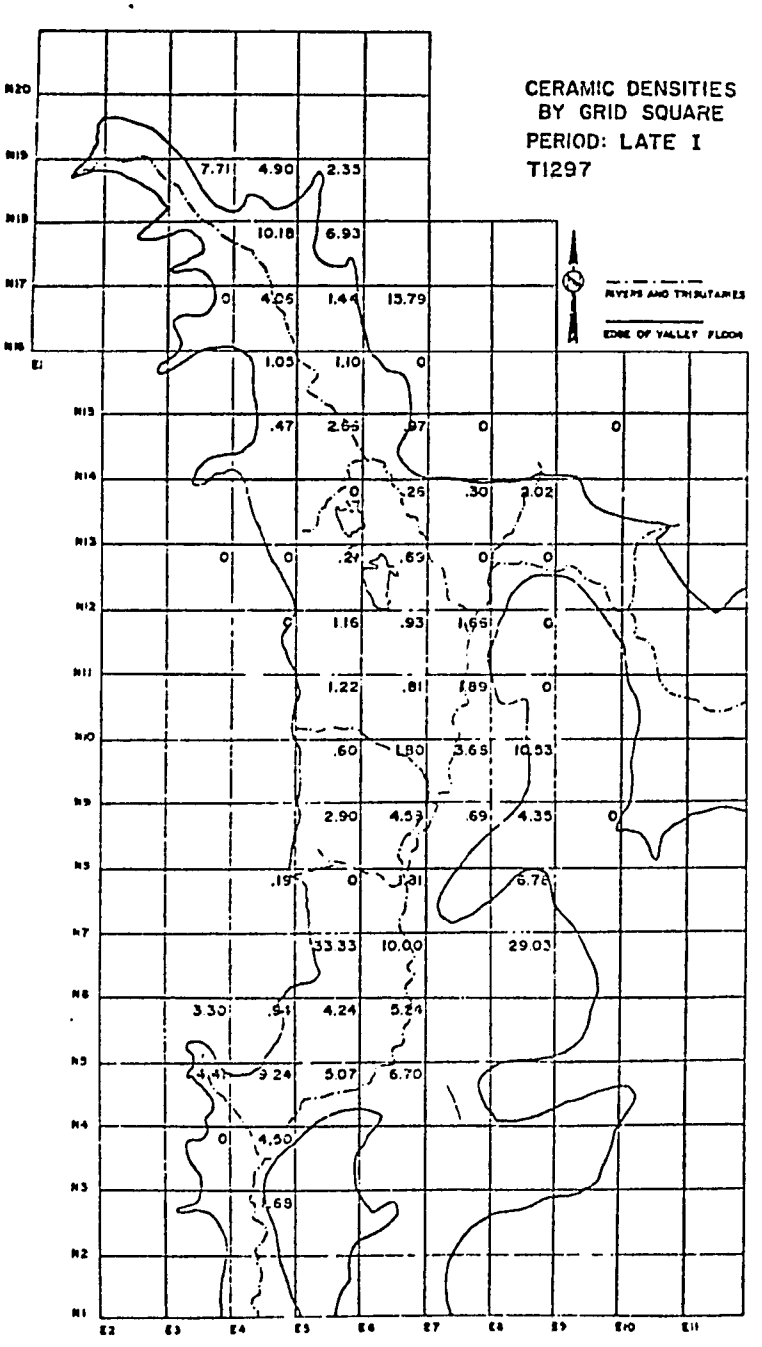

Fig. 51.--Ceramic Densities by Grid Square

Period: Late I T1297

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degree of isomorphism between political and economic channels of interaction and a more highly standardized ceramic production industry has been supported for period I, it is necessary to examine this transition from a broader analytical framework. Certain questions must be asked regarding the differences between Early I and Late I. Why was the control of production and exchange a more viable or essential strategy for the Valley administrators to adopt in Late I as compared to Early I? How were rural producers affected by these changes in administrative decision-making strategies? What were the effects of the large urban population at Monte Albán in Late I on the production and distribution of both agricultural and craft goods in the Valley?

Kowalewski's (MSa) diachronic analysis of prehispanic man-land relationships has provided some initial insights into the differences between Early I and Late I in the Valley of Oaxaca. He found that, although the total population was below the potential agricultural productivity in both phases (Figure 47), in Late I a much larger proportion of the population would have found it necessary to either reduce consumption or import maize in bad years. More specifically, with the marked population increase in and around Monte Albán (Kowalewski 1976; MSa) during the later half of period I, the central portion of the Valley most likely would have had to import agricultural produce periodically.

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In Late I, there also was an increase in the percentage of the population that resided in the piedmont zone. This residential strategy was especially pronounced in the central part of the Valley. In the piedmont, due to the unpredictability of rainfall and the great depth of the water table, agriculture would have been both risky and largely dependent on irrigation techniques (Kirkby, 1973; Kowalewski, MSa). But intensive, two-crop farming in the piedmont would have occasionally yielded huge bumper crops. As Kowalewski (MSa) has pointed out, the likelihood is that each year some portion of the piedmont would have produced one of these bumper crops. The surpluses from these harvests then could have been used to feed not only those farmers residing in the areas that did not produce in a given year, but also a portion of the non-agricultural segment of the Oaxacan population. Consequently, if a Valley-wide exchange network existed, irrigation farming in the piedmont would not only have been a viable strategy, but the surplus from such farming could have been tapped to support Monte Albán. With this in mind, it is interesting to note that the three phases during which Monte Albán was largest in population size (Late I, IIIA and IIIB) were also three of the first four phases in terms of the highest percentage of the total population residing in the piedmont zone (Table 23). It is also important to point out that initial evidence for piedmont canal irrigation in the

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Valley of Oaxaca also dates to Late I (Flannery, et al., 1967; Mason, et al., 1977).

In Early I, with a substantially lower population, imbalances could have been buffered entirely through local exchange mechanisms (Kowalewski, MSa). In Early I, as in Monte Albán II and V, Valley-wide movements of agricultural produce would not have been necessary. In Late I, as in IIIA and IIIB, the total Valley populations were closer to the region's potential agricultural productivity (Curran, 1978) and population-resource imbalances were spatially more numerous and greater in magnitude. Periodically, the Valley-wide movement of grain would have been necessary to buffer local shortages. It appears that the intensification of agricultural production in the piedmont was one mechanism for coping with these local imbalances. Yet, the encouragement of piedmont farming would have only worked if a dependable Valley-wide exchange system operated to buffer the populations in those areas which lost their crops. Consequently, it is not surprising that production and exchange appear to have been administratively controlled or influenced in Late I as well as in IIIA and IIIB. All three of these phases were characterized by low mean production step indices and by highly standardized ceramic complexes (Table 19). It thus appears that ceramics as well as other craft goods may have been exchanged for agricultural produce from the piedmont through tribute or administered

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exchange networks.

Elizabeth Brumfiel (1976) has argued convincingly that the Aztec elite during the Late Aztec period fostered the production of craft goods in urban centers in order to encourage intensive, specialized agricultural production in rural areas. Brumfiel (1976) further suggested that the manipulation of the cost and availability of craft items was used as a means for stimulating rural producers to intensify their production of agricultural surplus. The fact that at least some of this centralized craft production was directly influenced by the policies of the Aztec elite was suggested by Davies (1973:137) who wrote that:

> ...quite apart from the ruler's own property, the goods which the merchants themselves traded must also have been partly manufactured from raw materials obtained as tribute. Thus by monopolistic commerce the ruler multiplied his tribute, sometimes even imposing unfair terms of trade on conquered provinces and selling them goods which they did not value.

This kind of bureaucratic control over production and exchange would have required increased administrative activities and facilities. Thus it is not surprising that Late I, IIIA and IIIB were all characterized by the construction of a large amount of administrative architecture. In Late I, the rapid increase in the size and number of administrative places also suggests that there was increased administrative control over the Valley population. Interestingly, much of the Late I administrative growth occurred

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in the piedmont zone within which the monitoring of production and exchange would have been especially important.

The problem of supplying growing non-agricultural, urban populations with sufficient food has (Durán, 1971: 273-277; Gibson, 1974:354; Parsons, 1976; Pirenne, 1915; Tilly, 1975) and continues, even in this century, to be (Appleby, 1976) a major problem for administrative decision-makers in many areas of the world. Thus it seems likely that the Late I administrators in the Valley of Oaxaca may have been encouraged both to foster intensive piedmont farming, and to regularize intra-Valley exchange in order to feed the growing population of Monte Albán. Serious disruptions could have arisen if migrations from urban areas or reductions of urban consumption were necessary. In this regard, it should be recognized that the most intensive piedmont occupation occurred in the area adjoining Monte Albán where, theoretically, the extractive abilities of the local administration should have been greatest and where agricultural surplus could have been transported most inexpensively to Monte Albán (Kowalewski, 1976; Mason, et al., 1977).

Yet the increasingly powerful urban elite at Monte Albán must have derived an additional advantage by controlling the production and/or distribution of craft goods and promoting intensification and specialization of rural agricultural production. The increasing extent of economic

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specialization in agricultural as well as craft production must have intensified the dependence of both urban and rural segments of the Valley population on the mediating, administrative institution which fostered exchange. Wright (1977) has pointed out that the administrators in early states often attempted to encourage this kind of organic integration in order to strengthen their central position (see also Uzoiqwe, 1972:427, 459-452). In Oaxaca during period I the increased specialization and thus dependence of local populations must have served to solidify the economic and political unification of a region that seems to have been divided into more than one political unit prior to the foundation of Monte Albán (Blanton, 1976b).

Finally, transition from household ceramic production to more specialized production strategies must be discussed from the context of the time-budgets of rural producers. The increasing importance of two-crop piedmont farming strategies in Late I suggests that rural producers would have had less time to produce their own craft goods. In extensive farming systems, agriculturalists can produce their own craft goods during non-agricultural portions of the year. But in more intensive systems less time would be available for non-agricultural activities (Bates and Lees, 1977; Cook, 1970; Waddell, 1972). Therefore in Late I, specialized craft producers manufacturing for an increasing number of potential consumers would have found an open niche for their

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goods (Waddell, 1972:218). This factor along with the increasing population and the intensification of intra-Valley exchange would have expanded the number of potential consumers and thus encouraged the adoption of the large scale production techniques which were utilized by Late I ceramic producers.

C. Monte Albán II

The transition from Monte Albán Late I to Monte Albán II is more difficult to interpret than was the one between Early I and Late I. The series of indices that are being used to measure both the degree of overlap between economic and administrative subsystems and the organization of ceramic production provide somewhat contradictory results for period II. It therefore will be necessary to begin with a review of the Monte Albán II settlement pattern data (Blanton, 1978; Marcus, 1976) and then proceed with a discussion of the ceramic analysis for this phase.

Several major changes occurred in the Southern Highlands of Mesoamerica during the Terminal Formative period (Monte Albán II). Most importantly, the administrators at Monte Albán appear to have expanded their tributary domain beyond the Valley of Oaxaca (Marcus, 1976; MS). Although the scenes of prisoners or sacrificial victims depicted on the carved stone <u>danzantes</u> at Monte Albán date to period I, no solid evidence for Oaxacan conquest outside the Valley exists for this period. In period II, however,

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Monte Albán may have exercised some degree of control over an area about the size of the modern state of Oaxaca. Joyce Marcus has identified five place names on the Structure J "conquest slabs" at Monte Albán (Marcus, 1976:129-130; personal communication). According to Marcus (personal communication) these five localities [Ocelotepec (near Miahuatlán), Cuicatlán, Tututepec, Miahuatlán and Tuxtepec] can be located tentatively assuming: 1) that localities today have names that are Nahuatl transliterations of Zapotec place names, and 2) that the same name has referred to the same locality for close to two thousand years. Archaeological evidence supporting the hypothesis advanced by Marcus (1976) has been derived from research conducted at large sites located near the modern towns of Miahuatlán (Brockington, 1973) and Cuicatlán (Charles Spencer and Elsa Redmond: personal communications). In both of these regions, sites have been found with Monte Albán II ceramics associated with Terminal Formative period occupations. The preliminary findings from the area around Cuicatlan (the Cañada) have provided especially strong support for the hypothesis. Some Monte Albán Late I pottery was found during survey work in the Cañada, but this exotic ware was sparsely yet evenly distributed throughout the region. In the Terminal Formative, large walled sites were built at both the northern and southern entrances to the Cañada. The excavations at one of these sites revealed more substantial

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amounts of Oaxacan pottery than was found at other smaller contemporaneous occupations. Also significantly, very little Monte Albán IIIA and no IIIB pottery was found in the Cañada.

Oaxacan influence also may have extended to the Southern Isthmus of Tehuantepec in the Terminal Formative period. Grayware ceramics, which were very similar to those found in the Valley of Oaxaca, were noted in the Terminal Formative occupations at Laguna Zope in Tehuantepec (Zeitlin, 1978:92). No such direct similarities were reported between the ceramic assemblages from the Valley of Oaxaca and Tehuantepec for either the preceding Late Formative period or the later Classic period.

Curiously, although the tributary area associated with Monte Albán apparently increased in size during Monte Albán II, the population of the capital itself was smaller than in Late I. The population of the Valley's primary center decreased by 2,750 people or 16% of the Late I population. The total population of the region also decreased, dropping by roughly 30% from Late I. Most (95%) of this population decline occurred within 18 kilometers of Monte Albán in the area that was occupied most intensively during Late I. Since most of the decline occurred in this central area, which had been the scene of extensive piedmont development in Late I, a smaller proportion of the total period II population resided in the piedmont, and a correspondingly

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higher proportion of sites were in the alluvial zone (Table 23; Figure 52).

All other things being equal, growth in the size of Monte Albán was expected with the increase in the extent of the tributary network associated with that site (Harris, 1970:135; Kowalewski, MSb; Vapnarsky, 1969). Yet, the population and the amount of occupied mounded construction in the city declined in period II in relation to the Late I totals. In spite of the massive territorial expansion, the gap between the sizes of Monte Albán and the Valley's second largest center also was reduced by period II. This suggests that secondary centers in the Valley gained increasing autonomy in relation to Monte Albán in period II (Feinman, 1978). The fact that period II carved stone monuments at Valley sites have been shown to exhibit marked stylistic variation further supports this interpretation (Bernal, 1968; Marcus, 1976:133-136).

Several similarities are evident between the Monte Albán Late I-II transition in the Valley of Oaxaca and the model of Imperial Chinese expansion that has been put forth by Skinner (1977a). These similarities may help to provide insight into the changes in ceramic production and distribution which occurred in Oaxaca at this time. Skinner has noted that when the size of the Imperial Chinese system was increased the extent of centralized administrative control over taxation, marketing and trade in most parts of

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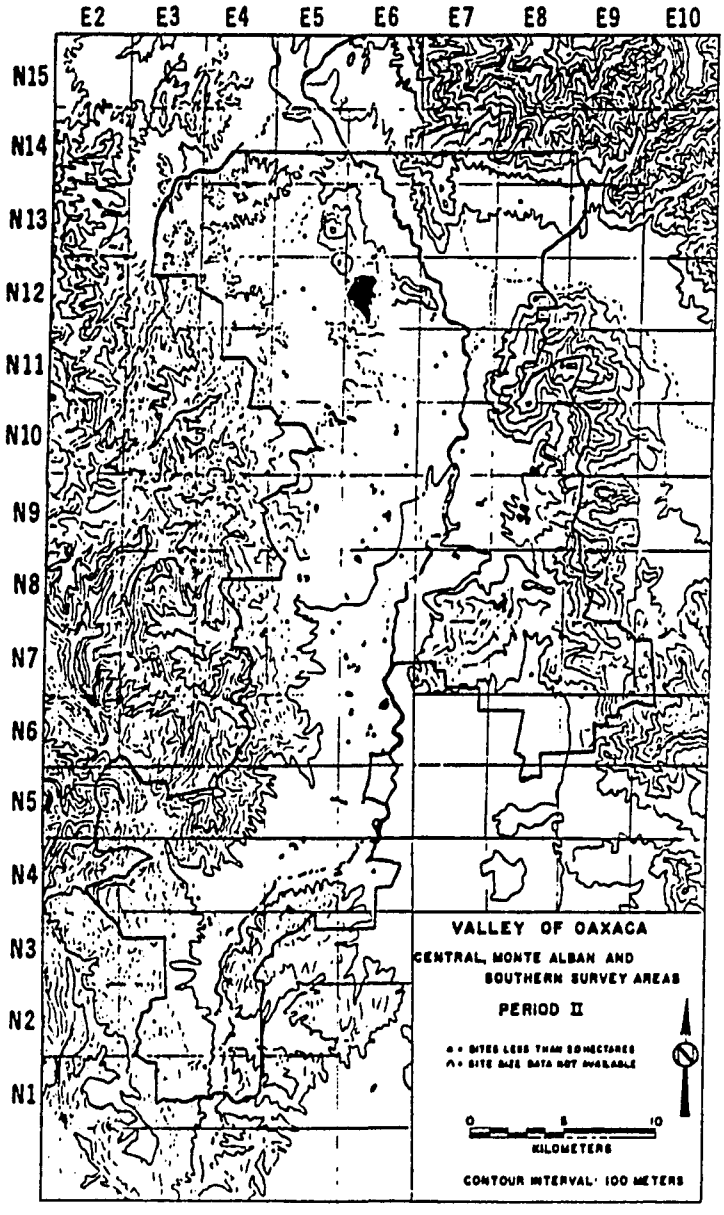

Fig. 52.--II Settlement Pattern

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the system was actually decreased. As in Oaxaca, the intensity of administrative control over the local system was not maintained as the size of the system was expanded. Skinner (1977a:25) also found, similar to period II in Oaxaca, that both the autonomy and the functional diversification of the local elites residing at secondary centers often increased after periods of expansion.

In summary, it appears that Monte Albán II was characterized by: 1) the decentralization of administrative control, 2) the reduced importance of intra-regional exchange ties with the shift away from intensive strategies of piedmont farming and a possible increase in tribute payments from outside the Valley, and 3) a reduction in the intensity of administrative control over production and exchange. This latter point is not clearcut and the somewhat contradictory data must be addressed.

The hypothesis that the degree of overlap between administrative and economic networks within the Valley was reduced in Monte Albán II in relation to Late I is supported by the analysis of the mean number of types found at administrative versus non-administrative sites (Table 9). While the mean number of types found at administrative sites was roughly constant in Late I (16.0) and II (15.6), non-administrative sites had access to a larger number of types in the latter phase (7.2 versus 5.8). The magnitude of this differential is even more significant when it is pointed

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out that there are 88 identified types for Late I and only 53 for period II. Thus, in Late I, non-administrative localities had access to an average of 6.6% of the total number of types, while in II, this class of site had access to 13.6% of the total complex. Non-administrative localities were thus able to procure a larger percentage of the available ceramic products in the latter phase.

The identification of four of the five period II ceramic production loci as administrative sites does not support the proposed hypothesis that administrative control of production was reduced in this phase (Table 20). Yet, in part this may be due to the incomplete nature of this data base. Considerable ceramic variability has been noted at period II sites in both the Etla and Tlacolula Arms of the Valley. Some of the ceramic vessel types found in these areas were not even noted in our surveys of the central and southern areas (John Paddock, personal communication). Thus, it is possible that when the production loci from these rather rare categories of ceramic vessels are identified they may be located in sites without administrative architecture.

The degree of overlap between administrative and economic networks was apparently less in Early I than in either Late I or II. Yet, it does appear that at least the distribution (if not the production) of craft products

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was more segregated from the administrative sphere in period II than in Late I. Thus, given the general research focus of this study, it was expected that the period II ceramic complex would be less standardized, more highly decorated and more heterogeneously distributed than the Late I complex. These predictions were only supported partially by the ceramic analytic measures. The mean production step measure for Monte Albán II was 5.09 as compared to 4.10 for Late I (Table 19). Only the Monte Albán V complex had a slightly higher mean production step measure than period II. Thus, the mean production step measure merely confirmed numerically that the Monte Albán II complex was composed in part by several very highly decorated ceramic vessels which were not found in the collections from other Monte Albán phases (Paddock, 1966:120). Several of these highly decorated ceramic types were distributed rather discretely in different sections of the Valley. For example, the Caso, Bernal and Acosta (1967:Fig. 48, 49) category A-9 (T3408) (Kowalewski, Spencer and Redmond, 1978:192) which was manufactured at Roalo (3-6-31) was found almost exclusively in the Central and Valle Grande Survey Areas (Figure 18). Only a few (4) A-9's were found in the collections from Etla. In addition, John Paddock (personal communication) found examples of a ceramic category which he termed "black and white" in the excavated collections from several

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period II occupations at sites in the Tlacolula Arm. This vessel type was not found in any of the survey collections made in the Etla, Central or Valle Grande Survey Areas. Finally, highly deocrated crema bowls were both proportionately more abundant and more variable at the period II sites within the five northernmost grid squares. These vessel categories (T0002, T0003, T0004, T0057, T0380) (Table 12), however, were present in smaller quantities throughout the Central and Valle Grande Survey Areas. The heterogenous distribution of some of the highly decorated period II vessel categories suggests that the distribution of at least the "fancy" portion of the complex was less centrally controlled than was the distribution of the Late I complex. It also supports the suggestion that there was less exchange between the local subsystems which comprised the Valley in period II (Kowalewski, MSa). This was expected with the reduced reliance on the risky piedmont farming strategies during this phase. Monte Albán most probably derived a fairly large portion of its support from extra-regional sources and thus the urban center may have been less reliant upon the agricultural surpluses produced within the Valley itself.

One measure did not conform to the expectations advanced above. The results of the contingency table analysis indicated that the more abundant period II ceramic types were distributed relatively homogeneously across the survey

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area (Tables 12, 22). Thus, at least certain utilitarian gris and crema ceramic types may have been administratively distributed in period II. Interestingly, the identified production loci for these types were all situated in administrative centers. Consequently, it is suggested tentatively that many of the utilitarian ceramics were still produced and distributed in a manner similar to the way they were in Late I. However, as suggested above, the highly decorated period II serving bowls were produced and distributed through different, less centralized economic networks.

The increased variability within the period II highly decorated serving dishes and the heterogeneous distribution of these bowls across the Valley also may have been due in part to the expanded autonomy of and the increased competition between local Valley elite. During period II, competition between Oaxacan elite may have been intensified with the extension of Monte Albán's tributary domain outside the Valley. This expansion would have opened up new economic opportunities for the Oaxacan lords and this may have promoted increased competition between them. Local lords then may have utilized and encouraged the production of their own distinct kinds of serving bowls rather than having used bowl types that were made outside their domain. By so doing, they would have been able to "signal" (Wobst, 1977) their local autonomy

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while promoting the production of craft goods within their own domains.

D. Monte Albán IIIA

Major changes occurred in the Southern Highlands of Mesoamerica during the Early Classic period. The tributary or territorial domain of Monte Albán retracted sometime during period *II*. Although very small quantities of IIIA ceramics have been found outside the Valley, for example in the vicinity of Miahuatlán (Brockington, 1973) and in the Cañada (Charles Spencer and Elsa Redmond, personal communications), the Valley was for the most part a ceramic isolate throughout the Classic period (Bernal, 1965:802). Even the Classic period Teotihuacán style pottery which was found throughout Mesoamerica was found only in very small quantities in the IIIA collections from within the Valley of Oaxaca. It seems clear that there was a marked decline in the amount of interregional interaction involving the Oaxacan population (Bernal, 1965; Feinman, 1978). This suggestion is supported directly by the work of Spencer and Redmond (personal communications) in the Cañada where they found that the Terminal Formative period "military garrison" at the entrance to the region was abandoned in the Early Classic period. It is likely that the area tributary to Monte Albán was diminished as the Central Mexican city of Teotihuacán grew and expanded its sphere of influence. In the Tehuacán Valley, which

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is located between the Valley of Mexico and the Valley of Oaxaca, Late and Terminal Formative period ceramics showed affiliation with the contemporary Oaxacan complexes (Drennan (ed.), 1977:9-13). Yet, by the Early Classic period, Tehuacán pottery showed little affiliation with the Monte Albán IIIA pottery types. Instead, actual Teotihuacán pottery types as well as local Tehuacán types displaying the Teotihuacán "Horizon Style" were found in Tehuacán (Drennan, 1978, Drennan (ed.) 1977; see also Hirth, 1978; MacNeish, Peterson and Flannery, 1970:175-176).

As Monte Albán lost its external tributary domain, its elite again must have been reliant primarily upon the Valley population for their support. Thus, it is not surprising that within the Valley itself, the Early Classic period was marked by a pattern of settlement which in many ways resembled Late I. The Early Classic was characterized by: 1) an increase in the total population of the survey area to a level not equaled in any prior or subsequent prehispanic phase (Figure 53); 2) the growth of Monte Albán from an estimated population of 14,492 in period II to 16,507 in IIIA; 3) a considerable amount of monumental construction at Monte Albán, especially around the Main Plaza area (Acosta, 1965); 4) an increase in the proportion of the population residing in the Valley piedmont (Table 23; Figure 53): 5) a general expansion of

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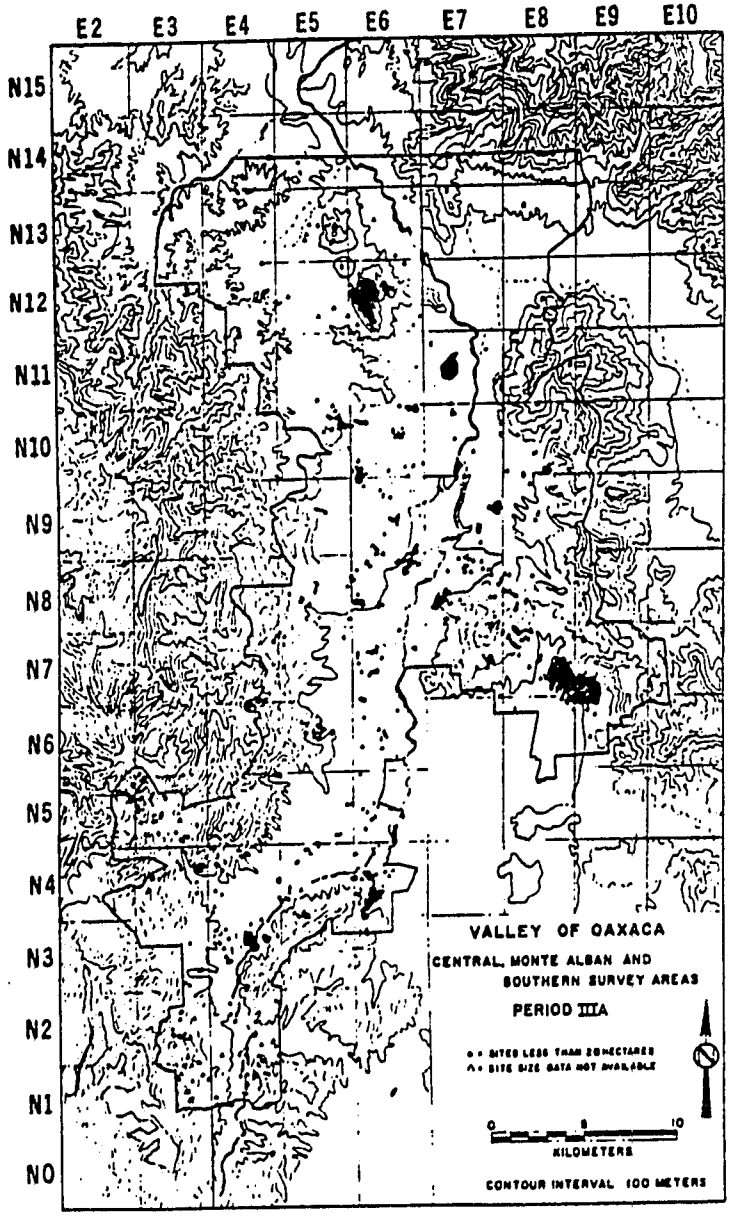

Fig. 53.--IIIA Settlement Pattern

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monumental construction in the survey region; and 6) an increase in the percentage of the population living in administrative centers. The major difference between the Late I and IIIA growth phases was that whereas in Late I, the population grew principally around Monte Albán, in IIIA, growth occurred in and around a series of secondary and tertiary centers located in the Valle Grande. The massive growth of these second and third ranked centers (e.g., Jalieza, Rancho Tejas, Santa Cruz Mixtepec, El Choco and Xoxocatlán) accounts for the close approximation to the expectation of the rank-size relationship that was observed for this phase. Although the Early Classic population increase could have been in part due to the return of the administrative elite from outside the Valley, this alone could not explain the tremendous growth which occurred at this time.

Interestingly, even though the size of the Valley's largest settlements approximated the expectations of the rank-size rule, Monte Albán still apparently served most highest order functions for the region during IIIA. Jalieza (3-7-136, 150-152) (Figure 21), the second largest settlement in the Valley, had an estimated population of 12,385 as compared to the 16,507 that resided at Monte Albán, yet the occupied Early Classic mound volume at Jalieza was 42,363 m^3, or less than one-tenth the volume of architectural construction (669,142 m^3) that was occu-

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pied contemporaneously at Monte Albán. Cuilapan (3-7-2-6,8) had the second largest volume of occupied mounded architecture (120,302 m^3) in the Early Classic period and it had less than one-fifth the amount occupied at Monte Albán. Thus, it seems likely that Monte Albán was still serving most highest order functions for the entire Valley during IIIA. The fact that the carved stone monuments, which showed regional variation in style in II, were both highly standardized and concentrated at Monte Albán in the Early Classic (Marcus, 1976) further supports this interpretation. The Oaxacan IIIA ceramic assemblage was both highly uniform and homogeneously distributed across the region (as will be discussed further below) and this also strengthens the support for the hypothesis that the Valley was organized into one political system centered at Monte Albán during IIIA (Feinman, 1978; Marcus, MS).

As noted above in IIIA, there was a return to the Late I pattern of administered development of the piedmont (Blanton, et al., in press, MS; Kowalewski, MSa). The major difference, however, was that in IIIA, this administration occurred largely at the lower levels of the political hierarchy whereas, in Late I, most piedmont administration emanated directly from the capital and secondarily from smaller centers. In several ways, therefore, the political organization of the Valley conformed to what Fesler (1968) has termed "psuedo-centralization." That is

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a system characterized by a decentralization of work load (i.e., administration of agricultural production) but not of real administrative power.

> To move work load out of the capital may be efficient and convenient for the public and may even promote a feeling that government is close to the people. But it may not involve any decentralization of power, that is, it may not provide the opportunity to exercise substantial local discretion in decision making (Fesler, 1968:373).

In IIIA as in Late I, a large segment of the Valley's population, especially those living in large centers, would have had either to reduce consumption or to import maize in bad agricultural years. Thus, the maintenance of a reliable Valley-wide exchange system would have been an important strategy for the Valley administrators (Kowalewski, MSa). Whereas only four grid squares in Early I and six grid squares in period II would have been vulnerable to food shortages in dry years, this kind of population/resource imbalance would have been a problem for 25 and 20 grid squares in Late I and IIIA respectively. In Late I, almost all of the vulnerable areas were located in the central part of the Valley. However in IIIA these areas were primarily located in the Valle Grande, although Monte Albán itself would have still had to import food from its surroundings.

The ceramic measures support the interpretation that there was a large increase in administrative involvement in production and distribution in IIIA. There was the

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second largest percentage differential in the mean number of types per site between administrative and non-administrative sites during this phase (Table 9). There was an average of only 4.8 types found at the non-administrative sites dating to this phase as compared to the average of 11.8 types found at administrative centers. Thus, the access to ceramic products was apparently markedly reduced for those inhabitants of non-administrative settlements in IIIA.

The relationship between piedmont farming and relatively intense periods of administrative control over production and exchange is further supported for phases Late I and IIIA by the analysis of the number of types per site. As stated above, in Late I the most intensive piedmont farming was undertaken in the central part of the Valley. In IIIA the most intensive area of piedmont population build-up was in the southern half of the Valle Grande, the area more than 20 kilometers from the Main Plaza at Monte Albán. Some intensive piedmont farming also must have been undertaken in the central region at this time in order to supply the large population at Monte Albán. As expected, in Late I the most standardized ceramic complexes with the least variability were located in Monte Albán's central district. These sites tended to have five or fewer pottery types while the other Late I sites averaged many more. In IIIA two areas of sites were

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found to have very few (less than five) types per site: 1) those sites within 8 kilometers of Monte Albán, and 2) those that were located more than 30 kilometers from the Main Plaza. Interestingly, those few IIIA sites that were located in the alluvial zone were found in the central part of the survey region between Zaachila and Santa Inez Yatzeche. In this area more IIIA types were found per site and there was less differential in the number of types per site between administrative and non-administrative localities. Non-administrative sites in this zone averaged 62% of the number of types found in sites with administrative functions. The comparable figure for the entire Central and Valle Grande Survey Areas was 41%. Thus, it seems clear that this primarily alluvial area was less connected than most of the rest of the survey region into the heavily administered production and exchange system. Consequently, this area had access to a wider assortment of ceramic products.

A high degree of administrative control over production and exchange in IIIA is also suggested by the location of the identified ceramic production places. All nine were situated in settlements that had administrative functions (Table 20). These nine included both Jalieza and Santa Cruz Mixtepec, two of the largest Early Classic administrative settlements. No hard evidence for Early Classic period ceramic production at Monte Albán has as

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yet been found. However, the very large number of Classic period kiln wasters found on the surface of an area of Late Classic ceramic production at Atzompa (Blanton, 1978) does at least raise the possibility that ceramic production may have been initiated at the site in the Early Classic period. Additional surface, and perhaps subsurface, research will be necessary to examine this hypothesis.

Based upon the analyses of settlement and ceramic information, the Early Classic period in the Valley of Oaxaca was thought to have been characterized by intensive administrative involvement in production and exchange. Consequently, administrative control over ceramic production was predicted for this phase. The IIIA ceramic complex therefore was expected to have been more highly standardized, more homogeneously distributed and less well decorated than the II complex.

These predictions are strongly supported by the series of ceramic analytic measures employed in this study. Unlike all earlier phases, Oaxacan ceramics dated to the Early Classic period were made almost entirely in one ware (gris). This ware remained characteristic of the Oaxacan ceramic complex throughout IIIB and IV. Only three crema, six café and three amarillo ceramic categories were identified in the IIIA complex as compared to 21 gris types. Yet, because most of the non-gris ceramic types were relatively rare and most of the common Early Classic

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ceramic categories were gris, it seems clear that at least 75-85% of the sherds in IIIA collections were gris. The increased standardization of the Early Classic complex is also indicated by the great frequency of plain G-35 (T1126) (Figure 54) bowls in the collections from this phase. The G-12 (T1207) gris incised bowl was plentiful in Late I and II ceramic collections, but comparatively the G-35 was even more abundant in the Classic period collections. In all but one of the 57 grid squares where IIIA collections were made, G-35's were collected.

In addition to its greater abundance, the G-35 bowl was less costly and more likely to have been mass manufactured than the G-12 bowl. The production step measure for the standard G-12 was 4.00 while the standard G-35 had a production step measure of 2.25. Also, whereas the G-35's were often found with bolstered rims, the G-12's were not (Caso and Bernal, 1965:888). This is significant because according to Sander Van der Leeuw (personal communication), bolstered rims on G-35's were probably the consequence of a very rapid, somewhat careless, production technique. This technique entailed the folding over and smoothing down of surplus clay on the exterior of a bowl rather than the removal of the surplus clay and the creation of a more finished rim.

The greater standardization of the IIIA complex is also indicated by the fact that, for the first time, the

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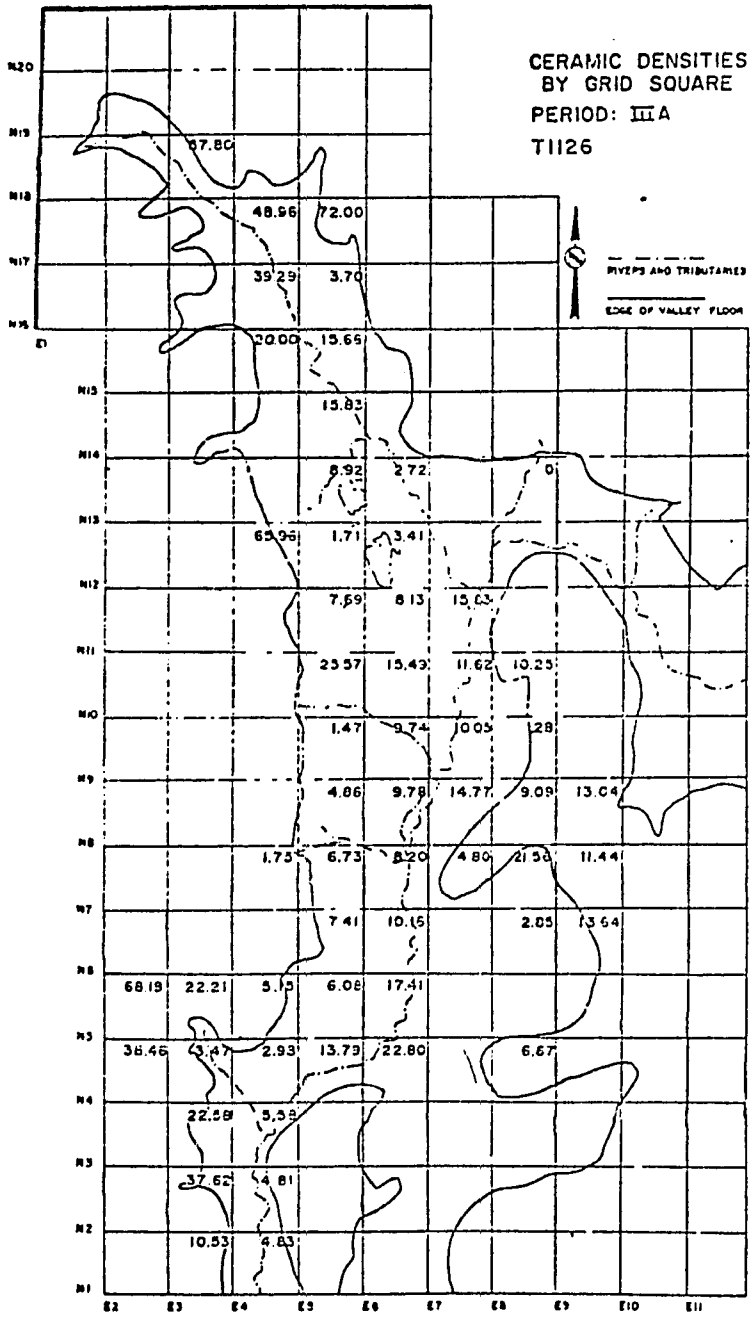

Fig. 54.--Ceramic Densities by Grid Square

Period: IIIA T1126

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most abundant bowl (T1126) and jar (T1120) (Figure 55) categories were both made in the same ware. In fact, these two ceramic vessels were similar in almost every attribute save those related to form. It thus seems very likely that the same ceramic production loci must have produced both of these types of vessels in the Classic period. Consequently, with the relative decline in the abundance of both café and crema jars in the Early Classic (a trend which intensified in the Late Classic) it seems safe to suggest that ceramic production was restricted to a relatively small number of places that utilized large scale production techniques.

The IIIA ceramic complex was the most homogeneously distributed according to the contingency table analysis (Table 22). Spatially discrete distributions of highly decorated types were not found for IIIA (Table 13) as they had been for Monte Albán II (e.g., T3408). The hypothesis that the Valley-wide exchange network was better integrated in IIIA than it was in II is well supported.

Finally the results of the mean production step measure supported the contention that on the average a greater number of steps were employed in the production of Monte Albán II as compared to IIIA ceramic vessels. The mean production step measure was 5.09 for the former phase as compared to 3.85 for the latter (Table 19). Yet, this differential does not completely describe the degree of

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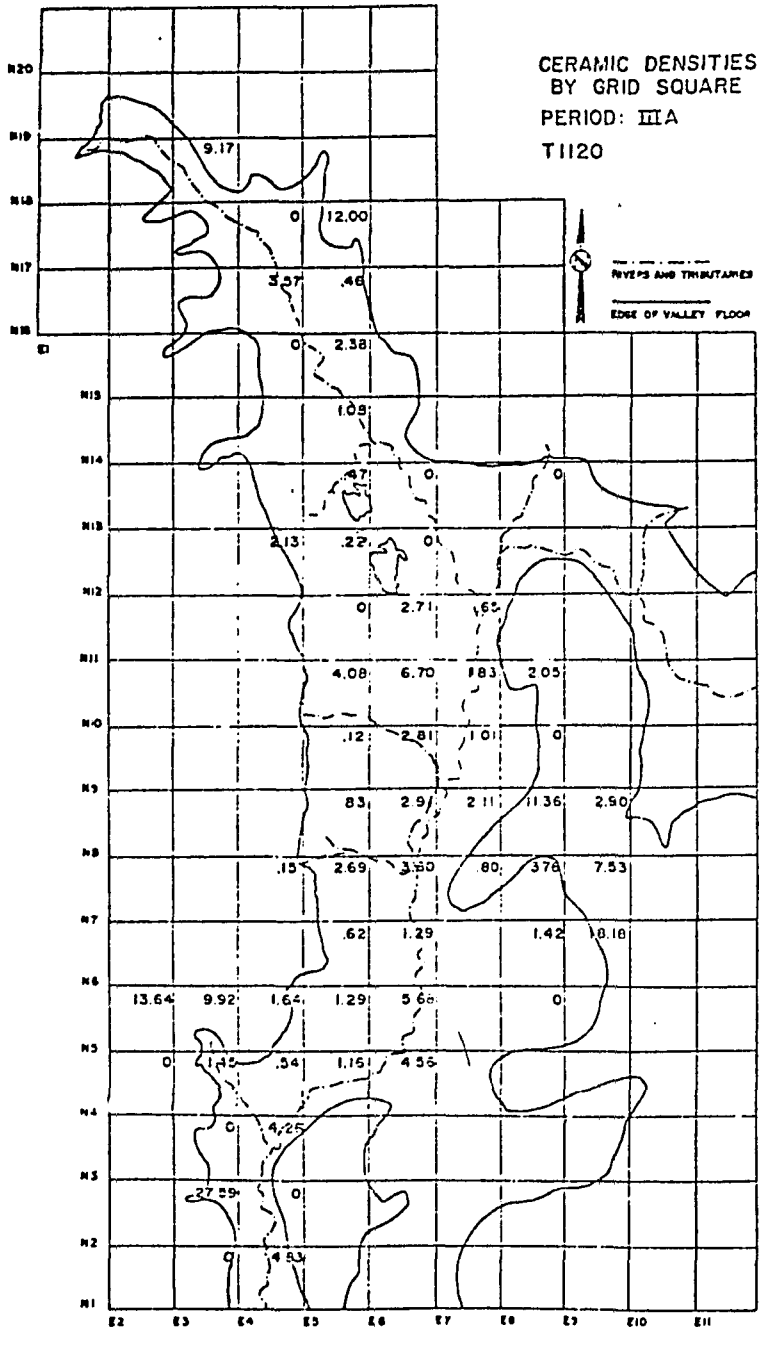

Fig. 55.--Ceramic Densities by Grid Square

Period: IIIA T1120

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contrast between the pottery of these two phases because the highly decorated period II vessels were relatively abundant in the collections dated to that phase while the "costly" IIIA types (T0057, T3410) were a comparatively small segment of the Early Classic complex (Table 13).

E. Monte Albán IIIB

In the Late Classic period a major demographic restructuring occurred in the Valley of Oaxaca. Most of those areas which were developed intensively during the Early Classic period were almost totally depopulated during the Late Classic (Figures 53,56). Within the surveyed area the population was almost completely concentrated within 15 kilometers of Monte Albán. Whereas tremendous population declines occurred in the portion of the Valle Grande more than 12 kilometers south of the Main Plaza, significant growth occurred in the Central and Etla Survey Areas (Kowalewski, 1976; Varner, 1974). The population of Monte Albán also increased by roughly 8,000 people to an estimated total of 24,189 (Blanton, et al., MS).

In many ways the IIIB distribution of population was similar to Late I pattern (Figure 46). Both were periods of population growth at the capital and in its immediate surrounds. Both phases were also similar in that the rural populations resided primarily in the piedmont and mountain zones (Table 24). As in Late I and IIIA, the two earlier phases that were marked by the intensive occupation of the

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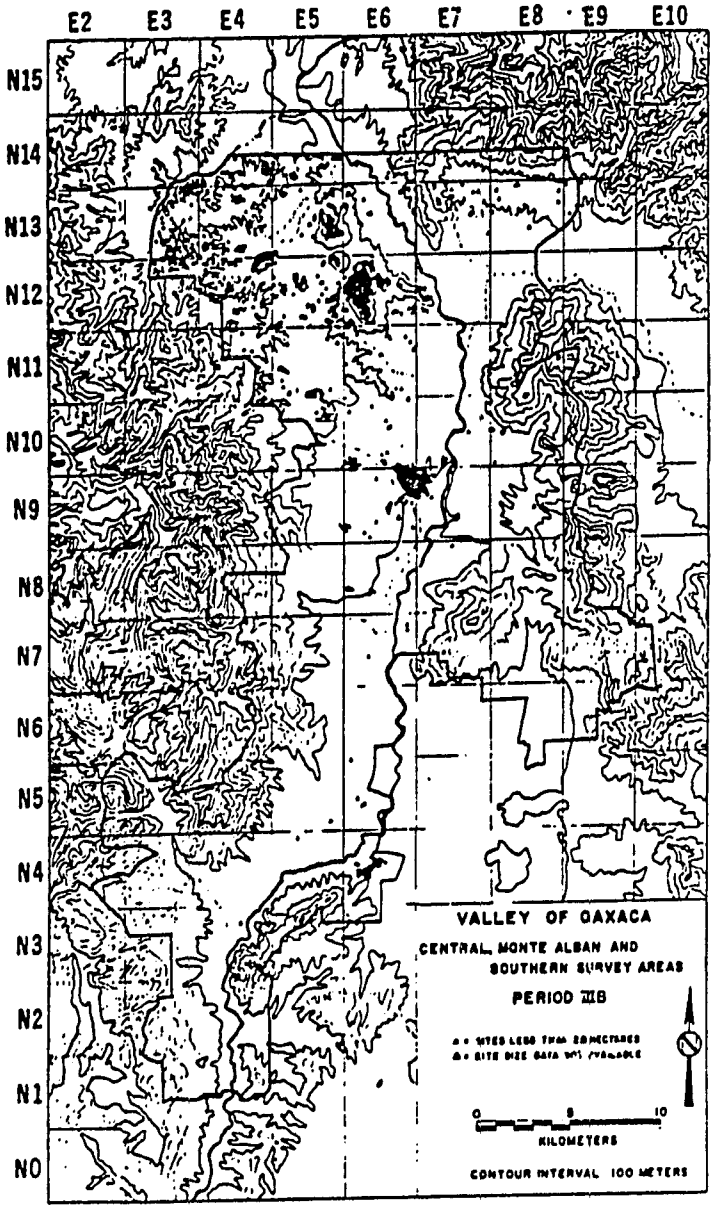

Fig. 56.--IIIB Settlement Pattern

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piedmont zone, there was a comparatively large volume of occupied mounded construction in IIIB. The association between piedmont farming and a high volume of administrative activity seems to hold for IIIB.

Yet the distribution of population in the Late Classic period was in certain ways different from any prior phase. The population and architectural differences between Monte Albán and all other Valley centers were more marked than in any previous phase (Bernal, 1965:805; Blanton, 1978; Caso, Bernal and Acosta, 1967). This was reflected in the IIIB rank-size relationship which indicated greater primacy than for any other time during the prehispanic sequence. Unlike Monte Albán II, when rank-size primacy for the survey area was at least in part due to the expanded size of Monte Albán's tributary network, primacy in IIIB seems to have been a consequence of the concentration of high level political and economic activities at Monte Albán (Feinman, 1978). No evidence for Late Classic period Oaxacan expansion outside the Valley has been found and the ceramic complex for IIIB was even more isolated stylistically from the rest of Mesoamerica than was the Early Classic period complex (Bernal, 1965).

In IIIB, more than 75% of the occupied monumental construction within the survey area was built at Monte Albán. Thus, it seems clear that most political functions were concentrated at the Valley capital. For the only time in

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the prehispanic sequence, it seems likely that certain economic activities were also concentrated at Monte Albán. Two known loci of IIIB ceramic manufacturing were found at this site (Blanton, 1978; Winter and Payne, 1976). In one of these areas, the Atzompa site subdivision, 34 Classic period kiln wasters were collected. This represented just less than one-third the number of wasters collected during the entire survey of the Central, Valle Grande and Monte Albán areas. Consequently, it seems safe to suggest that the ceramic production industry at Atzompa must have been rather massive in scale. The characteristic Atzompa diorite-tempered G-35 ollas (T1120) (Figure 30) and bowls (T1126) (Figure 31) were noted in large quantities at Monte Albán (Blanton, 1978) throughout much of the Central Survey Area, and in the southern half of the Etla Arm. If this entire area was serviced in large part by the Classic period Atzompa potters, then the scale of production must have indeed been huge. The economic importance of Monte Albán in IIIB is also suggested by the analysis of lithic production loci. Only five lithic production areas were found associated with Late Classic period pottery in the entire Valle Grande and Central Survey Areas while approximately 75 lithic production areas were found with IIIB pottery at Monte Albán (Blanton, 1978). Even if a large percentage of these production locations were not contemporaneous, it seems clear that most

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of the large scale lithic manufacturing that occurred within the survey area took place at Monte Albán.

Although it now seems clear that craft production was centered at Monte Albán during IIIB, this concentration of economic activities at the capital seems to have been largely a Late Classic period phenomenon. As Blanton (1976b; 1978) has suggested, far fewer economic functions were centered at Monte Albán during its initial phases of occupation. Thus, it is suggested that the capital was established principally as an administrative center, but that its role in the region had shifted by the Late Classic period. By IIIB, Monte Albán was the primary economic center in the Valley as well. In the ancient Near East similar transitions often occurred. New rulers often built their administrative palaces in isolated localities separated from existing urban centers (Olmstead, 1923:99, 270; Oppenheim, 1964:117-118, 124). Yet through time these administrative capitals often became economic centers of considerable importance (Oppenheim, 1964:104, 117-118).

> While the typical city enjoyed a modicum of prosperity slightly above the subsistence level, real prosperity came to a Mesopotamian city only when it had in its midst the palace of a victorious king. Then the spoils of war, the tribute of subjected cities, and the gifts of intimidated neighbors were added to the stores of the ruler and distributed among the hierarchy of the army and bureaucracy, thus raising the standard of living of the entire community. The sanctuaries then grew rich, were sumptuously decorated, and received grants in land and workers. The desire to decorate palace

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> and temple attracted traders who brought into the economy of the capital not only typical imports (metals, timber, precious stones), but also luxury items (certain spices, perfumes, wines, finery, rare animals). (Oppenheim, 1964:117)

It seems clear that first order administrative and economic functions were both centered at Monte Albán during Monte Albán IIIB. There also appears to have been a considerable degree of isomorphism between economic and administrative networks throughout the rest of the IIIB settlement system. The location of the Late Classic period ceramic producing localities offers some support for this interpretation. Although three sites without mounded architecture had evidence of ceramic manufacturing, two of these were isolated residences or very small hamlets (3-9-69; 3-9-58). The bulk of the ceramic production apparently occurred at some of the larger administrative centers Monte Albán proper, Atzompa, Cuilapan (3-9-8-18), and possibly Rancho Tejas (3-9-62, 63) (Figure 25).

It has been argued previously that the findings of more pronounced differences (i.e., Late I, IIIA) in the numbers of types found at administrative versus non-administrative sites suggested a greater exchange of pottery through administrative channels. Since it has been suggested that the regional system in the Late Classic period was highly centralized and that there was considerable degree of administrative involvement in economic activities, it was predicted that a similarly marked disparity in the

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quantity of types found at administrative versus non-administrative sites would be found. A disparity existed, but it was not as pronounced in IIIB as it had been in either Late I or IIIA (Table 9). In fact, the differential was less marked than that found for the less-administered phases Early I or II. Initially, this appeared to refute the interpretation derived from other data, but further consideration suggested that it did not. The IIIB values of types per site for both administrative and non-administrative sites were very low. Compared to Monte Albán which had all 22 types, the populations of all other sites had access to relatively little ceramic variety. The most important distinction in the access to ceramic products was between Monte Albán and all other settlements. These settlements averaged only 4.7 types/site. This differential corresponded to the marked distinction between the Valley capital and all other settlements in both population and architectural construction. In this regard, it is important to point out that the mean values of the numbers of types per site could not have been much lower for the non-administrative sites. Three to four types (actually 3.5) represents close to the minimum assortment (a basic bowl, a standard jar and one or two other vessels) of ceramic containers necessary for basic familial activities. Even the populations of administrative centers had access to little more than this minimal variability in ceramics. Thus, the IIIB system may

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have been so centralized that only the capital population could have obtained a fairly wide assortment of ceramic vessels.

Again in IIIB, as in Late I and IIIA, the area of most intensive piedmont development was apparently most closely tied into an administered system of production and exchange. The sites in the central portion of the Valley, adjacent to Monte Albán, had access to small numbers of types per site. Most of those sites with three or fewer Late Classic period types were within 12 kilometers of Monte Albán. The inhabitants of this zone often had access only to the minimum number of ceramic vessels that a household would need for basic cooking, storage, and food-serving tasks. Typically, these collections would include only plain G-35 bowls (T1126), plain G-35 jars (T1120) and either a sahumador (T1123) or a comal (T1125) and/or a G-35 bowl with hollow (T1263) or solid nubbin (T1274) basal supports.

As expected almost the entire IIIB ceramic complex was both highly standardized and mass produced. Almost the entire assemblage was manufactured in gris paste. Only five relatively rare categories of ceramic vessels were either cafés (T2083, T2086, T2418) or amarillos (T3030, T3035). No crema ceramics date to IIIB. The tremendous uniformity in ceramic jars is especially revealing since jars, unlike flat-bottomed or cylindrical bowls, cannot be stacked and thus are much more difficult and expensive to transport

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(Lightfoot, MS; Wittlesey, 1974). The fact that only three jar categories, all gris (T1120, T1141, T1508), have been dated to IIIB suggests that administrative involvement in production and exchange was intensive. The local production of jars in the piedmont (café and crema) clays must have been discouraged either through: 1) administrative sanction; 2) the exaction of high demands for agricultural tribute upon communities forcing the individuals within these communities to concentrate entirely upon farming (Brumfiel, 1976); and/or 3) the large-scale production of very inexpensive ollas which in spite of the distribution costs were still cheaper than locally produced jars.

The mean production step measure (2.68) for IIIB supported the notion that little energy was imparted in the production of Late Classic period pottery (Tables 18, 19). As with the IIIA complex, the vessel categories that were found most frequently in the collections (T1126 - 2.25; T1120 - 2.50) from IIIB had lower production step indices than the mean value calculated for the phase. Evidence for the importance of large scale production processes in ceramic manufacture is indicated by the great frequency of bowls with both rough incipient bases (T1138, T2083) (Blanton, 1978) and bolstered rims (T1122) in the Late Classic period complex (Table 14). Both of these attributes, which result from the employment of mass manufacturing techniques, were more prevalent in the IIIB complex than in any prior phase.

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Interestingly, these two attributes often co-occurred on the G-35 bowls that were found at Monte Albán (Caso, Bernal, and Acosta, 1967:390).

The IIIB complex was also distributed rather homogeneously throughout the region. Of the 42 grid squares occupied in IIIB, G-35 bowls (T1126) (Figure 31) and ollas (Figure 30) were found, respectively, in the IIIB collections from all but two and four of the grid squares (Table 21). As in IIIA, no clear ceramic style zones were apparent, although the cafés (e.g., T2086) (Figure 57) seemed to be most abundant at Monte Albán proper and in the area just south of the capital. There was so little surface decoration on the bulk of the IIIB ceramic complex that nothing similar to the partially discrete clustering of highly decorated Monte Albán II vessels was discernable for this latter phase.

Initially, the results of the contingency table analysis were somewhat perplexing. The Early Classic period (IIIA) complex was distributed very homogeneously across the Valley and it was expected that the IIIB complex would have been distributed just as homogeneously. Yet, it was not. Instead, the IIIB complex was distributed about as evenly as the Monte Albán II complex was (Table 22). As discussed above, this was in part due to the fact that some of the II types, which were distributed discretely, could not be included in the contingency table analysis because they were

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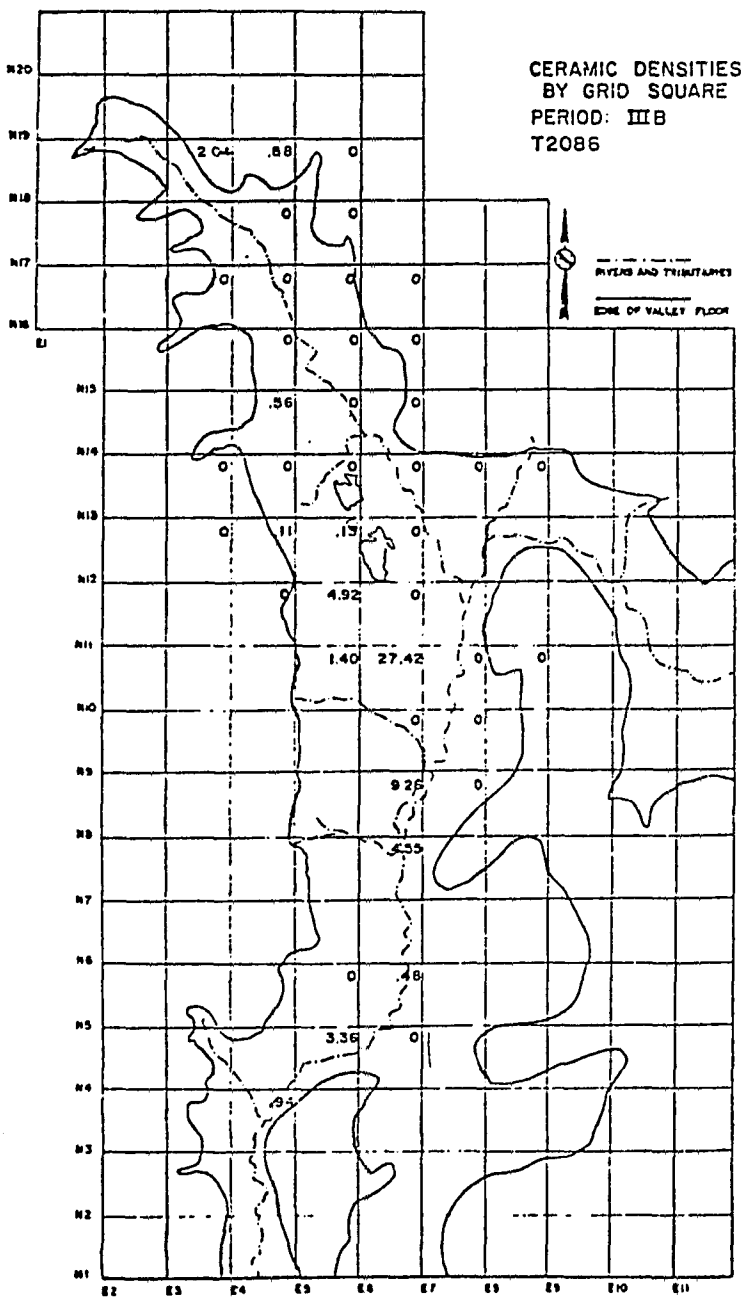

Fig. 57.--Ceramic Densities by Grid Square

Period: IIIB T2086

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too rare. Yet it was also due to the unequal distribution of some of the varieties of Late Classic period G-35's in the survey region.

It should be pointed out that most of the Classic period types were G-35's that were distinguished almost entirely by formal attributes. This is quite different than the Monte Albán I and II complexes in which categorical distinctions were drawn also according to paste and surface treatment. In the IIIB complex, types were based for the most part either upon differences in vessel shape or by the presence or absence of particular attributes on G-35 bowls (i.e., incipient bases, nubbin supports, hollow supports, bolstered rims) (Caso, Bernal and Acosta, 1967; Kowalewski, Spencer and Redmond, 1978). Interestingly, the five G-35 bowl and jar categories, distinguished according to their form [T1120 (olla), T1126 (conical cajete), T1141 (tecomate), T1143 (apaxtli) and T1259 (vertical walled bowl with flanged rim)], were distributed even more homogeneously across the Valley than was the IIIA complex (ϕ^2 = .016) (Table 24). Yet, several varieties of G-35 bowls (T1122, T1138, T1263, T1268 and T1274) were distributed unevenly in the IIIB collections that were made in the survey region (Table 25). The distribution of these varieties was very revealing. It was argued previously that bolstered rims and incipient bases provided evidence of mass production. Thus, these varieties were expected to be most prevalent in the areas

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TABLE 24

IIIB

GRIS WARE DISTRIBUTIONS:

VESSEL SHAPE VARIANTS

Observed:

	Ceramic Categories					
Grid Squares	1120	1126	1141	1143	1259	Total
15 - 18	382	1638	18	16	25	2079
12 - 14	142	716	9	15	4	886
6 - 11	256	639	10	9	2	916
1 - 5	40	133	1	3	0	177
Total	820	3126	38	43	31	4058

Expected:

	Ceramic Categories				
Grid Squares	1120	1126	1141	1143	1259
15 - 18	420	1602	19	22	16
12 - 14	179	683	8	9	7
6 - 11	185	706	9	10	7
1 - 5	36	136	2	2	1

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TABLE 25

IIIB

GRIS WARE DISTRIBUTIONS:

TECHNICAL VARIANTS

Observed:

	Ceramic Categories				
Grid Squares	1122	1263	1268	1274	Total
15 - 18	248	1	9	1	259
12 - 14	142	0	11	2	155
6 - 11	11	19	80	64	174
1 - 5	0	25	0	36	61
Total	401	45	100	103	649

Expected:

	Ceramic Categories			
Grid Squares	1122	1263	1268	1274
15 - 18	160	18	40	41
12 - 14	96	11	24	25
6 - 11	108	12	27	28
1 - 5	38	4	9	10

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where exchange was most heavily administered (in and around Monte Albán). This was indeed the case. More than twice as many (1009) bolstered rim G-35 bowls (T1122) were collected at Monte Albán than were found in the entire Etla, Central and Valle Grande Survey Areas. None of this variety was found in IIIB collections south of grid line N10. The distribution of the G-35 bowls with incipient bases (T1138) was very similar. Only 12 were found in the IIIB collections taken outside Monte Albán while 148 were collected at the capital (Blanton, 1978). None were found in IIIB collections south of grid line N11.

The distributions of the two G-35 bowl types with basal supports (T1263, T1274) (Figures 28, 29) were somewhat different. Interestingly, these bowls were both more costly to produce and more difficult to stack and transport than bowls without supports. Both bowl types were again most abundant at Monte Albán where, if they were made at the capital itself, distribution would not have been a major problem (Blanton, 1978). Yet both of these vessel types were very rare in the Etla and Central Survey Areas, a region perhaps serviced by administratively produced ceramics. Both of the G-35's with supports were most abundant (excluding Monte Albán) in the less heavily administered area south of grid line N9. Although IIIB settlements were sparse in this portion of the Valle Grande, 30 of 45 hollow-supported G-35's (T1263) and 89 of 103 nubbin-supported

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G-35's (T1274) were recovered in the IIIB collections made south of this arbitrary line.

F. Monte Albán IV

At this point Monte Albán IV is the most difficult phase in the Oaxacan sequence to interpret. In part, this is due to the difficulty of chronologically distinguishing this phase from IIIB. It is also partially a consequence of the fact that the Tlacolula Arm, an area known to be important in Monte Albán IV (Bernal and Gamio, 1974; Paddock (ed.) 1966; Peterson, 1976) remains unsurveyed.

At Monte Albán monumental construction ceased at the end of IIIB (Caso, Bernal, and Acosta, 1967:381; Paddock, 1978) though some occupation continued in the central portion of the site for at least part of period IV. Although it is difficult to identify the precise limits of the Early Postclassic occupation at Monte Albán, a known period IV type, the A-7 (T3030), was found on some of the terraces in site subdivisions 2, 4, 6, 7 and 12 (Blanton, 1978). Assuming a population density for the period IV occupation equivalent to that of the prior periods, a population of 4,062 was estimated for Monte Albán. This represented a significant collapse since the Late Classic population of the city was estimated to have been roughly 24,000 (Blanton et al, in press). The total population of the survey area also declined markedly from 42,587 in the Late Classic to 32,436 in period IV (Figure 47).

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Although the problem has been addressed at length (Caso, Bernal and Acosta, 1967; Paddock, 1966, 1973, 1978; Whitecotton, 1977), a convincing explanation for Monte Albán's collapse has not yet been formulated. No such explanation will be offered here; however, two suggestions will be proposed for structuring future investigations on this problem. First, following Blanton (1978), it is suggested that the decline of Monte Albán should be examined in relation to the other major changes which were occurring during the Late Classic period in Mesoamerica. It is suspected (Blanton, 1978; Blanton, et al., MS) that a principal function of the centralized decision-making institution at Monte Albán was interregional diplomacy. Marcus (MS), based on her analysis of the carved stone monuments at Monte Albán, has convincingly argued that meetings between representatives from Teotihuacán and Monte Albán occurred during the Classic period. Thus one would suspect that the collapse of the great Central Mexican urban center towards the end of the Classic period must have had an impact on Monte Albán and the Valley of Oaxaca. Perhaps, with the fall of Teotihuacán, local Valley lords were less willing to support the centralized decision-making structure at Monte Albán and this may have prompted the decline of the capital.

Second, it is proposed that the transition which took place between Monte Albán IIIB and IV in the Valley of

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Oaxaca should be viewed as a fundamental reorganization of the political and economic structure of the region and not merely as the collapse of Monte Albán. The partial abandonment of the Valley capital is easier to understand when examined in relation to other contemporaneous changes which occurred at that time. In addition to the depopulation of Monte Albán, period IV was characterized by: 1) the breakdown of the unified IIIB settlement system into seven discrete settlement clusters, each composed of one, or in some cases two, large head towns and several outlying villages; 2) the separation of these settlement clusters by large blocks of uninhabited terrain (Figure 58); 3) the absence of any single settlement comparable to Late Classic period Monte Albán in either population size or mounded architectural construction; 4) a population decline in the Central Valley (Figure 58); and 5) a population increase in the Valle Grande, especially at Jalieza (3-10-38-58, 60, 63, 64) (Figure 32). This large hilltop settlement located at the juncture of the Valle Grande and Tlacolula Arms (Figure 2) became the largest Valley settlement in period IV.

Although Jalieza was much larger than other contemporaneous centers, the volume of monumental construction at the site was roughly comparable to the volume found at other Early Postclassic centers (Peterson, 1976). Thus it appears that the site did not serve the same pan-regional administrative functions as Monte Albán had during the

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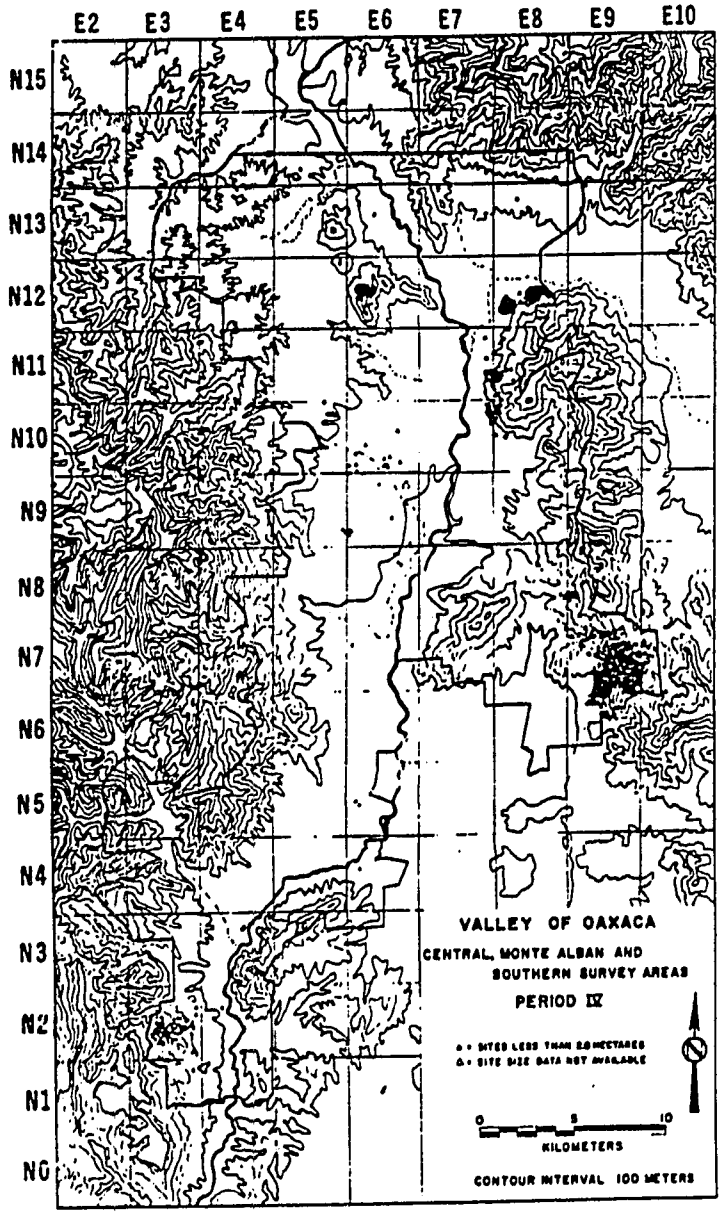

Fig. 58.--IV Settlement Pattern

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Classic period. The results of the interaction potential analysis (see chapter two; Blanton, et al., MS) also suggested that relatively little interaction occurred between period IV centers as a consequence of their rather dispersed spatial distribution.

However, Monte Albán IV was different from the two earlier phases of relative Valley decentralization (Early I and II) in that most of the IV population resided in the risky piedmont zone (Table 23). In fact, almost 97% of the IV population in the survey region was clustered in nine piedmont settlements; seven of which were head towns of settlement clusters. In light of earlier arguments, the concentration of the Early Postclassic population in the piedmont is somewhat of an anomaly given that the period IV regional population was relatively small, the Early Postclassic regional political organization was decentralized, and the amount of trade and interaction between period IV centers appears not to have been great. The only hypothesis that I can offer to help clarify this anomaly is that perhaps the period IV population resided in a nucleated settlement pattern at the upper reaches of the Valley in order to take advantage of defensible locations. Although no evidence exists to satisfactorily evaluate this hypothesis, an increase in intra-Valley warfare might be expected after the fall of Monte Albán and the reorganization of the Valley into semi-autonomous polities.

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Because of the concentration of population in the piedmont, food procurement must have been almost as large a problem for the Early Postclassic head towns as it was for Monte Albán in IIIB (Kowalewski, MSa). The problem may have been particularly serious in dry years when returns from piedmont agriculture would have been somewhat unpredictable. Critical shortages may have recurred regularly during this period as intra-regional exchange was not highly developed. Local lords may have maximized agricultural production with their domains by centrally controlling and administratively producing ceramics and other craft items. Each IV settlement cluster may have approximated the organization of the Late Classic system in miniature. This administrative organization may not have been able to eliminate all food shortages, but it may have stimulated the accumulation of stored food in good years.

The ceramic analysis suggested that the Early Postclassic complex was administratively produced. Three of the four period IV ceramic production places were situated in large settlements with mounded architecture (2-10-2-4; 2-10-67-72; Lambityeco) (Paddock, Mogor and Lind, 1968; Payne, 1970). In addition, the distinctiveness of the Early Postclassic ceramics at Jalieza suggests that pottery may have been manufactured at that center as well. The low mean production step measure (Table 19) for the Monte Albán IV complex also suggested that the pottery from this phase was

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produced through large scale production processes. The fact that period IV mean production step measure was even slightly lower than the IIIB measure was somewhat surprising, however this may have been in part due to our less than total understanding of the variability in the period IV complex. The projected survey of the Tlacolula Arm should help to familiarize us with a greater variety of period IV types. When these types are figured into the mean production step calculations, the period IV index most probably will increase [see Paddock, Mogor and Lind (1968) for an indication of the extent of the period IV variability noted in excavations in the Tlacolula Arm].

Interestingly, the one IV production locus not situated in an administrative center was within the Zaachila settlement cluster. This cluster was distinct from the other IV clusters in several respects. The population of Zaachila was considerably smaller than the population of any other head down. In addition, the population within this cluster resided primarily in the alluvial zone which was largely uninhabited throughout most of the rest of the survey area. Given these differences it is not surprising that the non-administrative settlements in the Zaachila cluster had access to a wider variety of ceramic types than did the non-administrative settlements in the other clusters. It is also not surprising that the differential between the mean number of types found at administrative versus

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non-administrative settlements was less marked in the Zaachila cluster than in any other period IV cluster (Table 26).

In the Classic period the highly standardized IIIA and IIIB utilitarian pottery was distributed homogeneously across the survey region. The period IV assemblage was not. This was not unexpected given that the Valley was "balkanized" into a series of relatively autonomous polities at this time.

The contingency table analysis showed that the IV complex was more heterogeneously distributed than either the IIIA or IIIB complexes (Tables 15, 22). The G-35 olla (T1120) (Figure 34) and bowl (T1126) (Figure 35) were the principal ceramic vessel types and they were found in each settlement cluster but the remainder of the IV complex associated with each cluster of settlements was distinct. Kowalewski (1976) has pointed out that the Monte Albán IV occupations in the western portion of the central area had ceramics that in several ways differed from the IIIB-IV pottery that was found at Monte Albán. The period IV ceramics found at Lambityeco (Paddock, 1978; Paddock, Mogor and Lind, 1968), Jalieza, El Choco and in the Etla Arm were also all quite distinct. Tan and grayish-brown tinted ceramic vessels, made in alluvial clays, were most prevalent within the Jalieza settlement cluster. In the Etla area, which was sparsely populated in IV, café ceramics

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TABLE 26

MEAN NUMBER OF TYPES PER SITE

MONTE ALBÁN IV

Administrative Cluster	Mean Number of Types Administrative Center	Mean Number of Types Non-administrative Site
Jalieza	9.25	4.33
Santa Cruz Mixtepec	10.00	1.00
El Choco	5.75	3.50
Monte Albán	19.00	3.00
Animas	6.00	3.00
2-10-2-4	5.00	N.C.[a]
Zaachila	6.67	5.33

N.C.[a] none of the non-administrative sites in this district were collected.

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(i.e., T2086) were proportionally more abundant (Table 24). The large plain gris storage jars (T1508), however, were most abundant in those period IV settlement clusters located in the southern half of the Valle Grande (El Choco, Santa Cruz Mixtepec, Jalieza). These jars were rarely found in the IV collections made in the central and northern portions of the Valley. Thus, ceramic diversification and the redevelopment of strong local ceramic traditions within the Valley were both initiated with the fall of Monte Albán and the "balkanization" of the Valley in Monte Albán IV.

G. Monte Albán V

Given the problems that the Early Postclassic period head towns must have had with feeding themselves in dry years, it is not surprising that the organization of the Valley changed markedly between Monte Albán IV and V and that period IV was relatively short-lived. In three respects these changes suggest a transition back to the Classic period regional organization. First, the largest Late Postclassic center was again located in the central part of the Valley (Monte Albán-Cuilapan) (Figure 59). Second, the population of the survey region increased by 51% (16,523) to an estimated total that was roughly halfway between the estimates for the Early and Late Classic period (Figure 47). Third, the regional system was apparently more integrated in V than in period IV. This latter change is suggested

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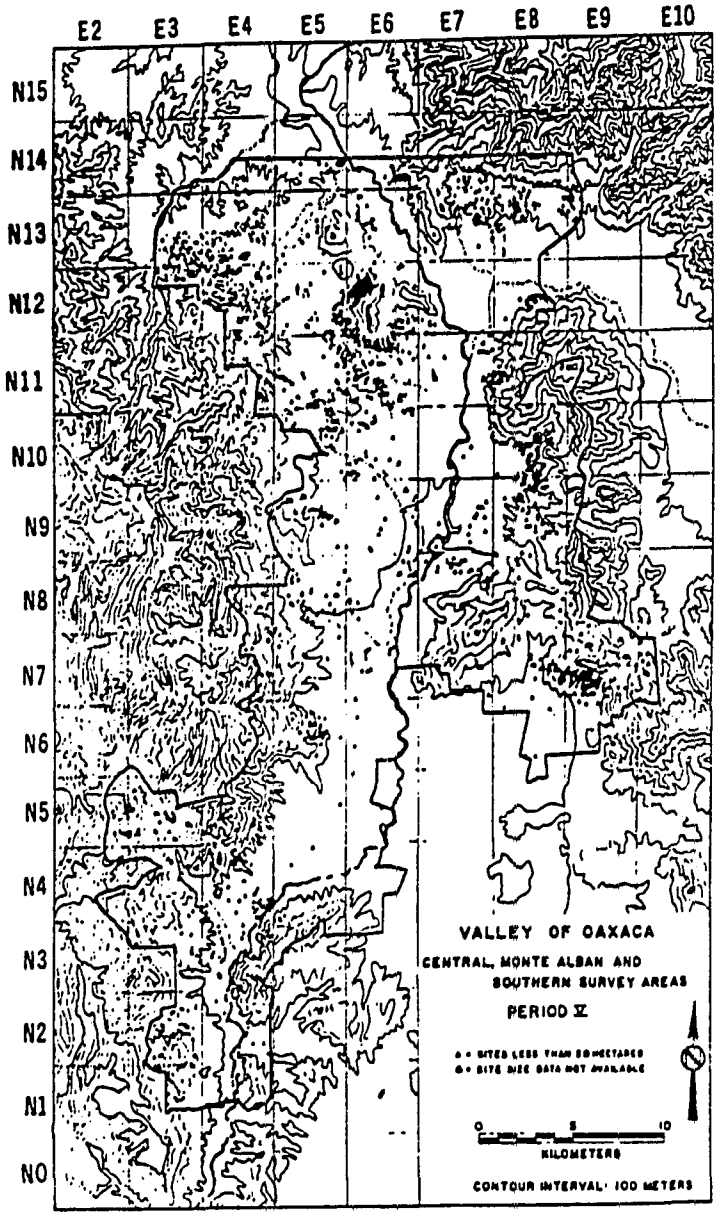

Fig. 59.--V Settlement Pattern

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by the calculation of higher interaction potential measures for period V than for period IV.

Yet upon closer inspection, the major differences between the Valley organization in the Classic period and its structure in the Late Postclassic period appear to have been more significant than the above mentioned similarities. Although Monte Albán-Cuilapan (termed "Cuiban" from now on) was the largest settlement in the region, it does not seem to have served comparable Valley-wide administrative functions to those performed at Monte Albán between Early I and IIIB. There was very little evidence for new construction of mounded buildings at Cuiban. The principal buildings in use at the site were structures that, as far as can be determined, were built in previous eras. Cuiban, in period V, was more similar to Jalieza in Monte Albán IV in that there was no central area of architectural construction comparable to the Main Plaza at Monte Albán. The Late Postclassic period construction at Cuiban was relatively modest in size, and as at period IV Jalieza (Finsten, 1978), it was not concentrated in one area of the settlement.

Several other differences appear to have existed between the Valley organization in the Classic period and its structure in the Late Postclassic. It has been argued that broad region-wide exchange systems probably were in operation during the Classic period in order to cope with periodic imbalances between resources and population. However, although

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the period V population was relatively large (Figure 47), periodic food shortages could have been remedied solely through the operation of local exchange networks (Kowalewski, MSa). This interpretation fits well with the fact that a larger proportion of the V population resided in the less risky alluvial zone than was the case in either IIIA or IIIB (Table 23). Similar to Early I and II, the less intensive occupation of the piedmont zone and the increased importance of local, rather than regional, exchange networks, was associated with the construction of less administrative architecture in the Late Postclassic period.

Thus, the settlements in the Valley of Oaxaca apparently were not integrated by administratively controlled exchange networks in Monte Albán V as they were in IIIA and IIIB. The spatial segregation of administrative and economic activities in the Late Postclassic was indicated by a series of factors. Ethnohistoric materials generally have shown that the most important political center in the Valley at the time of conquest was Zaachila (Whitecotton, 1977:128-129). Yet Monte Albán-Cuilapan (Cuiban) was the most populous settlement in the survey area as well as the Valley's most important locus of obsidian production (Blanton, 1978). It was also the site at which the greatest assortment of different Monte Albán V ceramic vessels were recovered. The distributional analysis of obsidian (Appel, 1979) also supported the notion that Valley administrative and

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economic networks were largely distinct in Monte Albán V. The Late Postclassic was the only period when residents of non-administrative sites actually had greater access to obsidian than did the inhabitants of administrative sites (Appel, 1979). Blanton's (1978) diachronic analysis of the spatial distribution of obsidian production loci at Monte Albán also supports this interpretation. He found that the production places which lacked evidence for Late Postclassic period habitation were spatially proximate to elite residences at the site, while in V there was a much weaker relationship between obsidian production and elite households.

The distribution of the Monte Albán V ceramic production loci also supports this interpretation. Six of the eight known V ceramic production places were located in settlements without mounded construction (Table 20). Not since Early I had the majority of identified loci been located in non-administrative sites. Interestingly, all of the known V production sites were producing gris pottery. Traditionally, this ware was produced administratively while crema and especially café pottery usually were made in smaller non-administrative settlements. Thus it seems probable that the percentage of Monte Albán V ceramic production loci within administrative sites was possibly even over-represented in our sample.

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The locations of these identified ceramic production loci were also revealing. The Tlacolula locus was in a piedmont cave far removed from any administrative architecture (Flannery, et al., MS). Many of the Valle Grande ceramic manufacturing places were located midway between Cuiban and Jalieza in an area devoid of any substantial administrative construction. The locations of these sites were both near alluvial clay beds and within servicing distance of several large centers of population. Thus, from the point of view of the potters, the location would have been optimal. Yet these locations were not especially advantageous for any administrators who wanted to tax or control ceramic manufacturing.

The results of the mean number of types per site analysis (Table 9) for this phase were also consistent with the previously discussed findings. The percentage differential between the mean number of types found at administrative versus non-administrative settlements was less marked in the Late Postclassic than in any prior phase. When the results from V are compared with the findings from IIIB and IV (the only phases when a comparable number of total ceramic categories were defined) an interesting relationship emerges. The access to ceramic products at non-administrative sites increased throughout this three-phase sequence with the most significant increase having occurred between IV and V (Table 9).

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It seems evident that access to at least certain goods was not primarily a function of administrative importance in period V. This is supported by the fact that for the first time since the establishment of Monte Albán, the mean number of types (7.7) found at non-administrative places with populations greater than 100 was larger than the mean number (7.0) recovered at administrative locations (Table 9). It seems likely that the production and distribution of goods in V occurred primarily through commercial exchanges that were not controlled administratively. The differences between this system of exchange and the network of exchange that operated during the Classic period can be shown by examining the changes in the access to ceramic products in the central part of the Valley. During the Classic period, rural settlements close to Monte Albán had access to the fewest mean number of types per site. These sites only had access to the highly standardized vessels that were produced and distributed administratively. In V, however, the non-administrative settlements located within Cuiban administrative district averaged 5.3 types per site or more than the mean found in all non-administrative sites (4.8). All non-administrative settlements within ten kilometers of Monte Albán averaged 4.60 types per site, a figure just below the regional mean for these settlements. Thus, greater articulation with the Valley's largest center may have served to increase, and certainly

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no longer acted to decrease, the flow of goods into non-administrative settlements during Monte Albán V. At the same time, those non-administrative sites furthest from Cuiban (in the El Choco administrative district) had access to only a mean of 3.85 types/site.

Economic transactions in Monte Albán V were for the most part both localized and segregated from administrative control. Yet the degree of interaction between Valley settlements was apparently substantial. Thus interaction was primarily commercial (Appel, 1978, 1979). Relative to earlier phases, increased competition between ceramic producers therefore was expected. If this were indeed the case, an expanded energy input per vessel would be predicted to characterize the V ceramic complex. Additionally, the ceramics of V were expected to have been both relatively variable and heterogeneously distributed. In short, the Monte Albán V complex should have been the diametric opposite of the IIIB complex.

These expectations were borne out in this analysis. The Monte Albán V ceramics had the highest mean production index (5.4) of any prehispanic phase in the Oaxacan sequence (Tables 18, 19). The most "costly" ceramic category, polychromes (T5007), with the highest production step index, dated to the Late Postclassic. In addition, the most abundant plain gris vessels (T1104) from Monte Albán V were both much better fired and far more carefully surface fin-

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ished than were the most common Classic period vessel categories (G-35's). This bowl type had a production step index of 5.00, while the index for its earlier counterparts, the G-12 and G-35, were 4.00 and 2.25 respectively.

The Monte Albán V complex was less standardized and more variable than the Late Classic or Early Postclassic period complexes. No one ceramic vessel was as predominant as was the G-35 bowl in IIIB and IV. The number of different ceramic wares found in the Valley in the Late Postclassic period also increased. Cremas which were not produced in IIIB and IV were again manufactured in V. The greatest change, however, was the marked increase in the number of different jar types. No longer were jars manufactured primarily in a single paste. Monte Albán V jars were made in gris (T1109), café (T2221, T2222) and crema (T0423).

In addition, very little excavation has been completed at the Late Postclassic period sites in the Valley. Thus most of the known variability in the period V complex has been discovered through survey. As the area surveyed has been expanded, the recognized variability in the V complex has been increased significantly. In part this has been due to the great spatial variability that existed in this complex. As with the Monte Albán IV ceramic complex, it seems clear that the known variability (and consequently

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the number of known ceramic categories) in the V complex will be expanded once the Tlacolula Arm has been studied. Thus the rough equivalence in the number of types recognized for IIIB, IV and V may be largely due to the amount of analysis that has been done on the occupations dated to these phases and not to the full extent of the real ceramic variation that was associated with each of these phases.

The period V ceramic complex was not distributed evenly across the Valley. In fact, the contingency table analysis revealed that as a whole the V assemblage was distributed more heterogeneously than were the complexes dated to any other phase (Tables 9, 16). The plain G-3M (T1104) (Figure 60) bowls were found pretty much throughout the region in 66 of 71 of the grid squares occupied in V. But the distribution of ollas was much less uniform. The predominant olla type (T1109) (Figure 61) was only found in 56 of the 71 grid units that were inhabited in Monte Albán V (Table 21). The fact that bowls were distributed more evenly across the region was expected given the comparative ease of transporting these vessels as compared to jars.

The different V wares were found to be most abundant in the different sub-areas of the Valley (Figures 62-64). All three crema ceramic vessels (T0423, T0424, T5425) were most commonly found in the western portion of

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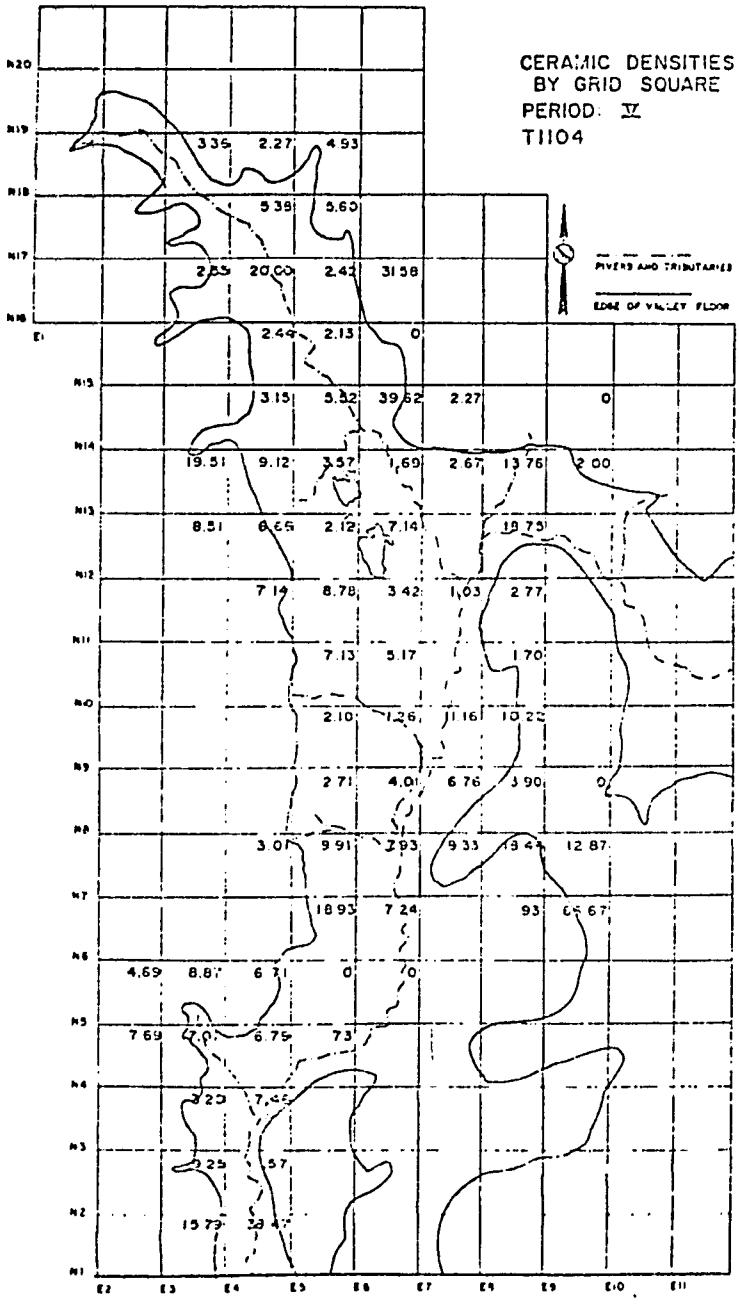

Fig. 60.--Ceramic Densities by Grid Square

Period: V T1104

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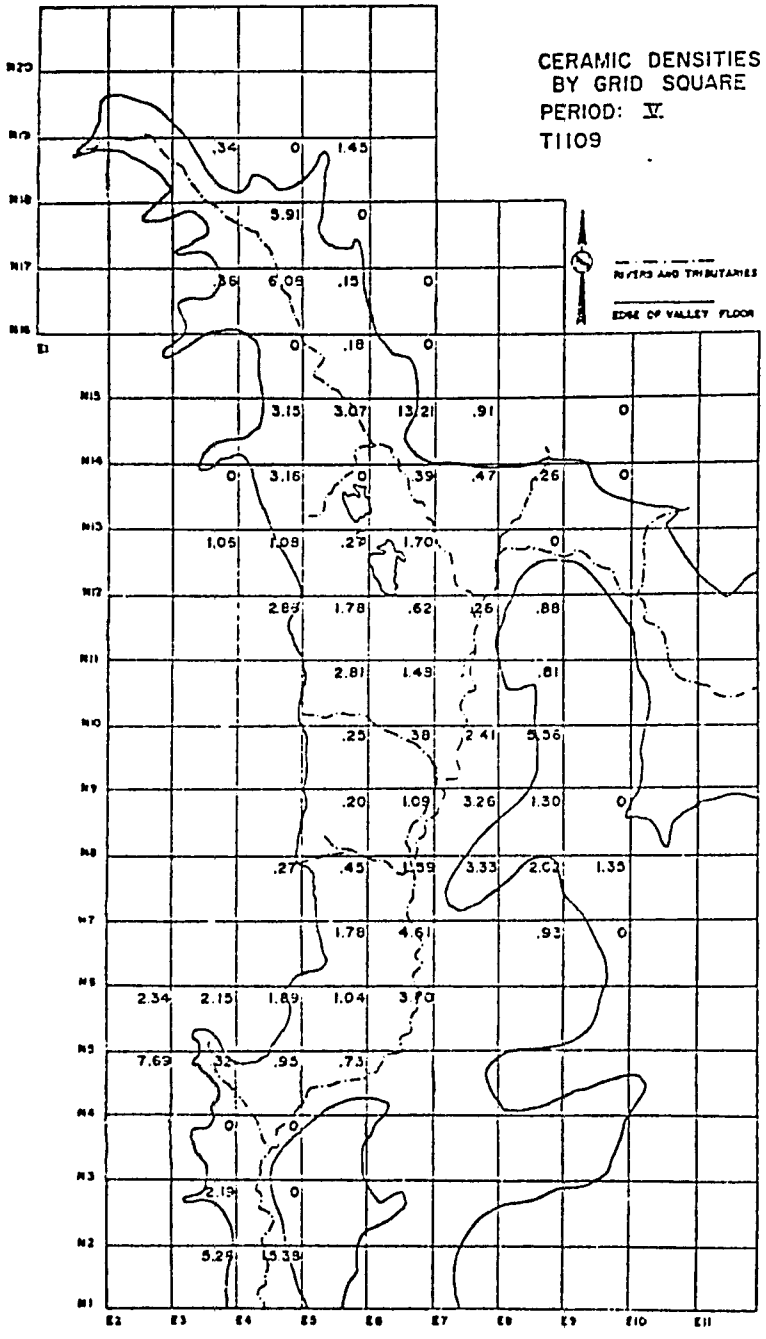

Fig. 61.--Ceramic Densities by Grid Square

Period: V T1109

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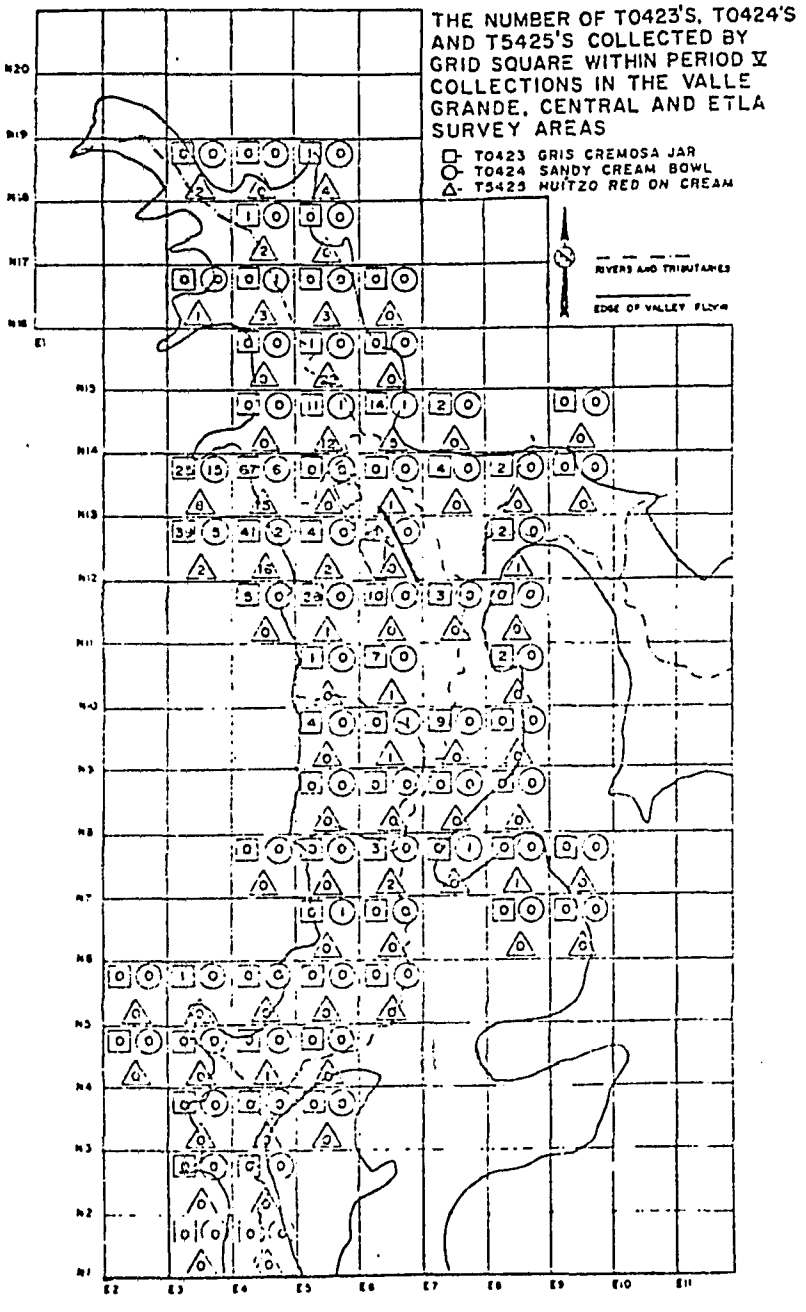

Fig. 62. The number of T0423's, T0424's, T5425's collected by Grid Square within Period V collections in the Valle Grande, Central and Etla Survey Areas.

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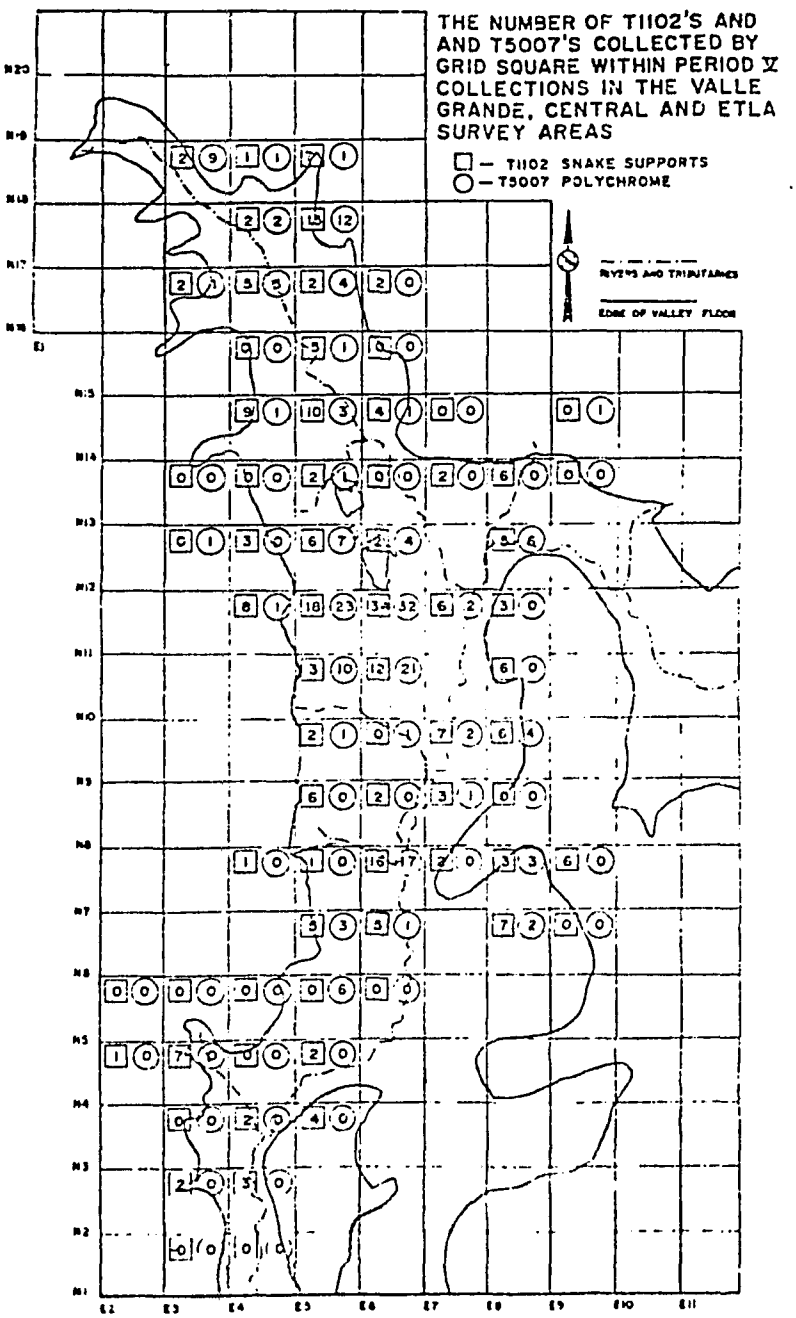

Fig. 63.--The number of T1102'a and T5007's collected by Grid Square within Period V collections in the Valle Grande, Central and Etla Survey Areas.

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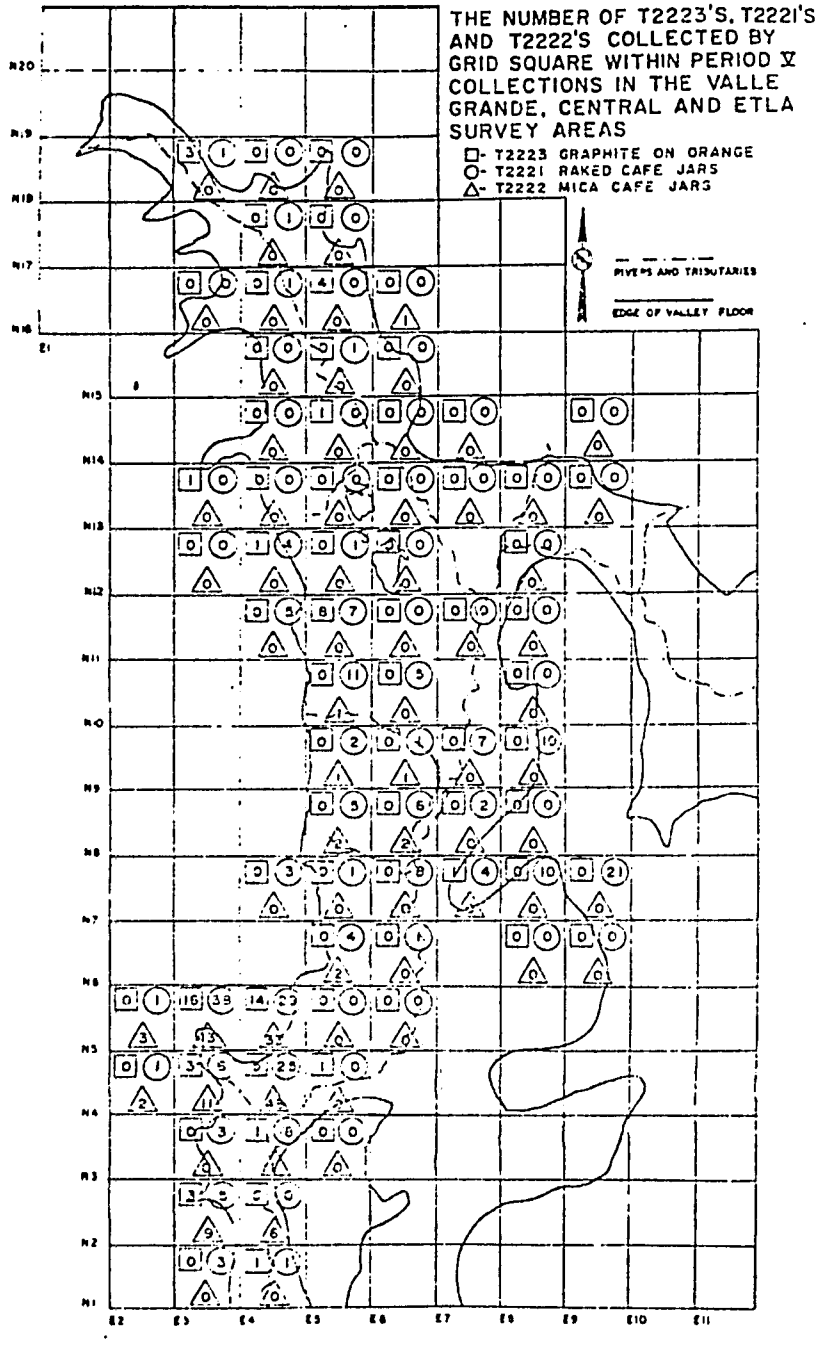

Fig. 64.--The number of T2223's, T2221's, and T2222's collected by Grid Square within Period V collections in the Valle Grande, Central and Etla Survey areas.

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the Central Valley Survey Area (Figures 42-44). The four cafe types (T2221, T2222, T2223, T2224) (Figures 38-41) were most densely distributed in the southern half of the Valle Grande. Most of the V gris vessels were found through the survey region although they were most abundant in both the central and eastern portion of the Etla region (Figures 65-67). Polychromes (T5007) (Figure 68) were also found to be most common in the central and Etla portions of the Valley.

IV. Summary

In summary, the general hypothesis that the relative degree of overlap between economic and political networks generally did associate with the structure of Valley-wide ceramic production and distribution through time was supported. Relatively high degrees of overlap (i.e., Late I, IIIA, IIIB, IV) were associated with centralized administratively controlled production and/or distribution while relatively low degrees of overlap (i.e., Early I, II and V) were associated with more localized, autonomous ceramic production/distribution networks. These latter networks were associated with competition between producers and a high amount of energy investment per pot while the former were associated with the predominance of large scale production techniques.

In addition, it was noted that large scale ceramic production industries operated during those phases (Late I,

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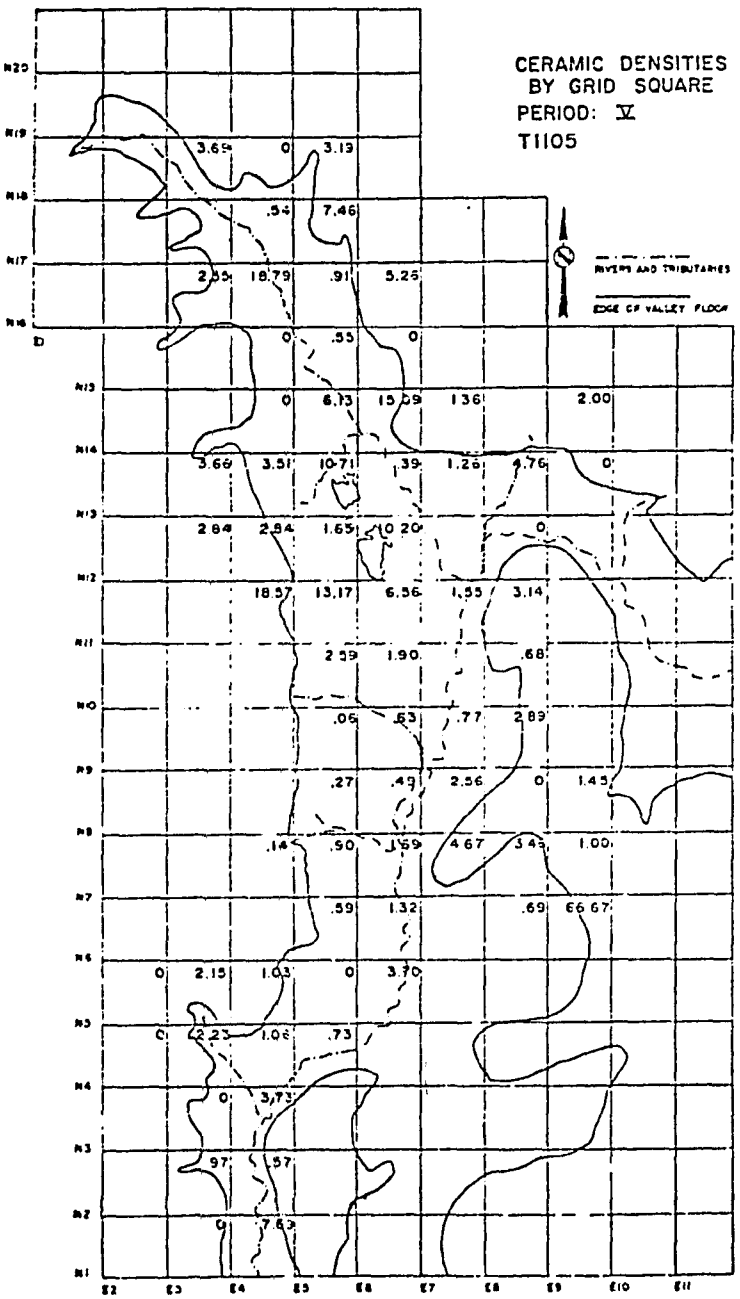

Fig. 65.--Ceramic Densities by Grid Square

Period: V T1105

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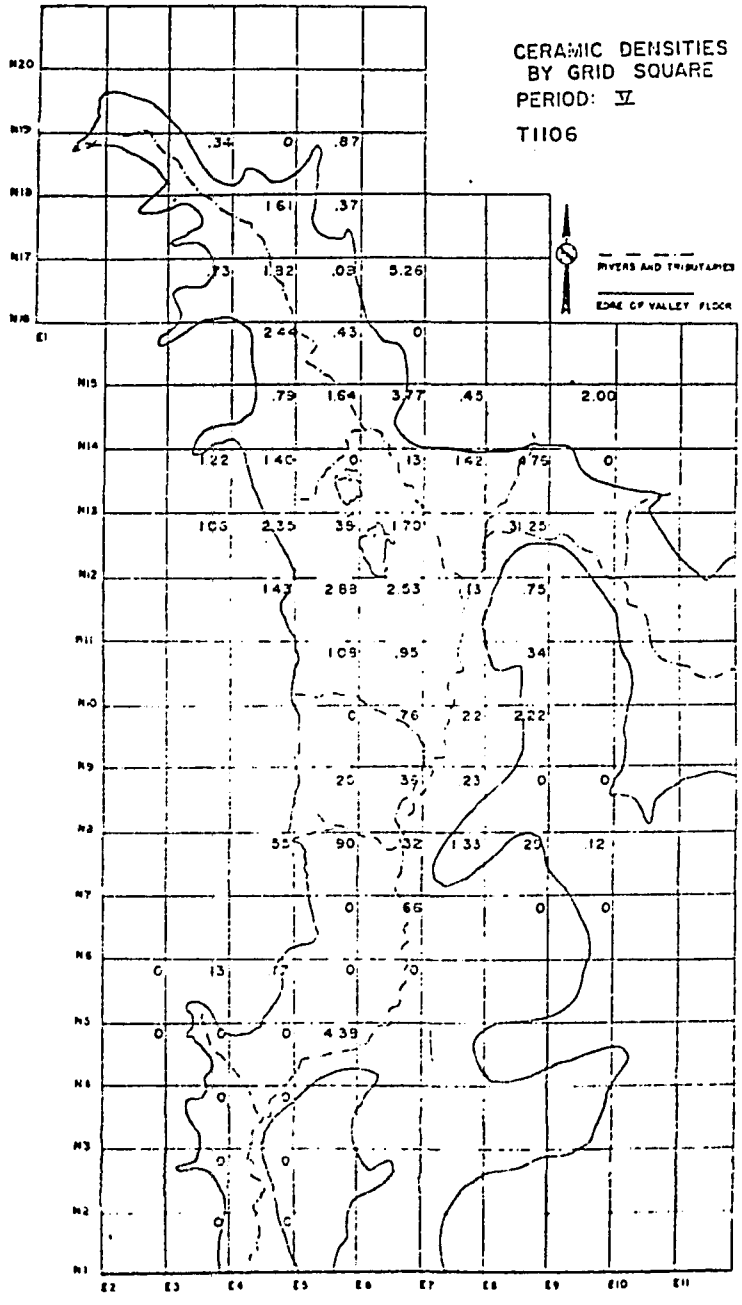

Fig.66.--Ceramic Densities by Grid Square

Period: V T1106

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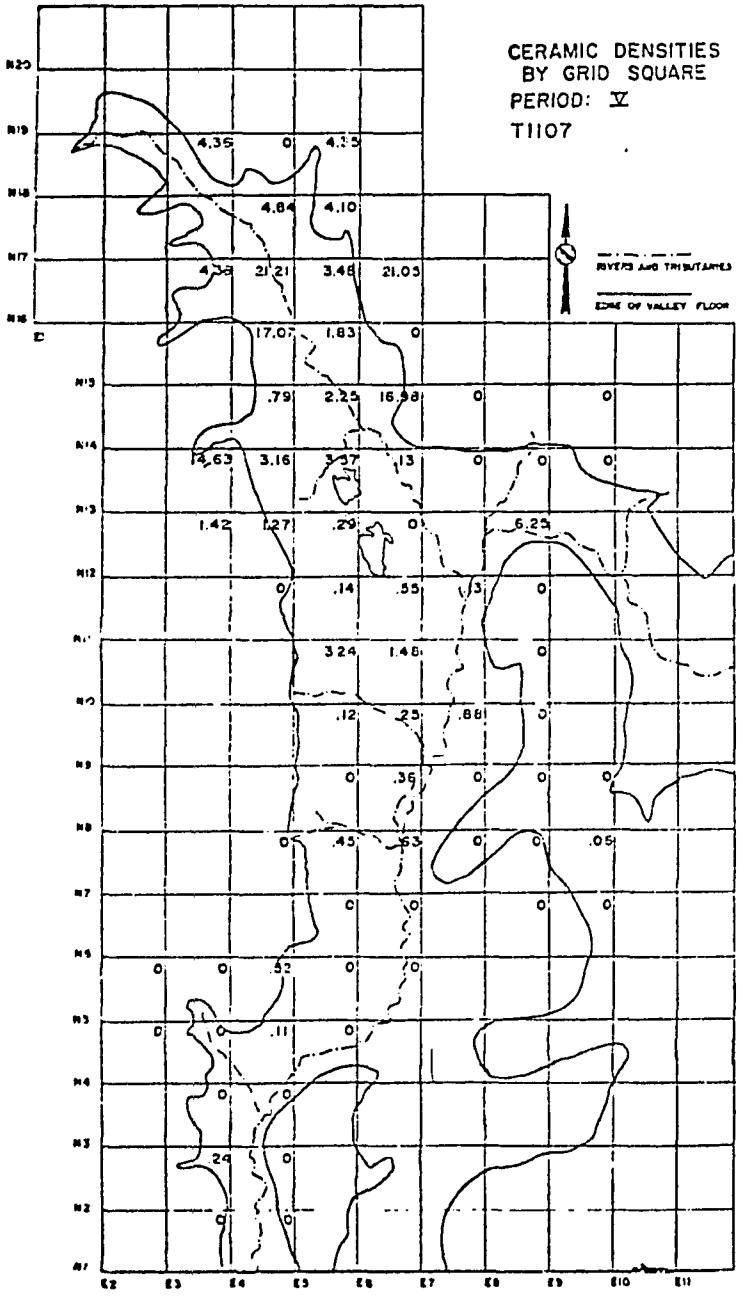

Figure 67.--Ceramic Densities by Grid Square

Period: V T1107

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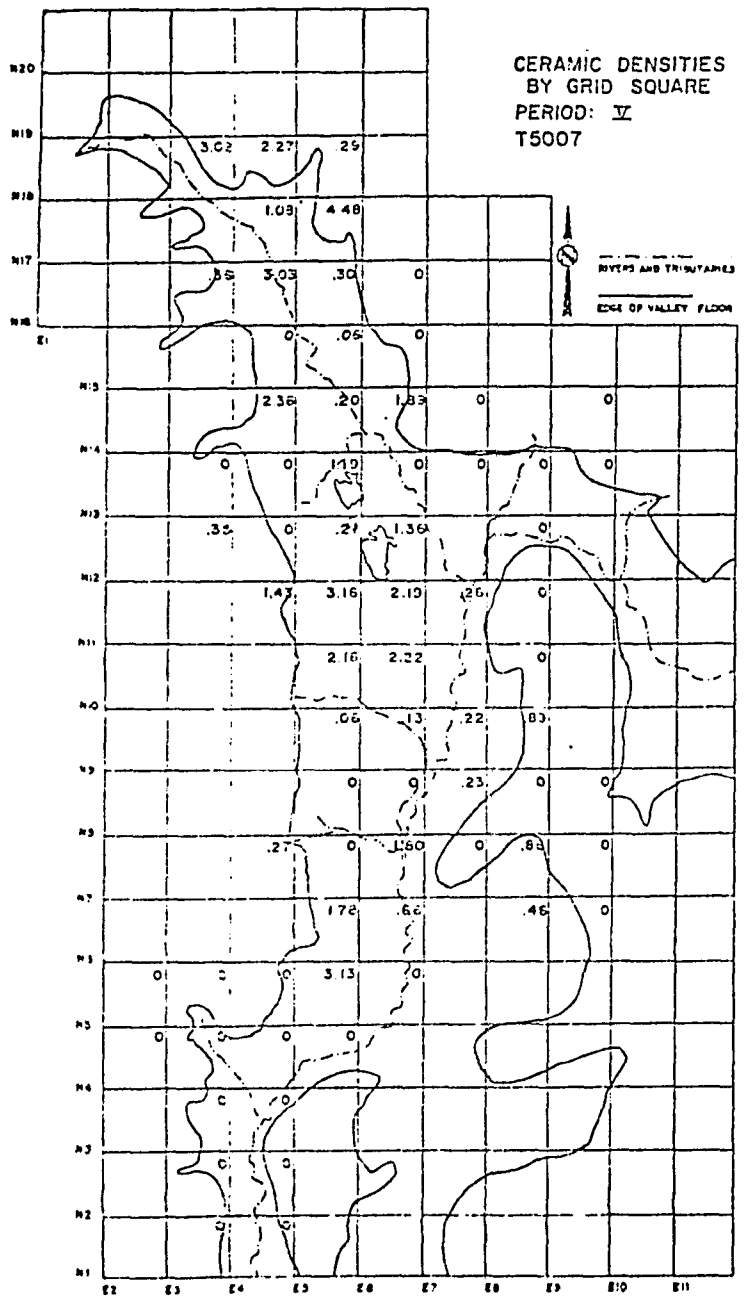

Fig. 68.--Ceramic Densities by Grid Square

Period: V T5007

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IIIA, IIIB) when periodic, localized food shortages must have been a serious problem for Valley administrators. At these times, large scale ceramic production was apparently part of a Valley-wide strategy that included intensive farming in the piedmont zone and the operation of region-wide systems of exchange. Alternatively, more decentralized ceramic manufacturing strategies were shown to have existed during those phases (Early I, II, V) when Valley agriculture was oriented more to the less risky alluvial zone and when temporary population-resource imbalances could have been resolved through the operation of localized exchange networks alone. At this point, Monte Albán IV remains somewhat of an enigma that hopefully will be better understood following additional research.

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CHAPTER V

SUMMARY AND CONCLUSION

This manuscript concludes with a brief review of the results of the analyses discussed in the three previous chapters. As these findings are summarized, some of the possible implications of this study for future research are addressed. Following the general organization of this manuscript, this review initially examines issues relating to the regional ceramic chronology. It then focuses on ceramic production and distribution. Finally, the review concludes with a discussion of long-term change in the Valley of Oaxaca and the implications of this study for the examination of change in other areas.

In chapter two, several suggestions are offered which, hopefully, should enable archaeological researchers in the Valley to more easily distinguish the ceramics from Monte Albán IIIA, IIIB and IV. The differentiation of these three phases has long been a difficult problem for archaeologists working in the region (Caso, 1965; Caso, Bernal, and Acosta, 1967; Paddock, 1978). In addition, it has been noted that within the Valley, the Postclassic ceramic complexes (Monte Albán IV and V) were characterized by far greater spatial variability than were the Classic period complexes (Monte Albán IIIA and IIIB). Consequently, given

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the limited number of Postclassic sites that have been excavated, it is suggested that we as yet do not understand the full range of the diversity in the Valley's Postclassic ceramic complexes.

Chapter three focused on the identification and analysis of ceramic production sites in the prehispanic Valley of Oaxaca. A set of criteria was defined for this purpose and these criteria were utilized to interpret ceramic data collected during the settlement pattern survey. Systematically collected diachronic information concerning the nature, size and distribution of ceramic production places is not available from many other regions of comparable size (e.g., Irwin, 1978; Johnson, 1973, MS). Yet, this kind of information must be gathered if we are ever going to understand the development of large scale systems of pottery production and the relationship of these developments to other societal changes.

The analyses of regional ceramic distributions discussed in chapter four also have yielded some interesting results. The measurements of the relative homogeneity/heterogeneity of the ceramic distributions for each pottery complex have yielded information on the changes in the intra-regional organization of ceramic exchange. These findings have been utilized to support the conclusions that were derived independently from Kowalewski's (MSa) analysis of land use. This kind of ceramic distributional analysis

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also may prove useful (Blanton, et al., MS) for measuring changes in regional integration (Yoffee, 1979), a concept that has been discussed in relation to developmental change but rarely quantified. In short, the availability and analysis of pottery collections from a large survey region has led to several interesting observations concerning production and exchange which could not have been made without the set of ceramic data. Other regional studies (e.g., Sanders, et al., 1979) which have not analyzed or published data from their ceramic collections have therefore left a potentially interesting source of information insufficiently examined.

In this study, the ceramic production step measure, although somewhat rough, has proven useful for comparing different ceramic complexes. This index should also have utility for comparing the differential distribution of contemporaneous ceramic vessels across specific regions. For example, using this measure, the labor inputs involved in the construction of different kinds of vessels can be quantified, and the distribution of these ceramics across contemporaneous sites in a region can then be examined. In this way, it will be possible to compare between different classes of sites (e.g., large sites versus small sites; sites with administrative functions versus sites without administrative functions) the differential access to ceramic vessels that required varying amounts of labor input during

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production.

Chapter four examined the principal problems set forth in this analysis through an investigation of long-term change in the Valley of Oaxaca. Since this research is concerned primarily with shifts in the nature of the articulations between regional political and economic systems in state-level polities, this investigation principally focused on Monte Albán Early I through Monte Albán V (i.e., 500 B.C. through 1521 A.D.). It now appears that this former phase, which was marked by the foundation of the hilltop center of Monte Albán, was the initial period during which a state level political organization developed in the region (Blanton, 1976b, 1978). The development of the state in the Valley of Oaxaca during Early I is suggested by the existence of a three-level hierarchy of settlements with administrative functions (Johnson, 1973, MS; Wright, 1977) by that phase (Blanton, et al., in press). Prior to the foundation of Monte Albán, only two tiers of settlements with evidence of administrative activities could be distinguished (Blanton, et al., in press; Fisch, 1978).

This study also indirectly supports some of Blanton's (1976b, 1978) suggestions concerning the origins of Monte Albán. If, as suggested here, the administrators at Monte Albán during Early I had relatively little control over regional production and exchange, it would seem likely, following Blanton (1978), that the hilltop center may have

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initially served important Valley-wide functions relating to offense-defense. Marcus' analyses (1976, MS) of the period I carved stone monuments from Monte Albán also support this contention.

The principal expectation that the relative degree of overlap between economic and administrative institutions generally would associate with the structure of region-wide ceramic production and distribution through time was supported. Relatively high amounts of articulation (i.e., Late I, IIIA, IIIB, IV) were associated with centralized administratively influenced production and/or distribution while comparatively low degrees of overlap (i.e., Early I, II, V) were associated with more localized, independent ceramic production/distribution systems. These latter systems were associated with competition between producers and a high energy investment per vessel, while the former were linked with large scale production techniques and relatively little labor input per vessel.

Additionally, it was noted that large scale ceramic manufacturing systems operated at those times (Late I, IIIA, IIIB) when the regional population was relatively nucleated and when periodic, localized food shortages were most probably a critical problem for Oaxacan administrators. During these phases, it seems likely that supplying Monte Albán and other large centers (e.g., Jalieza in IIIA) with their required quantity of grain would in certain years have been a

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serious concern. These urban centers could not have supplied sufficient quantities of grain each year to feed themselves from their immediate catchment areas (Kowalewski, MSa). In the Late Classic, for example, the entire central part of the Valley most probably would have had to import maize regularly. One administrative strategy that could have, at least partially, resolved this problem would have been to encourage intensive farming in the Valley's piedmont zone. In this rather unpredictable area, occasional bumper crops of maize could have been produced periodically. Almost every year, some portion of the piedmont would have had a bountiful harvest. Thus, if intensive piedmont farmers were located throughout the piedmont zone, a surplus large enough to feed at least a great percentage of Monte Albán's population should have been available annually. This administrative strategy would have worked as long as: 1) piedmont agriculturalists continued to farm intensively, taking advantage of wet years to produce surpluses, 2) the surpluses were extractable, and 3) piedmont farmers were supplied with grain in dry years when they lost their produce. Consequently, it is not surprising that Valley administrators may have tried to encourage intensive piedmont farming by supplying these areas with cheap mass-produced ceramic vessels (and perhaps other craft goods). Supplying non-agricultural goods to the piedmont would have both encouraged intensive farming and enabled Valley administrators

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to acquire grain regularly from piedmont producers. The existence of region-wide exchange systems during these phases also is not unexpected, given that grain would have been continually moved across the Valley to feed the farmers in those areas of the piedmont that did not produce. In this regard, it appears that the bumper crops from portions of the piedmont not only would have fed a large percentage of Monte Albán, but in most years, they also could have been used to feed the non-productive parts of the piedmont. Thus, large scale ceramic production was apparently part of a Valley-wide strategy that included intensive piedmont farming and the operation of region-wide exchange networks. Alternatively, more decentralized ceramic production occurred during those phases (Early I, II, V) when Valley agriculture was oriented more toward the less risky alluvium and when temporary population-resource imbalances could have been alleviated through the operation of localized exchange networks alone.

Several additional conclusions can be drawn from this research. Based on the results of the regional survey, it seems clear that population growth and the intensification of land utilization, especially in the piedmont zone, seem to be closely interrelated; however, both appear to be causally consequent to the institution of specific administrative strategies. Through time, regional changes in land use and population did not occur at linear or regular rates.

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The shifts in these subsystems also did not occur in homogeneous fashion across the region. Rather, the shifts in land use and population were quite complex and they appear to have been most extreme in the highly administered central portion of the Valley.

Similarly, the organization of ceramic production seems to have changed in response to shifts in the Valley's political organization. Consequently, it is safe to conclude that in the prehispanic Valley of Oaxaca, and probably in most other regions as well, ceramic production can best be understood in a broad systemic context. Simple models of linear or progressivistic change in technological processes could not satisfactorily explicate the complex cycles of change in the Oaxacan ceramic industry, and there is no reason to believe that such interpretations will work in other regions either.

Although the predicted relationship between the organization of the ceramic production system and the degree of isomorphism between economic and political networks in the Valley was well supported when examined within each of the seven Monte Albán phases, the predictions were met even more closely when the relationship was examined as a series of processual transitions between phases. The directions of the changes in the ceramic production industry occurred as retrodicted for all of the temporal transformations, between Monte Albán Early I and Monte Albán V (Table 27).

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TABLE 27

TRANSITIONAL CHANGES IN THE DEGREE OF ISOMORPHISM BETWEEN ECONOMIC AND POLITICAL NETWORKS AND THE ORGANIZATION OF CERAMIC PRODUCTION-DISTRIBUTION

Phase - Phase Transitions	Degree of Isomorphism between Economic and Political Networks	Organization of Ceramic Production-Distribution
Early I - Late I	increased	increased scale
Late I - II	decreased	decreased scale
II - IIIA	increased	increased scale
IIIA - IIIB	relatively constant; perhaps slight increase in scale	relatively constant; perhaps slight increase in scale
IIIB - IV	decreased	relatively constant; perhaps slight decrease in scale
IV - V	decreased	decreased scale

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Consequently, following F. Plog (1979:223) and Renfrew (1979:38-39), it is suggested that in studying change one must not only examine the strength of the correlations or associations between specified variables within certain temporal units, but one should also examine the patterning in the transformations themselves.

Finally, it is recognized that this research represents only a preliminary attempt to address the very complex relationships that have been discussed above. The primary intent is to ask a set of new questions about societal change which can then be initially operationalized through the analysis of data from regionally-oriented research projects. Future research will hopefully far surpass this study in both the sophistication of the questions asked and the rigor of the analytical methods employed.

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APPENDIX I

DESCRIPTION OF CERAMIC CATEGORIES

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CATEGORY: 0423

PERIODIZATION: V

PASTE: Gris Cremosa or Sandy Cream

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Common features are short, outcurved rims and incipient annular bases.

SURFACE TREATMENT:

Interior: Variable

Exterior: Light raking (identical to 2221).

CATEGORY: 0424

PERIODIZATION: V

PASTE: Gris Cremosa or Sandy Cream

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: See G-3M bowl description (Caso, Bernal and Acosta, 1967:448).

SURFACE TREATMENT:

Interior: See G-3M bowl description

Exterior: Burnished

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CATEGORY: 0600

ALT. DESIGNATION: Tierras Largas Burnished Plain (Winter, 1972:314-315)

PERIODIZATION: Tierras Largas phase

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Hemispherical bowls with plain or slightly incurved rims. Thin walls.

SURFACE TREATMENT: Streaky burnished

DECORATION: Some have punctations on the rim.

CATEGORY: 0601

ALT. DESIGNATION: Tierras Largas Burnished Plain (Winter, 1972:314-315)

PERIODIZATION: Tierras Largas phase

PASTE: Crema

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Elongated jars with tall out-curving necks. Thin walls.

SURFACE TREATMENT: Streaky burnished on exterior. Interiors are either pocked, smooth or wiped.

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CATEGORY: 0602

ALT. DESIGNATION: Clementina Red-on-Buff (Winter, 1972: 314-315)

PERIODIZATION: Tierras Largas phase

PASTE: Crema

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Hemispherical bowls with flattened rims.

SURFACE TREATMENT: Well burnished

DECORATION: Painting: Red (usually specular) paint applied either to the rim alone, in geometric designs, or over the entire vessel.

ADDITIONAL COMMENTS: Relatively fine temper.

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CATEGORY: 0603

ALT. DESIGNATION: Avelina Red-on-Buff (Winter, 1972:315)

PERIODIZATION: Tierras Largas phase

PASTE: Crema

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Hemispherical bowls with rounded bases.

SURFACE TREATMENT: Burnished

DECORATION: Painting: Red paint.

ADDITIONAL COMMENTS: Usually fired at a low temperature and appears coarse.

CATEGORY: 0604

ALT. DESIGNATION: Avelina Red-on-Buff (Winter, 1972:315)

PERIODIZATION: Tierras Largas phase

PASTE: Crema

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Jars with outcurved necks.

SURFACE TREATMENT: Burnished

DECORATION: Painting: Red paint.

ADDITIONAL COMMENTS: Usually fired at a low temperature and appears coarse.

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CATEGORY: 0605

ALT. DESIGNATION: Matadamas Orange (Winter, 1972:315)

PERIODIZATION: Tierras Largas phase

PASTE: Crema

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Hemispherical bowls with flattened bases.

SURFACE TREATMENT: Burnished

DECORATION: Slipped surface: Orange on surface similar to Tierras Largas Burnished Plain.

CATEGORY: 0606

ALT. DESIGNATION: Matadamas Orange (Winter, 1972:315)

PERIODIZATION: Tierras Largas phase

PASTE: Crema

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Elongated jars with high outcurved necks.

SURFACE TREATMENT: Burnished

DECORATION: Slipped surface: Orange slip on surface similar to Tierras Largas Burnished Plain.

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CATEGORY: 0607

ALT. DESIGNATION: Matadamas Orange (Winter, 1972-315)

PERIODIZATION: Tierras Largas phase

PASTE: Crema

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Tecomate

SURFACE TREATMENT: Zoned dentate stamping on burnished surface.

DECORATION: Slipped surface: Orange slip on surface similar to Tierras Largas Burnished Plain.

CATEGORY: 0608

ALT. DESIGNATION: Matadamas Red

PERIODIZATION: Tierras Largas phase

PASTE: Crema

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Hemispherical bowls with flattened bases.

SURFACE TREATMENT: Burnished

DECORATION: Slipped surface: Red slip on surface similar to Tierras Largas Burnished Plain.

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CATEGORY: 0609

ALT. DESIGNATION: Matadamas Red

PERIODIZATION: Tierras Largas phase

PASTE: Crema

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Elongated jars with high out-curved necks.

SURFACE TREATMENT: Burnished

DECORATION: Slipped surface: Red slip on surface similar to Tierras Largas Burnished Plain.

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CATEGORY: 0610

PERIODIZATION: II

PASTE: Fine Crema

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Various thin bowls though not cylindrical with hollow feet.

SURFACE TREATMENT: Interior and exterior always treated. Usually burnished although occasionally surfaces are wiped or scraped. Slipping occurs on some vessels.

ADDITIONAL COMMENTS: This category is for thin, Fine Paste period II bowls that do not fit into already defined categories.

CATEGORY: 1108

CBA DESIGNATION: G-3M. Form is similar to Figure 384a. (Caso, Bernal and Acosta, 1967).

PERIODIZATION: V

PASTE: Gris

vessel form;

General Shape Mode: Bowl

Specific Shape Mode: Cylindrical

SURFACE TREATMENT: Interior and exterior burnished.

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CATEGORY: 1109

CBA DESIGNATION: G-3M

PERIODIZATION: V

PASTE: Gris

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Unknown (Misc. body sherds).

SURFACE TREATMENT:

Interior: Plain or wiped

Exterior: Burnished

CATEGORY: 1120

ADDITIONAL PERIODIZATION: IIIA

CATEGORY: 1137

ADDITIONAL PERIODIZATION: IIIA, IV

CATEGORY: 1138

ADDITIONAL PERIODIZATION: Rare in IIIA, IV

CATEGORY: 1274

ADDITIONAL PERIODIZATION: IV

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CATEGORY: 1310

ADDITIONAL COMMENTS: In some cases it appears that the flaw would not have been serious enough to prevent normal use of vessel.

CATEGORY: 1400

CBA DESIGNATION: G-3M. Page 451, Figure 381 (Caso, Bernal and Acosta, 1967).

PERIODIZATION: V

PASTE: Gris

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Thin hemispherical or outleaned wall bowl with slightly flared rim.

SURFACE TREATMENT: Interior and exterior burnished.

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CATEGORY: 1500

ALT. DESIGNATION: Delfina Fine Gray (Winter, 1972:316)

PERIODIZATION: Middle Formative

PASTE: Gris

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Cylindrical

SURFACE TREATMENT: Excised; often with Olmec style motifs.

ADDITIONAL COMMENTS: Very hard, fine ware with metallic sheen.

CATEGORY: 1501

ALT. DESIGNATION: Socorro Fine Gray

PERIODIZATION: Guadalupe, Rosario, and Monte Albán I.

PASTE: Gris (Better fired and harder than Fidencio Coarse.)

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Outleaned wall bowls.

SURFACE TREATMENT: Streaky burnished; usually plain.

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CATEGORY: 1502

ALT. DESIGNATION: Socorro Fine Gray

PERIODIZATION: Guadalupe phase

PASTE: Gris (Better fired and harder than Fidencio Coarse.)

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Olla; some with wide mouths.

SURFACE TREATMENT: Streaky burnished; often with incising on either interior or exterior.

CATEGORY: 1503

ALT. DESIGNATION: Socorro Fine Gray (Drennan, 1976a:56)

PERIODIZATION: Rosario phase (Elaborate versions of the line break motif can appear in Monte Albán Early I).

PASTE: Gris

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Outleaned wall bowls.

SURFACE TREATMENT: Streaky burnished with incising on the interior rim or upper surface of out-curving rims. Incised motifs include the pennant motif, the crescent motif, the line break motif and incised wavy lines (Drennan, 1976a:56-58).

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CATEGORY: 1507

CBA DESIGNATION: None

PERIODIZATION: II-IIIA

PASTE: Gris

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Various

SURFACE TREATMENT: Cream or brown slip on at least one surface of vessel.

CATEGORY: 1508

PERIODIZATION: III-IV

PASTE: Gris

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Large thick storage vessel.

SURFACE TREATMENT: Exterior streaky burnished, scraped or wiped and interior rough.

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CATEGORY: 1509. Like 1333 and 1334 in being notched, but these are not everted.

CBA DESIGNATION: G-15,G-17, pp. 25, 32, 35 (Caso, Bernal and Acosta, 1967).

PERIODIZATION: I

PASTE: Gris

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Flaring or outcurving rims with notches.

SURFACE TREATMENT:

Interior: Burnished

Exterior: Smoothed and/or burnished

DECORATION: Plastic Decoration: Fine or wide-line incising occasionally.

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CATEGORY: 1510 (Replaces 1331, 1336, 1340).

CBA DESIGNATION: G-15, G-17, pp. 32, 35, Figure 12, rows 1 and 2 and row 3, second and third from left (Caso, Bernal and Acosta, 1967).

PERIODIZATION: Late I

PASTE: Gris

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Rims everted or flaring.

SURFACE TREATMENT:

Interior: Burnished

Exterior: Burnished or smoothed

DECORATION: Wide-line incising.

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CATEGORY: 1511 (Replaces 1367, 1368, 1369).

CBA DESIGNATION: G-15, G-16, pp. 26, 32; e.g., Figure 10, second row second from left (Caso, Bernal and Acosta, 1967).

PERIODIZATION: Early I mostly

PASTE: Gris

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Tecomates or jars with straight or curved-backed necks. (Most examples are body sherds.)

SURFACE TREATMENT:

Interior: Wiped or plain. Burnished around rim.

Exterior: Burnished.

DECORATION: Plastic Decoration: Various fine-line incising on exterior, occasionally with wide-line incising. Rarely red paint is rubbed into the incised areas.

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CATEGORY: 1512

CBA DESIGNATION: G-15, G-16, pp. 26, 32 (Caso, Bernal and Acosta, 1967).

PERIODIZATION: Probably Early I

PASTE: Gris

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Strap handles.

SURFACE TREATMENT: Exterior burnished.

DECORATION: Fine-line incising present.

CATEGORY: 1513 (Combines M.A. 1335, 1346, 1347).

CBA DESIGNATION: G-15, pp. 26, 32; Figure 9, fourth row, second from left (Caso, Bernal and Acosta, 1967).

PERIODIZATION: Early I

PASTE: Gris

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: "Pinched In" rims.

SURFACT TREATMENT:

Interior: Burnished

Exterior: Usually burnished.

DECORATION: Plastic Decoration: Normally has fine-line incising on interior and/or exterior walls.

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CATEGORY: 1514 (Combines M.A. 1336 and 1337).

CBA DESIGNATION: G-15, pp. 26, 32. Figure 8 (first and fourth from left) (Caso, Bernal and Acosta, 1967).

PERIODIZATION: I

PASTE: Gris

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Narrow everted rims.

SURFACE TREATMENT:

Interior: Burnished

Exterior: Burnished or smoothed

DECORATION: Fine or wide-line incising on rim top and/or below rim interior.

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CATEGORY: 1515 (Replaces 1333, 1334, 1340).

CBA DESIGNATION: G-16, pp. 32. Figure 10, bottom row, second from left (Caso, Bernal and Acosta, 1967).

PERIODIZATION: Early I possibly lasting into Late I.

PASTE: Gris

VESSEL FORM

General Shape Mode: Bowl

Specific Shape Mode: Everted rims.

SURFACE TREATMENT:

Interior: Burnished

Exterior: Smoothed or burnished

DECORATION: Plastic Decoration: Plain or with fine-line incising. Some rims are notched; some are scalloped, some are thumb impressed.

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CATEGORY: 1516

CBA DESIGNATION: Probably G-15 or G-16, pp. 26, 32 (Caso, Bernal and Acosta, 1967).

PERIODIZATION: Early I

PASTE: Gris

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Outleaned wall, direct rims.

SURFACE TREATMENT:

Interior: Burnished

Exterior: Usually burnished

DECORATION: Plastic Decoration: Fine-line incising in various simple designs below the rim interior.

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CATEGORY: 1517

CBA DESIGNATION: G-15. Figure 8, second from left (Caso, Bernal and Acosta, 1967).

PERIODIZATION: Early I

PASTE: Gris

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Outcurving, rounded flaring, or slightly everted rims.

SURFACT TREATMENT:

Interior: Burnished

Exterior: Usually burnished

DECORATION: Fine-line incising, simple patterns usually not bordered by parallel lines. Includes parallel lines and wavy lines.

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CATEGORY: 1518 (Combines 1339, 1342, 1344, 1357, 1363, 1364).

CBA DESIGNATION: G-15, G-16, pp. 26, 32. Eg. Figure 10, third row, first from left (Caso, Bernal and Acosta, 1967).

PERIODIZATION: Early I

PASTE: Gris

VESSEL FORM:

General Shape Mode: Bowl, plate

Specific Shape Mode: Outleaned wall, flaring, outleaned or everted rims.

SURFACE TREATMENT:

Interior: Burnished

Exterior: Burnished or smoothed

DECORATION: Plastic Decoration: Fine and wide-line incising, often in cross-hatching, diagonal lines, opposed lines or wavy lines bordered by wide or fine line borders.

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CATEGORY: 1519 (Replaces 1353, 1354, 1355, 1356, 1361).

CBA DESIGNATION: G-12, G-15, pp. 25, 26, 32. E.g., Figure 8, fifth row, third from left (Caso, Bernal and Acosta, 1967).

PERIODIZATION: I

PASTE: Gris

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Outleaned, direct, or flaring rim.

SURFACE TREATMENT:

Interior: Burnished

Exterior: Burnished, smoothed, scraped or wiped.

DECORATION: Plastic Decoration: 2-3 parallel lines below the rim on the interior wall (rarely also on the exterior); additional fine or wide-line incised designs between the lines or above the lines.

CATEGORY: 2083

ADDITIONAL PERIODIZATION: IV

CATEGORY: 2086

ADDITIONAL PERIODIZATION: IIIA

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CATEGORY: 2220

PERIODIZATION: V

PASTE: Café (Gris?)

VESSEL FORM:

General Shape Mode: Handle

Specific Shape Mode: Narrow, hollow tube. (Sahumador)

CATEGORY: 2221

CBA DESIGNATION: K-2, pp. 50, Figure 26, pp. 457; Figure 387 (Caso, Bernal and Acosta, 1967).

PERIODIZATION: V

PASTE: Café

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Thin to medium thick globular ollas, with outcurved rims.

SURFACE TREATMENT:

Interior: Variable

Exterior: Wiped or scraped

DECORATION: Plastic Decoration: Roughly scraped or incised while wet resulting in shallow lines that are usually closely spaced.

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CATEGORY: 2222

CBA DESIGNATION: None

PERIODIZATION: V

PASTE: Café. Contains moderate to heavy amount of mica particles ranging in size from small specks to large flakes. Finished vessel has distinct sparkling or glittering appearance. Some examples appear to have more mica than clay.

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Olla

SURFACE TREATMENT:

Interior: Variable

Exterior: Wiped or scraped

DECORATION: Plastic Decoration: May be roughly scraped while wet. Treatment is identical to 2221.

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CATEGORY: 2223

CBA DESIGNATION: None

PERIODIZATION: V

PASTE: Fine Café

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Thin hemishperical bowls.

SURFACE TREATMENT: Interior and exterior burnished

DECORATION: Painting: Horizontal graphite stripes usually on the interior.

Plastic Decoration: One example has an incised design on the bowl exterior.

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CATEGORY: 2224

CBA DESIGNATION: K-1M, K-10M, K-19; Table XVIII (pp. 449). Pp. 451; Figure 380 (pp. 454) (Caso, Bernal and Acosta, 1967).

PERIODIZATION: I

PASTE: Café

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Thin hemispherical or outleaned wall.

SURFACE TREATMENT:

Interior: Smoothed or burnished or wiped

Exterior: Smoothed or burnished.

CATEGORY: 2500

ALT. DESIGNATION: Atoyac Yellow White (Drennan, 1976a:22)

PERIODIZATION: San Jose, Guadalupe, and Rosario phases

PASTE: Café (Smaller temper particles than Fidencio Coarse.)

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Outleaned bowls with flat base.

SURFACE TREATMENT: None

DECORATION: Slipped Surface: White kaolin slip on exterior surface.

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CATEGORY: 2501

ALT. DESIGNATION: Atoyac Yellow White (Drennan, 1976a:22)

PERIODIZATION: San José, Guadalupe and Rosario phases

PASTE: Café

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Outleaned wall bowls with flat base.

SURFACE TREATMENT: Incising, often with double-line break or excising, often raspada design.

DECORATION: Slipped Surface: White kaolin slip on exterior surface.

CATEGORY: 2502

ALT. DESIGNATION: Atoyac Yellow White (Flannery, MS)

PERIODIZATION: San José, Guadalupe and Rosario phases

PASTE: Café

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Bolstered rim bowls.

DECORATION: Slipped Surface: White kaolin slip on surface

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CATEGORY: 2503

ALT. DESIGNATION: Atoyac Yellow White (Drennan, 1976a:22)

PERIODIZATION: San José, Guadalupe and Rosario phases

PASTE: Café

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Cylindrical

DECORATION: Slipped Surface: White kaolin slip on exterior surface.

CATEGORY: 2504

ALT. DESIGNATION: Atoyac Yellow White (Flannery, MS)

PERIODIZATION: San José and Guadalupe phases

PASTE: Café

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Vertical necked.

DECORATION: White kaolin slip on surface.

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CATEGORY: 2505

ALT. DESIGNATION: Atoyac Yellow White

PERIODIZATION: Guadalupe and Rosario phases

PASTE: Café

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Tecomate

DECORATION: Slipped Surface: White kaolin slip.

CATEGORY: 2506

ALT. DESIGNATION: Fidencio Coarse (Winter, 1972:316; Drennan, 1976a:21)

PERIODIZATION: San José, Guadalupe and Rosario phases

PASTE: Café

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Outleaned wall bowls

SURFACE TREATMENT: Scraped or smoothed

DECORATION: Painting: Sloppily applied dull red stain sometimes added.

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CATEGORY: 2507

ALT. DESIGNATION: Fidencio Coarse (Winter, 1972:316; Drennan, 1976a:21)

PERIODIZATION: San José, Guadalupe and Rosario phases

PASTE: Café

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Hemispherical

SURFACE TREATMENT: Scraped or smoothed

DECORATION: Painting: Sloppily applied dull red stain sometimes applied.

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CATEGORY: 2508

ALT. DESIGNATION: Fidencio Coarse (Winter, 1972:316; Drennan, 1976a:21, 33-37)

PERIODIZATION: San José, Guadalupe and Rosario phases

PASTE: Café

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Ollas with outleaning rims.

SURFACE TREATMENT: Plastic decorations including rosettes, herringbone incised, incised dashes, oblong punctations, cross-hatching and punctations in semi-circles

DECORATION: Painting: Carelessly applied dull red stain sometimes added.

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CATEGORY: 2509

ALT DESIGNATION: Fidencio Coarse (Winter, 1972:316; Drennan, 1976a:21)

PERIODIZATION: San José, Guadalupe and Rosario phases

PASTE: Café

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Tecomate

SURFACE TREATMENT: Scraped or smoothed

DECORATION: Painting: Carelessly applied dull red stain.

CATEGORY: 2510

ALT. DESIGNATION: Lupita Heavy Plain (Drennan, 1976a:22)

PERIODIZATION: San José, Guadalupe and Rosario phases

PASTE: Café (Fired at low temperature)

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Outleaned wall bowl rims

SURFACE TREATMENT: Surface smoothed, never burnished

ADDITIONAL COMMENTS: No slip or wash applied.

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CATEGORY: 2511

ALT. DESIGNATION: Lupita Heavy Plain

PERIODIZATION: San José, Guadalupe and Rosario phases

PASTE: Café

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Hemispherical bowls.

SURFACE TREATMENT: Smoothed, never burnished

ADDITIONAL COMMENTS: No slip or wash applied.

CATEGORY: 2512

ALT DESIGNATION: Leandro Gray (Drennan, 1976a:22)

PERIODIZATION: San Jose phase (Occasionally occurs in Guadalupe phase)

PASTE: Café

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Outleaned wall bowls.

SURFACE TREATMENT: Well burnished; often incised or excised

ADDITIONAL COMMENTS: Softer than Socorro Fine Gray ware because it is fired at a lower temperature. Temper contains larger particles.

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CATEGORY: 2513

ALT. DESIGNATION: Leandro Gray (Drennan, 1976a:22)

PERIODIZATION: San José phase (Slight occurrence in Guadalupe phase)

PASTE: Café

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Tecomate

SURFACE TREATMENT: Well burnished

ADDITIONAL COMMENTS: Softer than Socorro Fine Gray wares due to firing at lower temperatures. Tempering contains thicker particles.

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CATEGORY: 2514

ALT. DESIGNATION: Leandro Gray (Drennan, 1976a:22)

PERIODIZATION: San José phase (Occasionally occurs in Guadalupe phase)

PASTE: Café

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: Ollas

SURFACE TREATMENT: Well burnished

ADDITIONAL COMMENTS: Softer than Socorro Fine Gray wares since firing occurs at lower temperatures. Tempering contains thicker particles also.

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CATEGORY: 2515

ALT. DESIGNATION: Leandro Gray (Drennan, 1976a:22)

PERIODIZATION: San José phase (Occasionally occurs in Guadalupe phase)

PASTE: Café

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Cylindrical

SURFACE TREATMENT: Well burnished

ADDITIONAL COMMENTS: Softer than Socorro Fine Gray wares due to firing at lower temperatures. Tempering contains thicker particles than Socorro Fine ware.

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CATEGORY: 2516

ALT. DESIGNATION: San José Black and White (Winter, 1972: 316; Flannery, MS)

PERIODIZATION: San José phase

PASTE: Café

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Outleaned wall bowls with flat bases, bolstered rim bowls, cylindrical bowls.

SURFACE TREATMENT: Differential firing; white with black rim or black with white rim. Some have Olmec style decoration, and some are excised or incised.

DECORATION: Slipped Surface: White kaolin slip.

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CATEGORY: 2517

ALT. DESIGNATION: San José Black and White

PERIODIZATION: San José phase

PASTE: Café

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: 1) Tecomate

2) Vertical necked jars

SURFACE TREATMENT: Differential firing: Olmec style decoration.

DECORATION: Slipped Surface: White kaolin slip.

CATEGORY: 2518

ALT. DESIGNATION: San José Red-on-White (Flannery, MS)

PERIODIZATION: San José phase

PASTE: Café

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Often with bolstered rim

SURFACE TREATMENT: Often well burnished

DECORATION: Slipped Surface: Red hematite slip along rim.

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CATEGORY: 2519

ALT. DESIGNATION: San José Red-on-White (Flannery, MS)

PERIODIZATION: San José phase

PASTE: Café

VESSEL FORM:

General Shape Mode: Jar

Specific Shape Mode: 1) Tecomate

2) Vertical necked jar

SURFACE TREATMENT: Often well burnished, sometimes with zoned rocker stampings.

DECORATION: Slipped Surface: Red hematite slip in bands or along the rim.

CATEGORY: 2520

ALT. DESIGNATION: Guadalupe Burnished Brown (Drennan, 1976a:22)

PERIODIZATION: Guadalupe, Rosario phases

PASTE: Café (Same clay as Fidencio Coarse ware)

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Outleaned wall bowls

SURFACE TREATMENT: Streaky burnished

DECORATION: Usually plain

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CATEGORY: 2521

ALT. DESIGNATION: Socorro Fine Gray (Drennan, 1976a:22)

PERIODIZATION: Rosario, Monte Albán Early I

PASTE: Café (Better fired and harder than Fidencio Coarse)

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Hemispherical, incurved and composite silhouette bowls.

SURFACE TREATMENT: Streaky burnished

DECORATION: Usually plain. Appears gray.

ADDITIONAL COMMENTS: Bowl shapes other than outleaning wall and fluted bowls do not occur in Guadalupe phase (Drennan, 1976a:65)

CATEGORY: 3035

ADDITIONAL PERIODIZATION: IIIA

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CATEGORY: 5425

PERIODIZATION: V

PASTE: Gris Cremosa or Sandy Cream

VESSEL FORM:

General Shape Mode: Bowl

Specific Shape Mode: Thin hemispherical or outleaned wall bowls.

SURFACE TREATMENT:

Interior: Red paint usually on the interior of the vessel.

Exterior: Burnished

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APPENDIX II

CERAMIC DATA

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This data set is a listing of the ceramics collected from each collection area in the Etla, Central and Valle Grande Survey Areas. The ceramic data set from the Monte Albán survey has already been published (Blanton, 1978).

In this listing, each collection area is treated as an entity composed of a sequence of seven lines. Lines one through seven thus refer to the initial collection area while line eight begins the next collection area. Each seven line sequence can be distinguished by the last or seventh line in the sequence which has only 44 digits. All other lines have 80 digits.

The collection areas are ordered in this appendix from north to south and from west to east. Consequently, the collection areas from Etla are listed first, while those from the Valle Grande are at the end of the appendix. Each collection area is identified by the first seven columns in each line. The first two columns refer to the north grid square coordinate that the collection is located in. The third and fourth digits refer to the east grid square coordinate that the collection is in. Thus, the first four digits in each line identify the specific three by four kilometer grid square that a given collection is located in. Column five refers to the specific subsquare or quadrant within a grid square that the collection was made in. Each grid square is divided into four equal

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subsquares. The northwest subsquare is numbered one. The northeast subsquare is two. The southwest is three and the southeast is four. Columns six and seven refer to a specific collection's number within a given subsquare. Thus, for example the initial seven digits of line one identify collection area 1803101. That is, the first collection area in the northwest (1) subsquare of grid square N18 and E3 (1803).

In order to derive information on any collection area, the specific seven line sequence associated with that collection area, must be understood. The following list will enable the reader to interpret every column within each of the seven lines of the sequence.

Line 1

Columns 1,2: North grid square coordinate

Colums 3,4: East grid square coordinate

Column 5: Subsquare number

Columns 6,7: Collection number in subsquare

Column 8: Number of line or card in the seven line sequence.

Columns 9, 10, 11, 12: Collection area size. The initial two digits should be placed to the right of a decimal point (whole hectares), while columns 11, 12, should be placed to the left of the decimal point. Thus, 0050 would refer to a

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collection area half a hectare in size. Four successive nines in these columns does not refer to a collection area that was 99.99 hectares in extent, but rather to a collection area of unknown size.

Column 13: The nature of the collection area.

0 = A bounded collection area

1 = A structure collection

2 = A collection taken from an entire site

3 = A terrace collection

4 = A collection area that does not conform to the above categories

5 = Missing data

Column 14: The presence or absence of the Tierras Largas phase in a given collection area.

1 = present; 0 = absent; 9 = uncertain

Column 15: The presence or absence of San José phase in a given collection area.

1 = present; 0 = absent; 9 = uncertain

Column 16: Guadalupe phase.

1 = present; 0 = absent; 9 = uncertain

Column 17: Rosario phase.

1 = present; 0 = absent; 9 = uncertain

Column 18: Monte Albán Early I.

1 = present; 0 = absent, 9 = uncertain

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Column 19: Monte Albán Late I.

1 = present; 0 = absent; 9 = uncertain

Column 20: Monte Albán II.

1 = present; 2 = absent, 9 = uncertain

Column 21: Monte Albán IIIA.

1 = present; 2 = absent, 9 = uncertain

Column 22: Monte Albán IIIB

1 = present; 2 = absent, 9 = uncertain

Column 23: Monte Albán IV.

1 = present; 2 = absent, 9 = uncertain

Column 24: Monte Albán V.

1 = present; 2 = absent; 9 = uncertain

Columns 25-80: These columns provide information on the quantity of potsherds of a series of different ceramic categoreis that were present in each collection area. All ceramic categories are described either by Kowalewski, Spencer and Redmond (1978) or in Appendix I. Two columns were reserved for each category. Thus, these columns refer to, in sequence, quantities of: T0001 (columns 25, 26), T0002, (columns 27, 28), T0003, T0004, T0005, T0006, T0008, T0016, T0018, T0021, T0022, T0023, T0031, T0032, T0038, T0056, T0057, T0121, T0122, T0123, T0374, T0375, T0376, T0377, T0378, T0379, T0380, and T0381 (columns 79,

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80) in each collection area.

Line 2

Columns 1,2: N coordinate

Columns 3,4: E coordinate

Column 5: Subsquare number

Columns 6,7: Collection number in subsquare

Column 8: Number of line or card in the seven line sequence.

Columns 9-80: These columns provide information on the quantities of potsherds of a series of different ceramic categories that were present in each collection area. Two columns were reserved for each category. Thus, these columns refer to, in sequence, the quantities of: T0382, T0383, T0384, T0385, T0386, T0387, T0388, T0389, T0390, T0391, T0393, T0394, T0395, T0396, T0397, T0398, T0399, T0400, T0401, T0402, T0403, T0404, T0405, T0406, T0407, T0561, T1102, T1103, T1104, T1105, T1106, T1107, T1109, T1111, T1120, and T1122 in each collection area.

Line 3

Columns 1,2: N coordinate

Columns 3,4: E coordinate

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Column 5: Subsquare number

Columns 6,7: Collection number in subsquare.

Column 8: Number of line or card in seven line sequence.

Columns 9-80: These columns provide information on the quantities of potsherds of a series of different ceramic categories that were present in each collection area. Two columns were reserved for each category. Thus, these columns refer to, in sequence, the quantities of: T1123, T1125, T1126, T1137, T1138, T1140, T0423, T0424, T0610, T1108, T1141, T1143, T1144, T1194, T1207, T1227, T1241, T1258, T1259, T1262, T1263, T1264, T1265, T1268, T1274, T1275, T1277, T1297, T1310, T1312, T1319, T1330, T1332, T1338, T1341 and T1343 in each collection area.

Line 4

Columns 1,2: N coordinate.

Columns 3,4: E coordinate.

Column 5: Subsquare number.

Columns 6,7: Collection number in subsquare.

Column 8: Number of line or card in seven line sequence.

Columns 9-80: These columns provide information on the quantities of potsherds of a series of different ceramic categories that were present in each collection area. Two columns were

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reserved for each category. Thus, these columns refer to, in sequence, the quantities of: T1345, T1320, T1348, T1349, T1358, T1359, T1360, T1366, T1370, T1371, T1372, T1373, T1419, T1420, T1421, T1422, T1999, T2009, T2010, T2011, T2013A, T2014, T2015, T1400, T1504, T1505, T1506, T1507, T1508, T1509, T1510, T1511, T1512, T1513, T1514, and T1515 in each collection area.

Line 5

Columns 1,2: N coordinate.

Columns 3,4: E coordinate.

Column 5: Subsquare number.

Columns 6,7: Collection number in subsquare.

Column 8: Number of line or card in seven line sequence.

Columns 9-80: These columns provide information on the quantities of potsherds of a series of different ceramic categories that were present in each collection area. Two columns were reserved for each category. Thus, these columns refer to, in sequence, the quantities of: T1516, T1517, T1518, T1519, T2040, T2042, T2052, T2061, T2064, T2065, T2072, T2073, T2076, T2077, T2078, T2079, T2080, T2083, T2085, T2086, T2411, T2412, T2413, T2220, T2221, T2222, T2223, T2224, T2414, T2415,

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T2416, T2417, T2418, T3030, T3033, and T3035 in each collection area.

Line 6

Columns 1,2: N coordinate.

Columns 3,4: E coordinate.

Column 5: Subsquare number.

Columns 6,7: Collection number in subsquare.

Column 8: Number of line or card in seven line sequence.

Columns 9-80: These columns provide information on the quantities of potsherds of a series of different ceramic categories that were present in each collection area. Two columns were reserved for each category. Thus, these columns refer to, in sequence, the quantities of: T3066, T3408, T3409, T3410, T3411, T5000, T50007, T5329, T0600, T0601, T0602, T0603, T0604, T0605, T0606, T0607, T0608, T0609, T2500, T2501, T2502, T2503, T2504, T2505, T2506, T2507, T2508, T2509, T2510, T2511, T2512, T2513, T2514, T2515, T2516, and T2517 in each collection area.

Line 7

Columns 1,2: N coordinate.

Columns 3,4: E coordinate

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Column 5: Subsquare number.

Columns 6,7: Collection number in subsquare.

Column 8: Number of line or card in seven line sequence.

Columns 9-44: These columns provide information on the quantities of potsherds of a series of different ceramic categories that were present in each collection area. Two columns were reserved for each category. Thus, these columns refer to, in sequence, the quantities of T2518, T2519, T1500, T1501, T1502, T2520, T2521, T1503, T5425, ceramic urn fragments, ceramic figurine fragments, non-diagnostic gris pottery, non-diagnostic crema pottery, non-diagnostic café pottery, non-diagnostic amarillo pottery, T2013B, T2013C, and T2013D in each collection.

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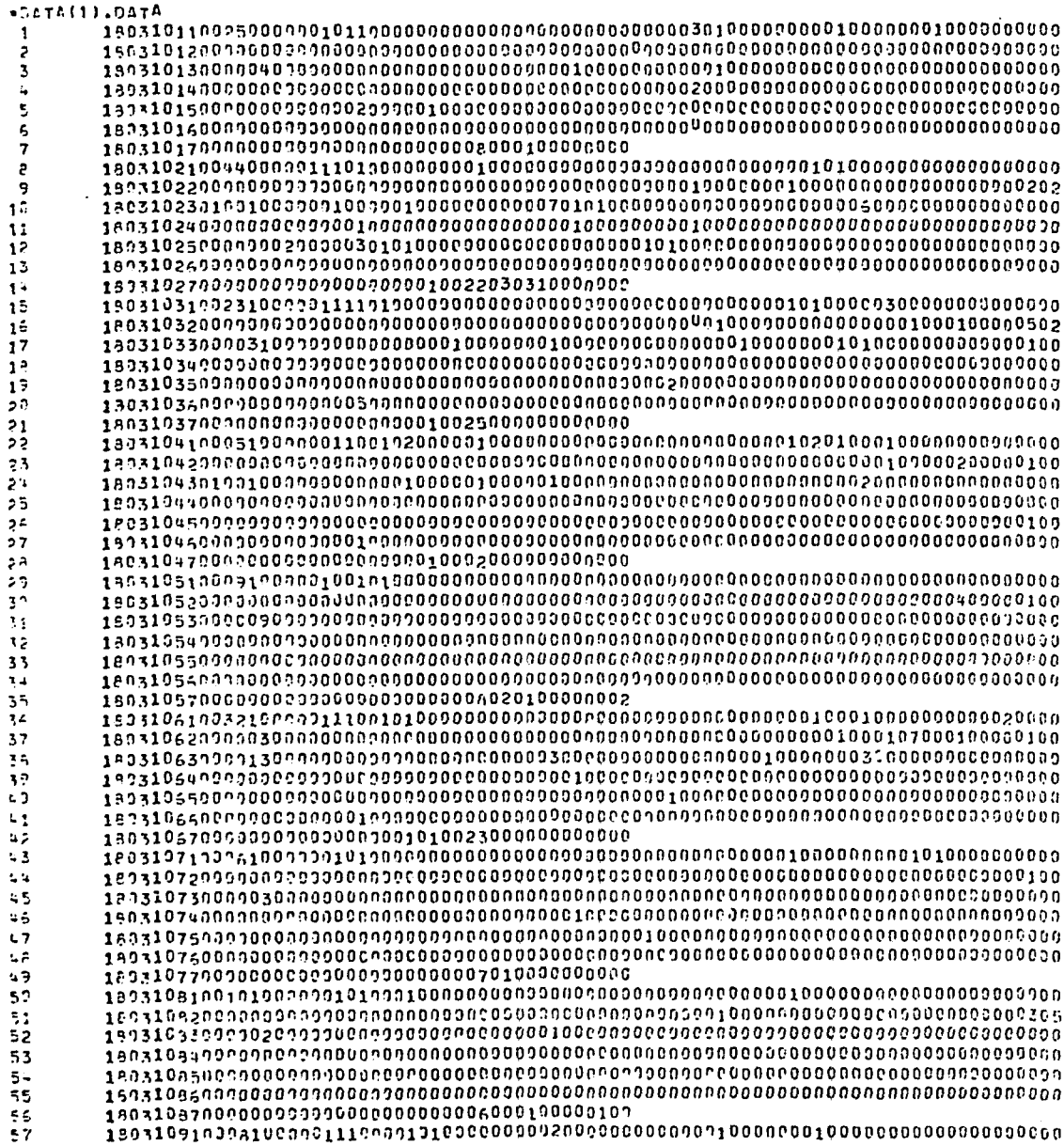

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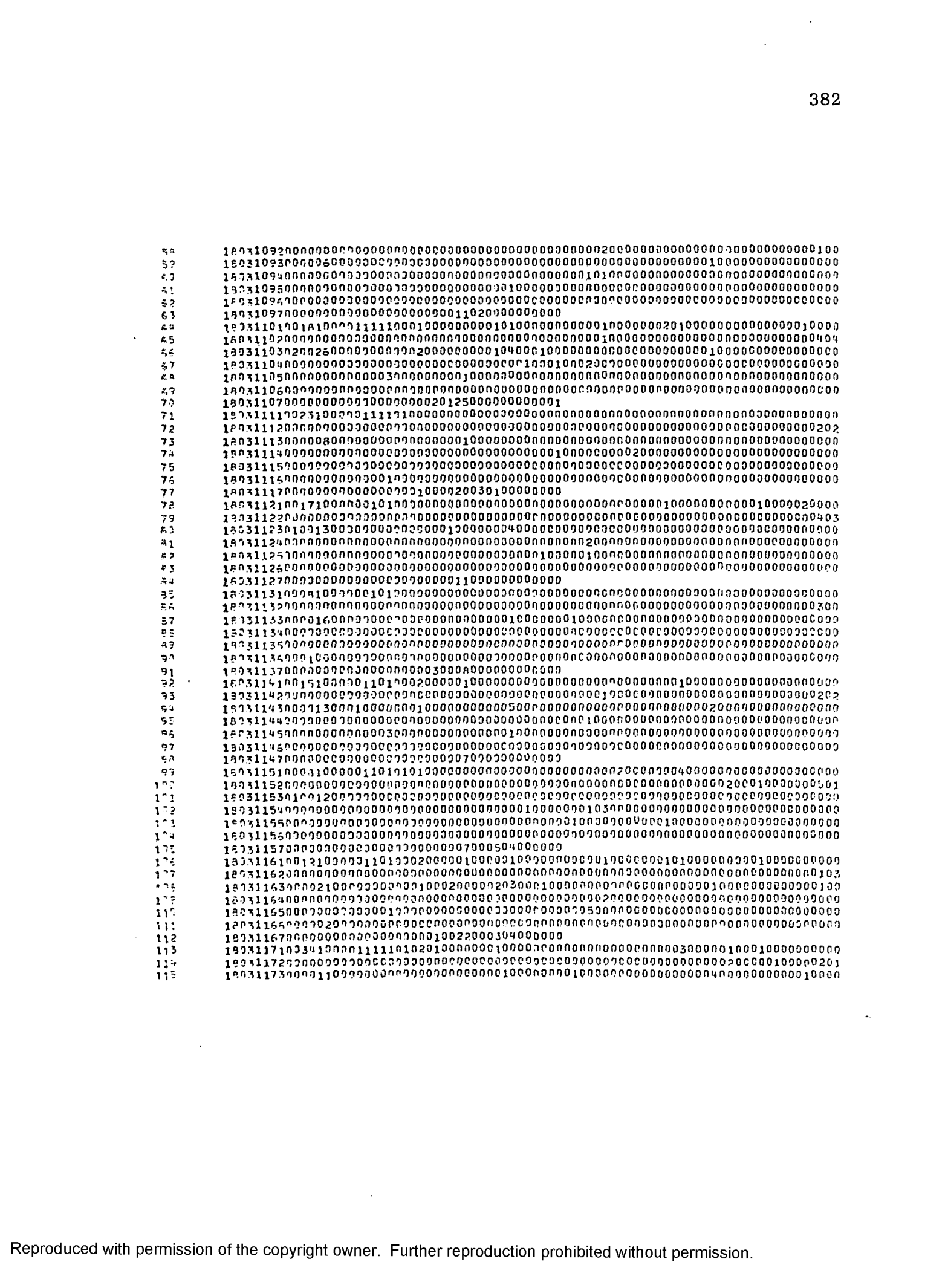

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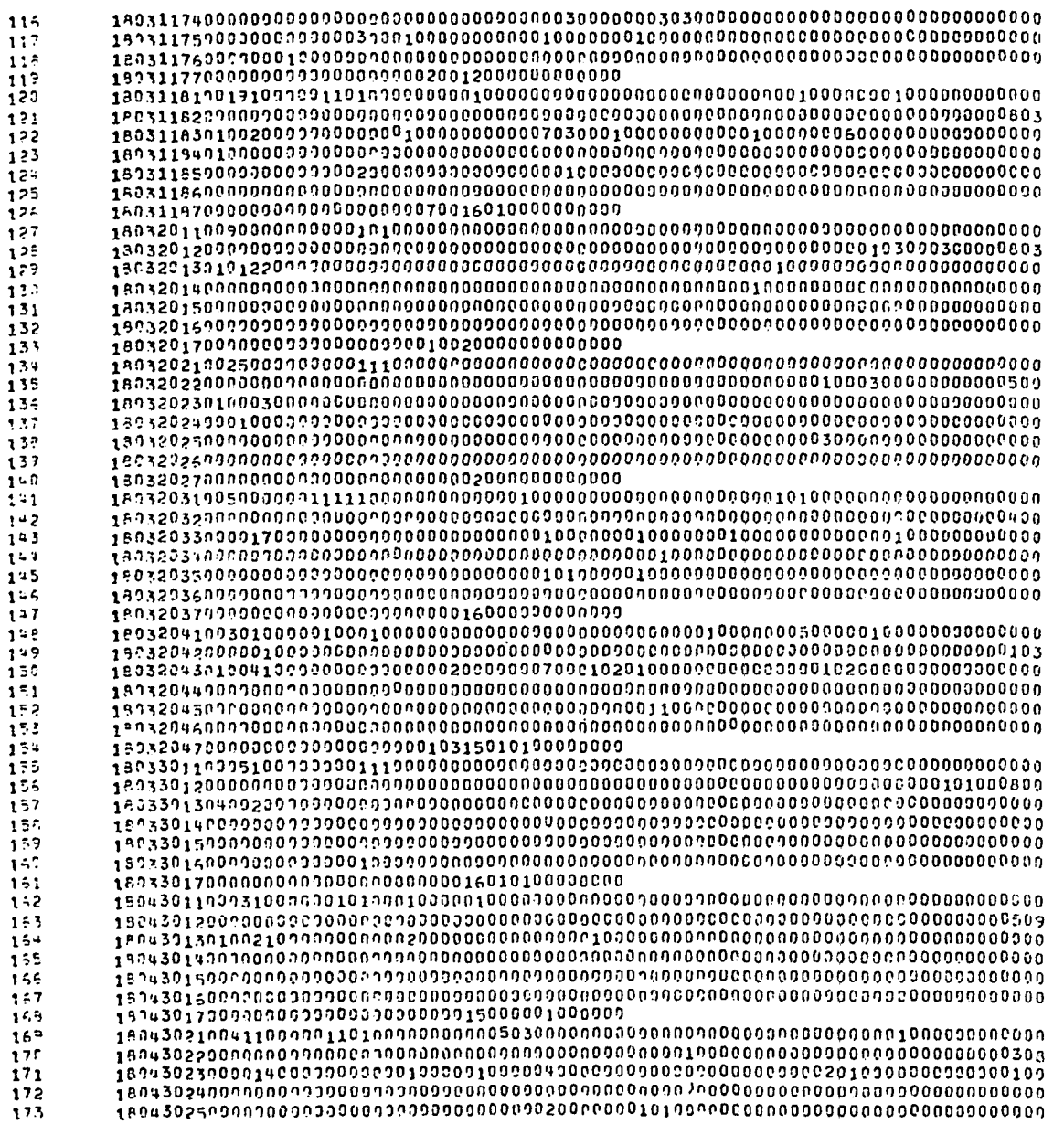

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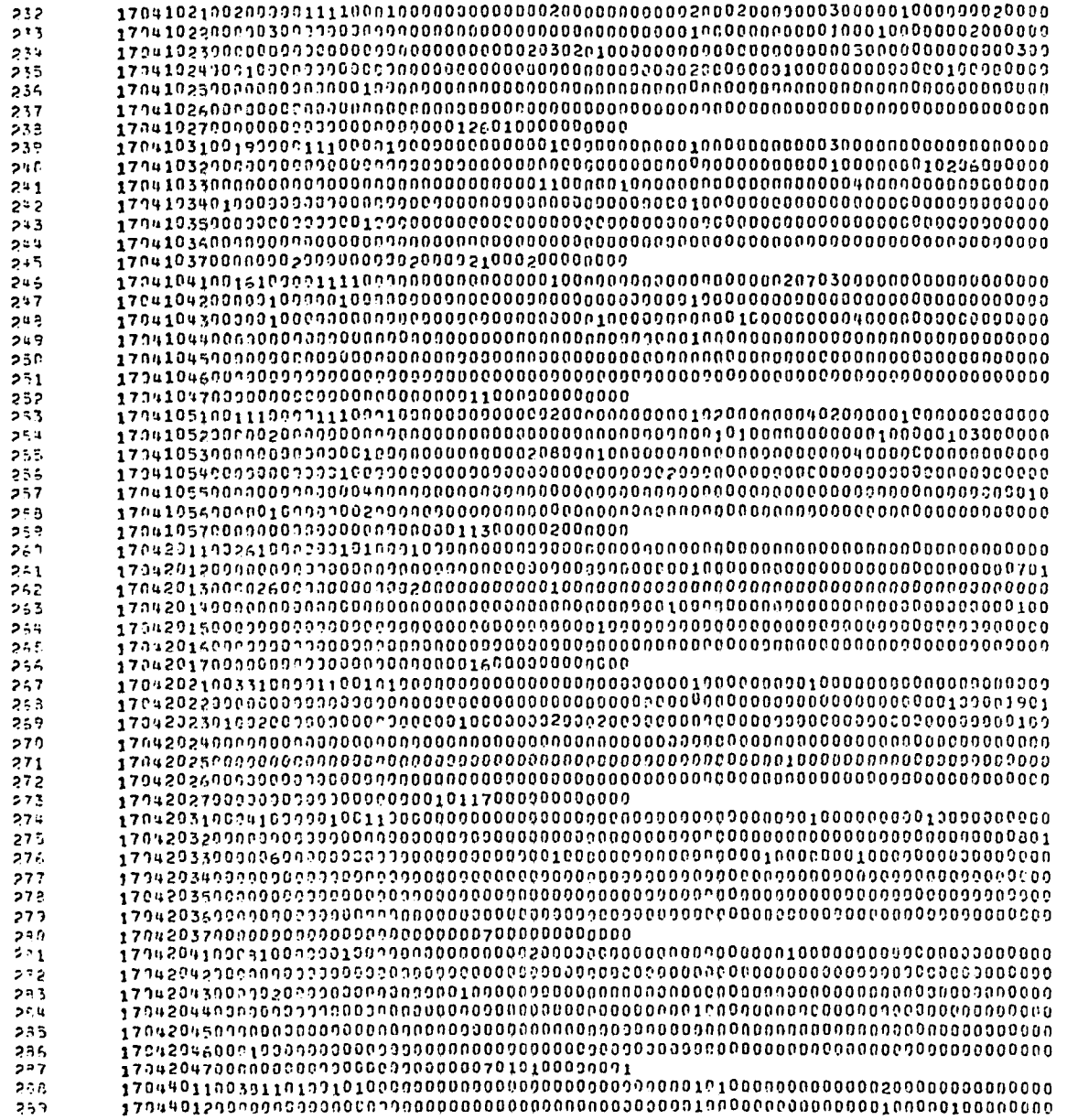

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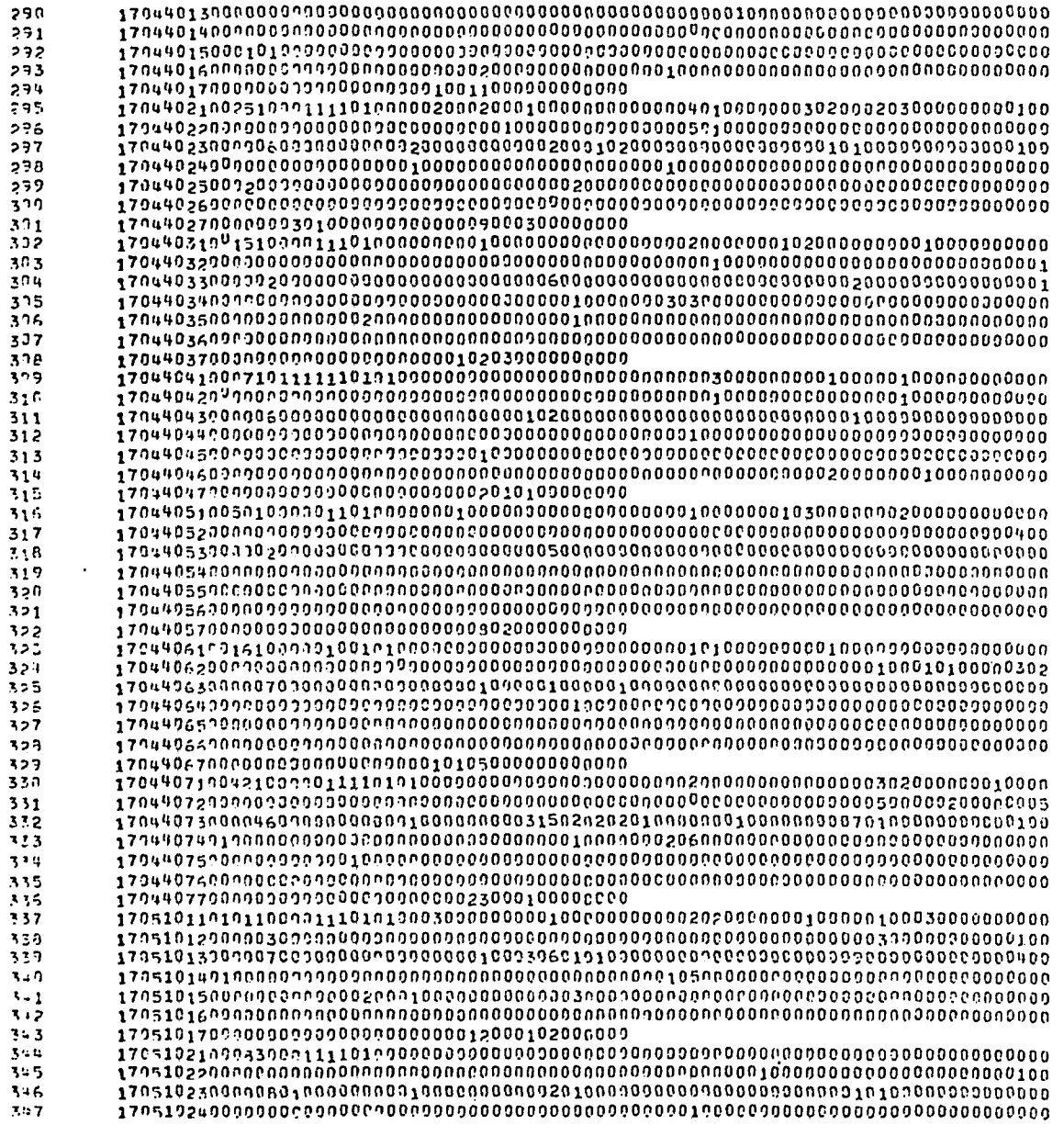

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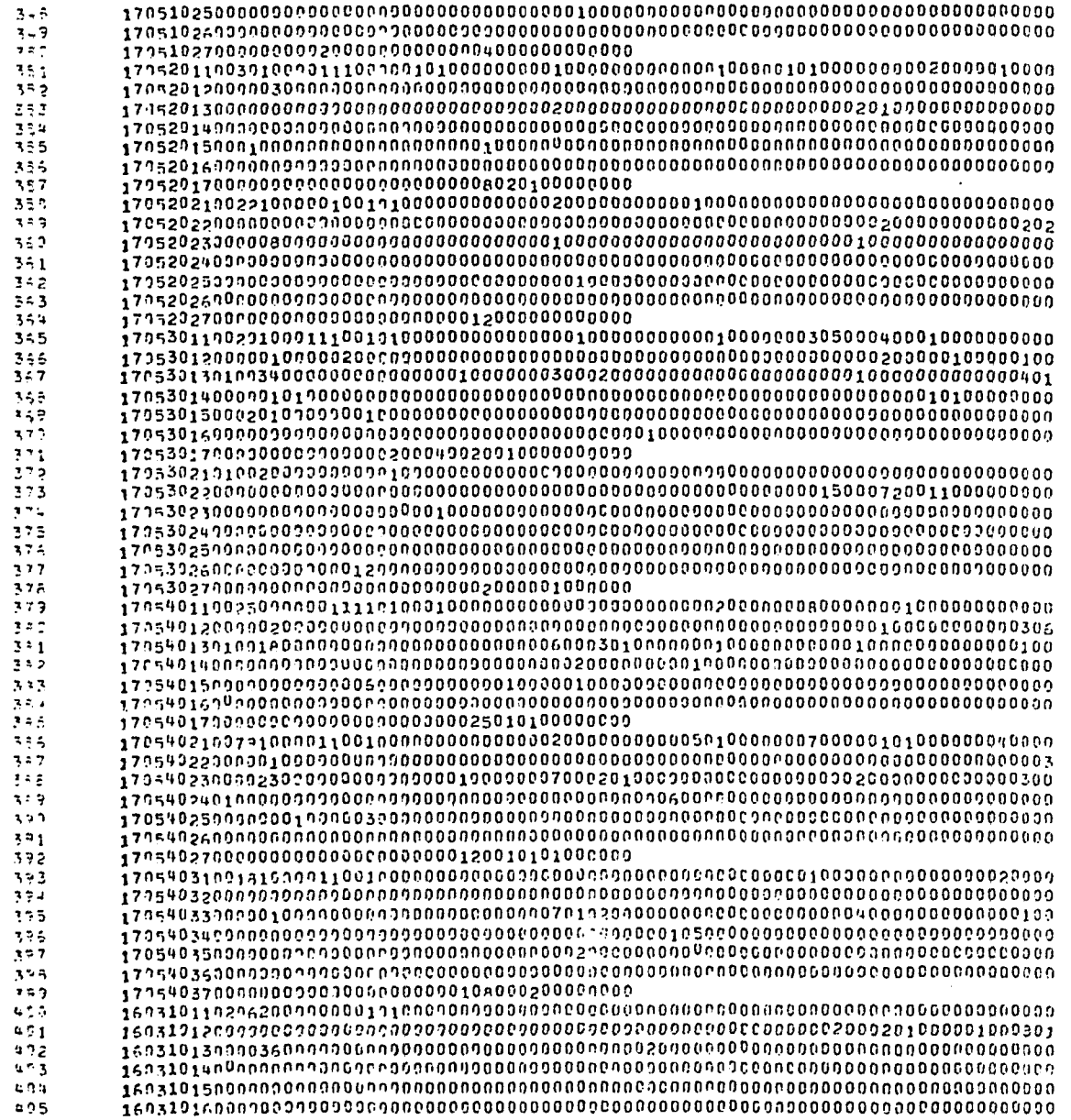

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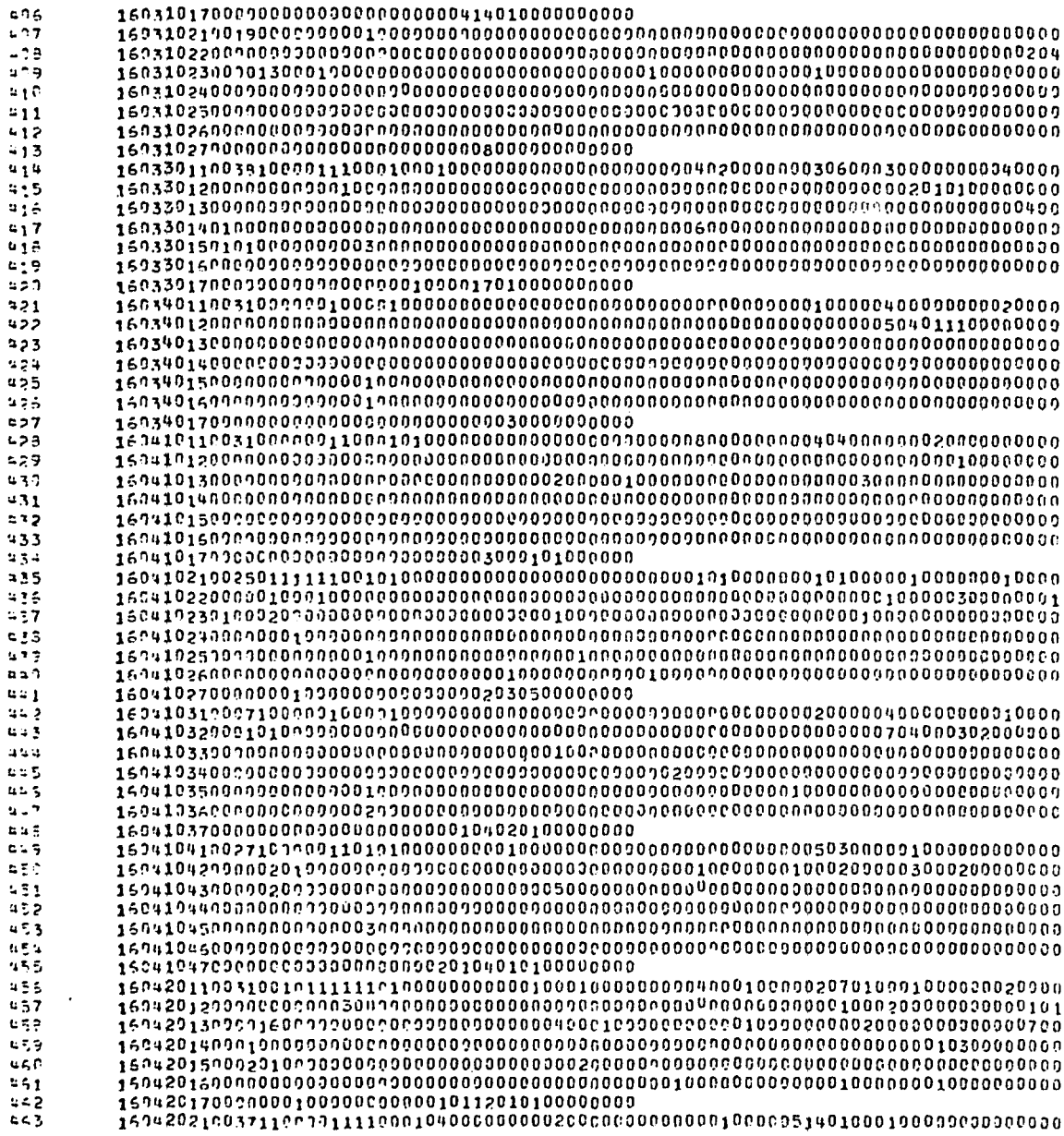

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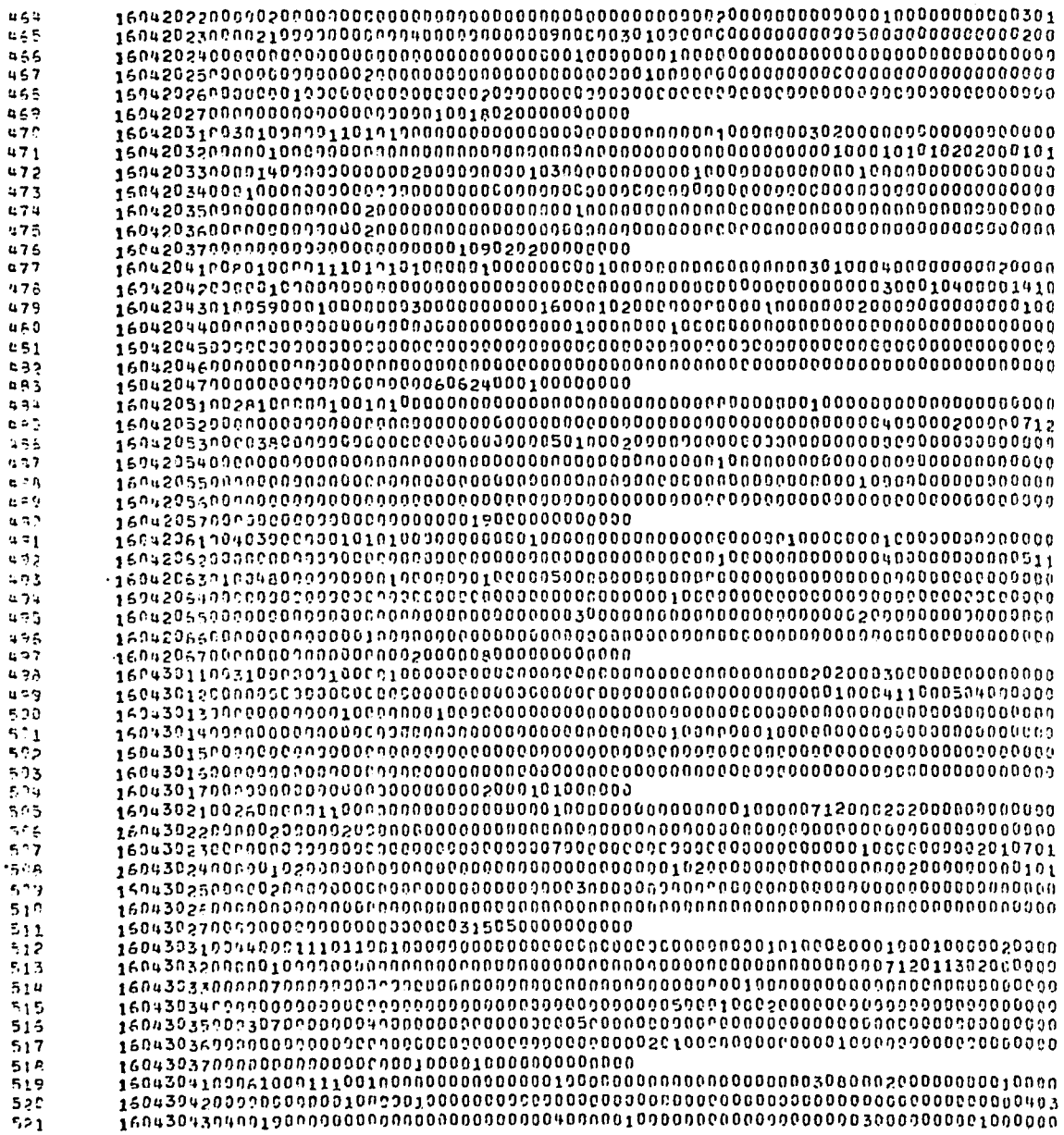

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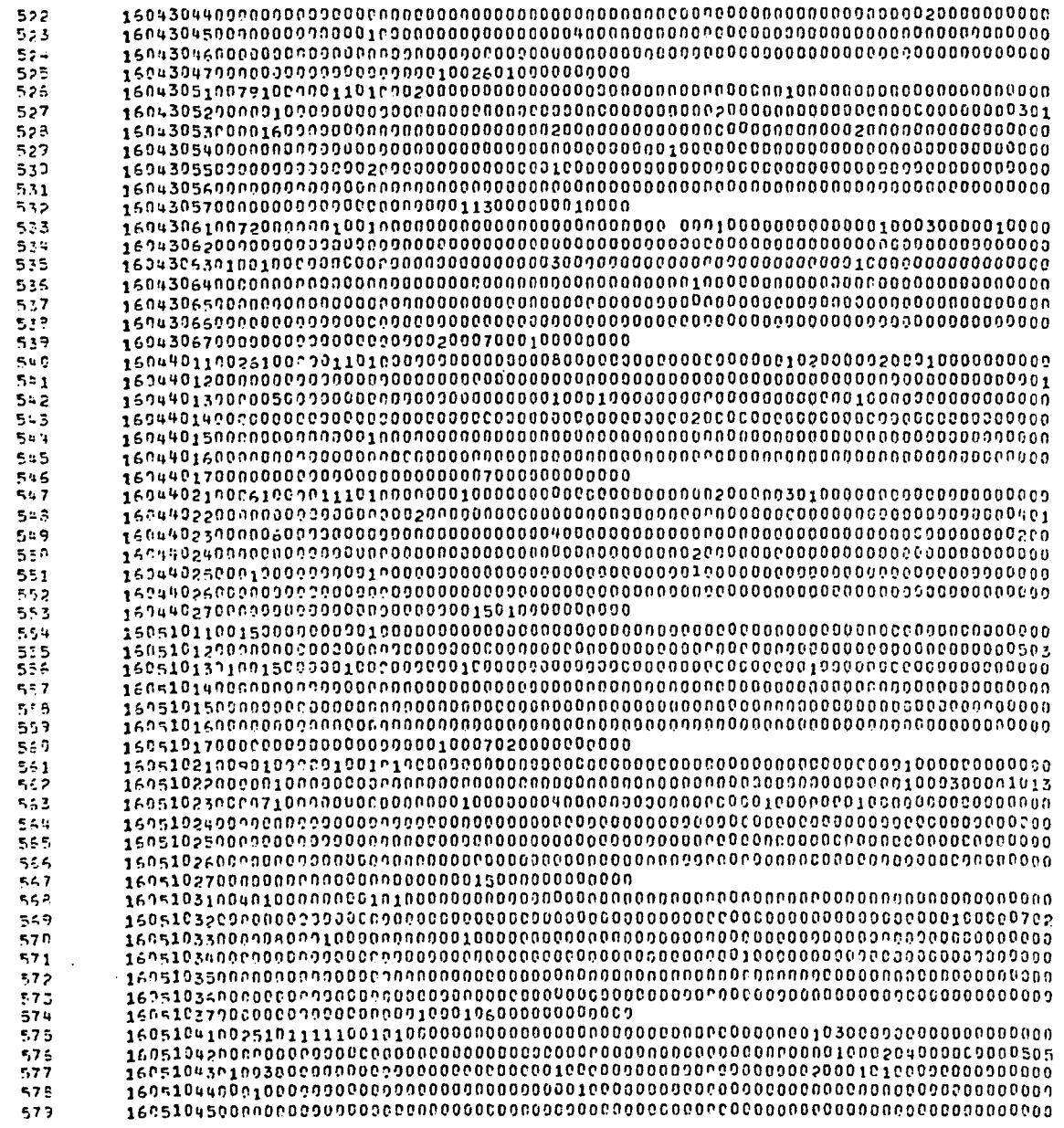

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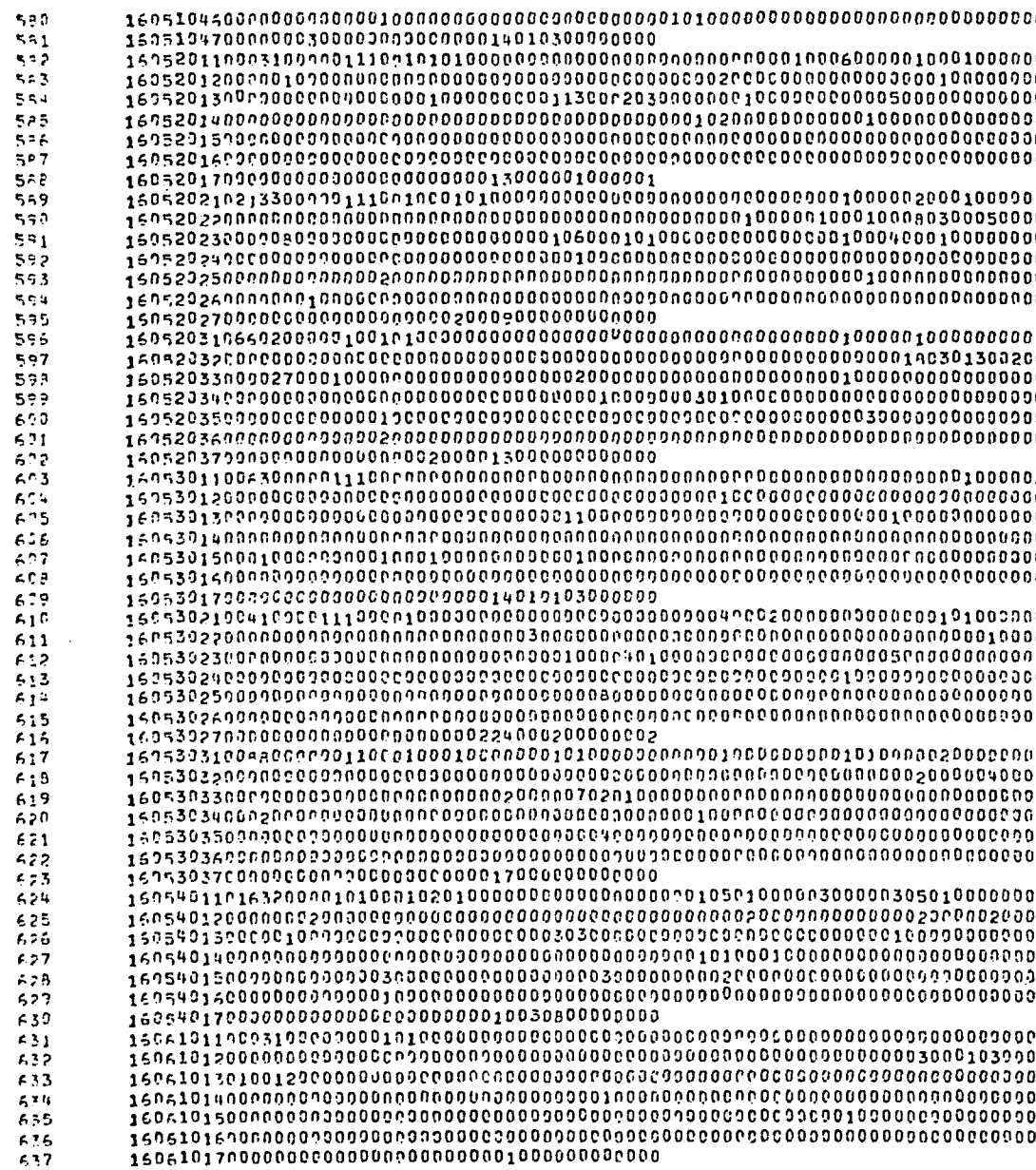

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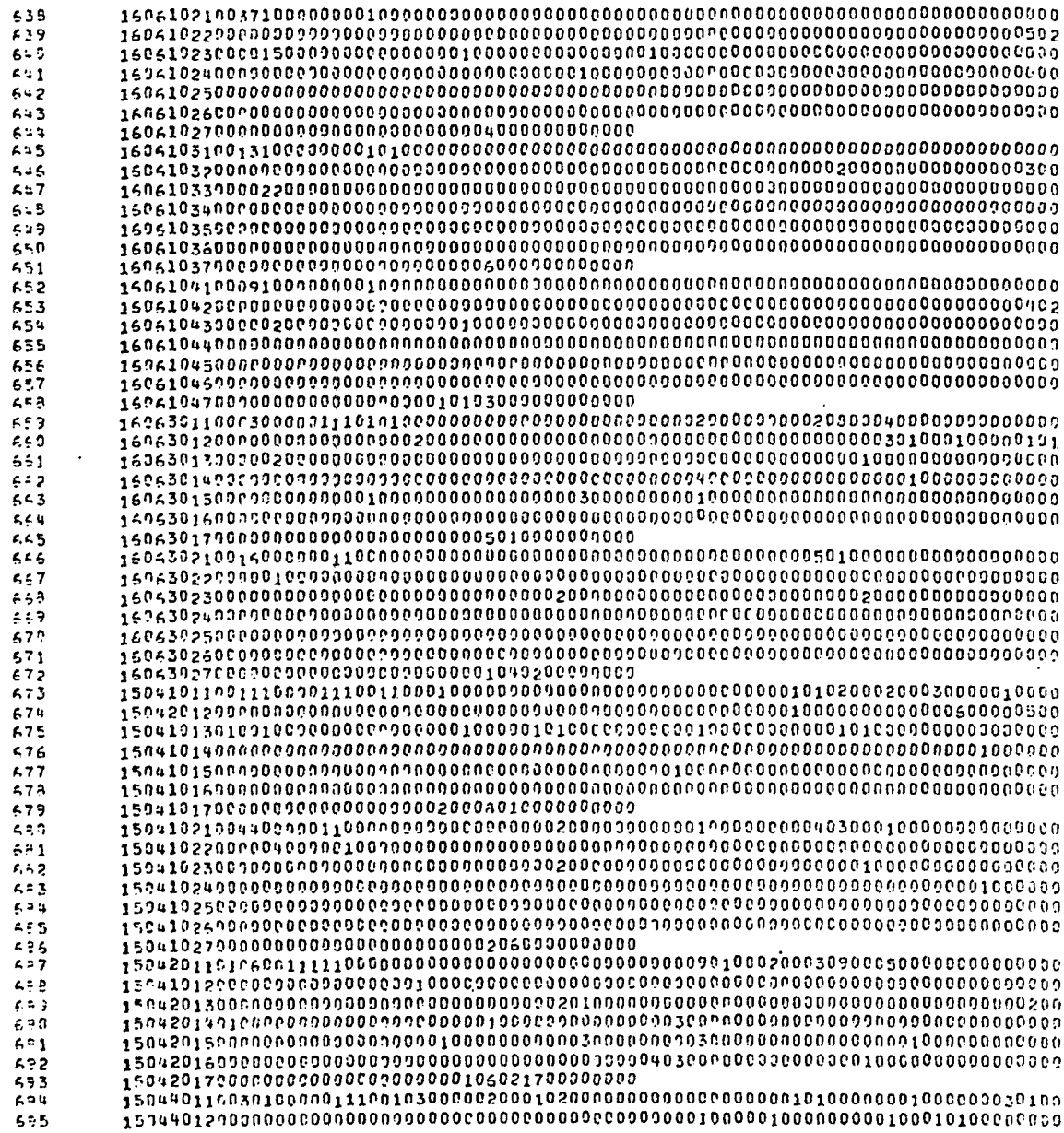

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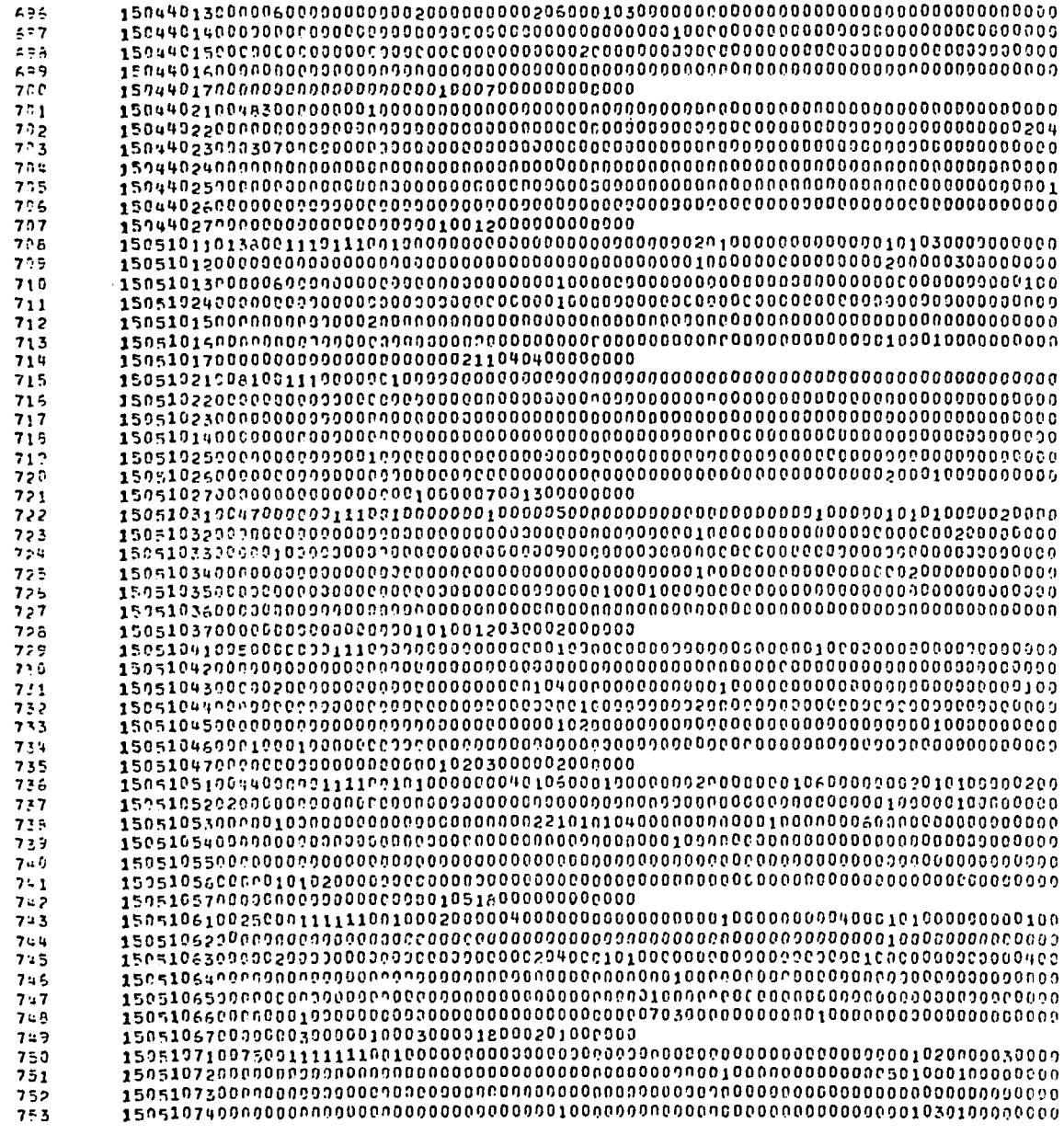

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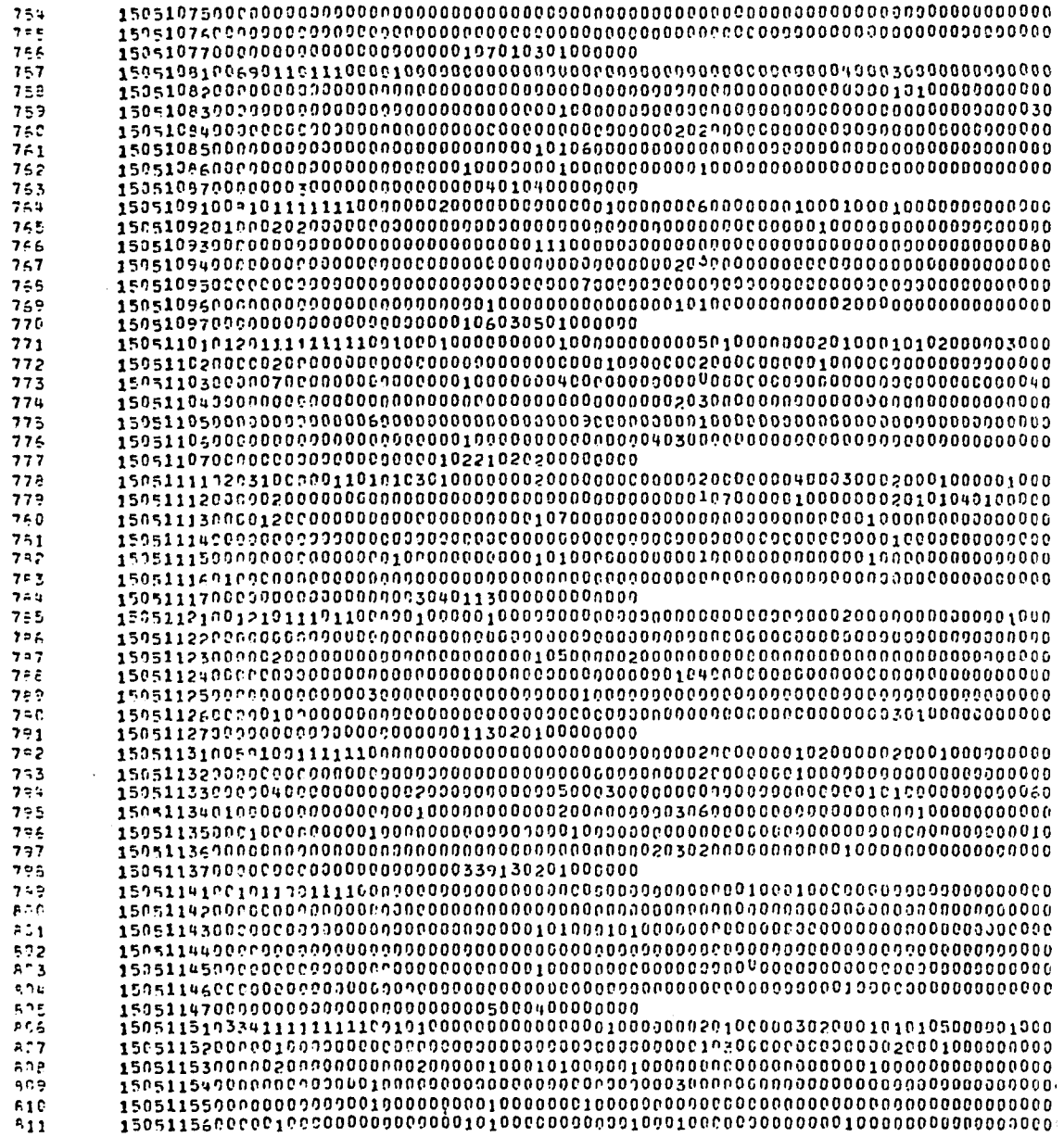

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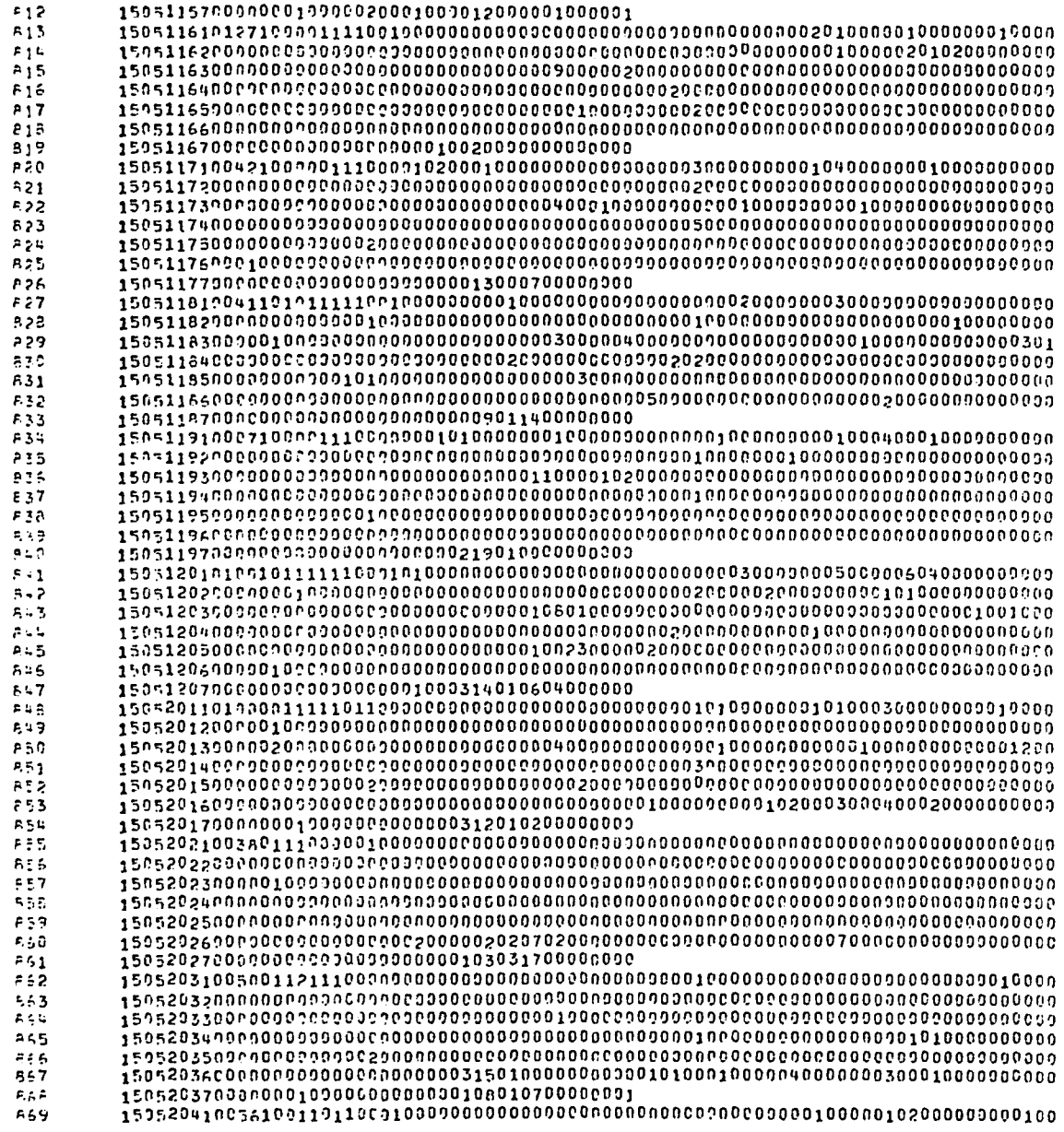

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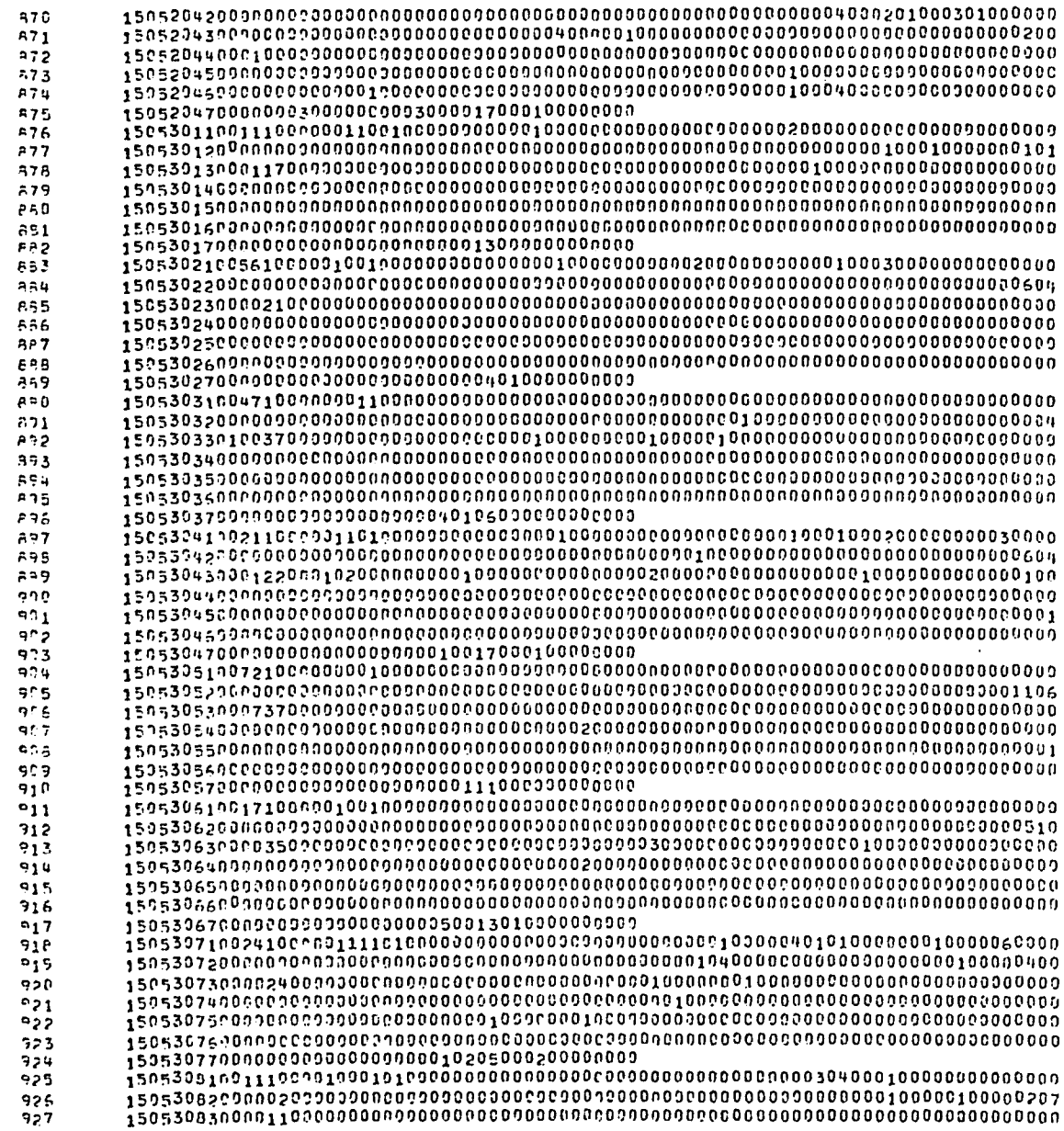

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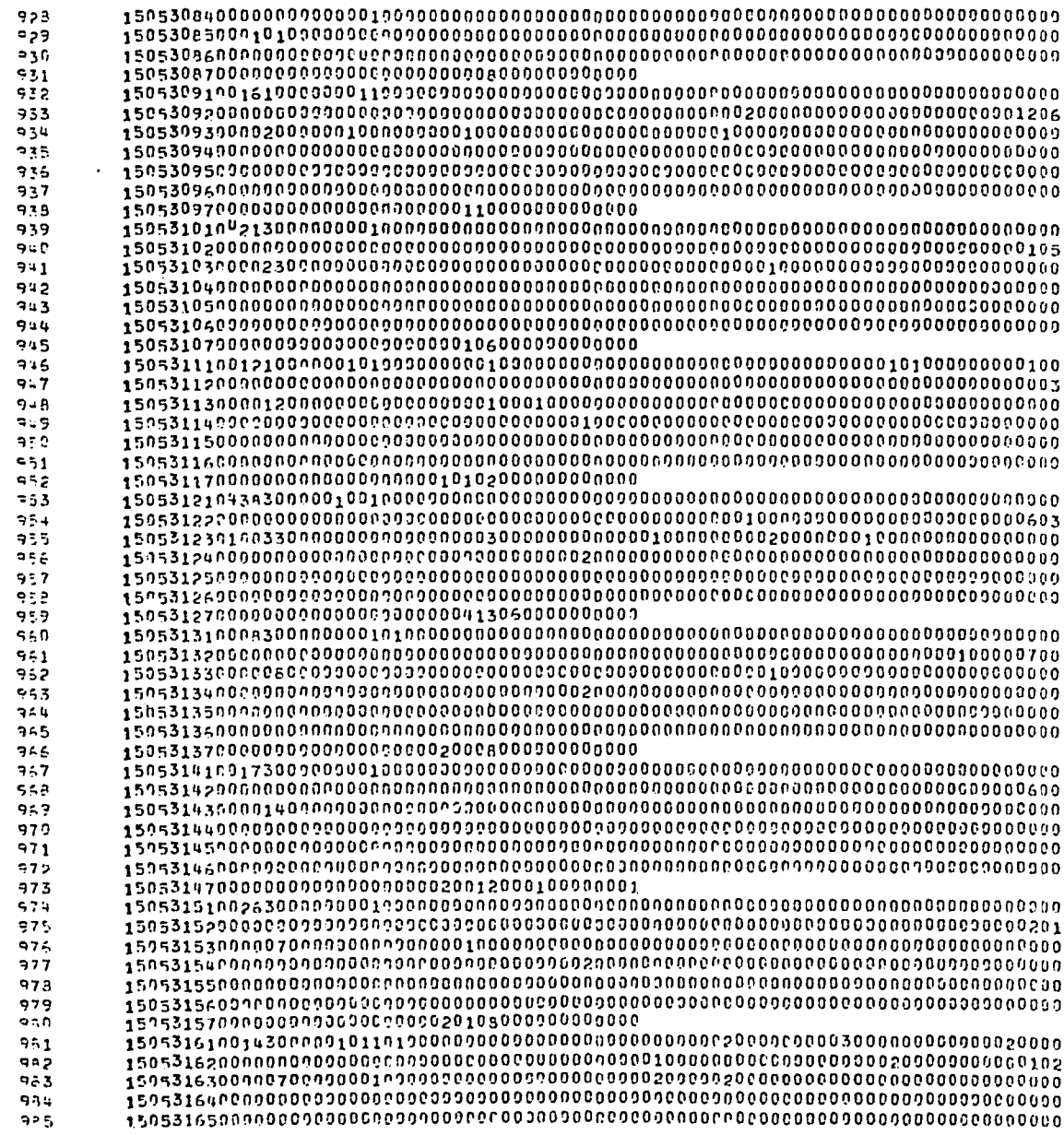

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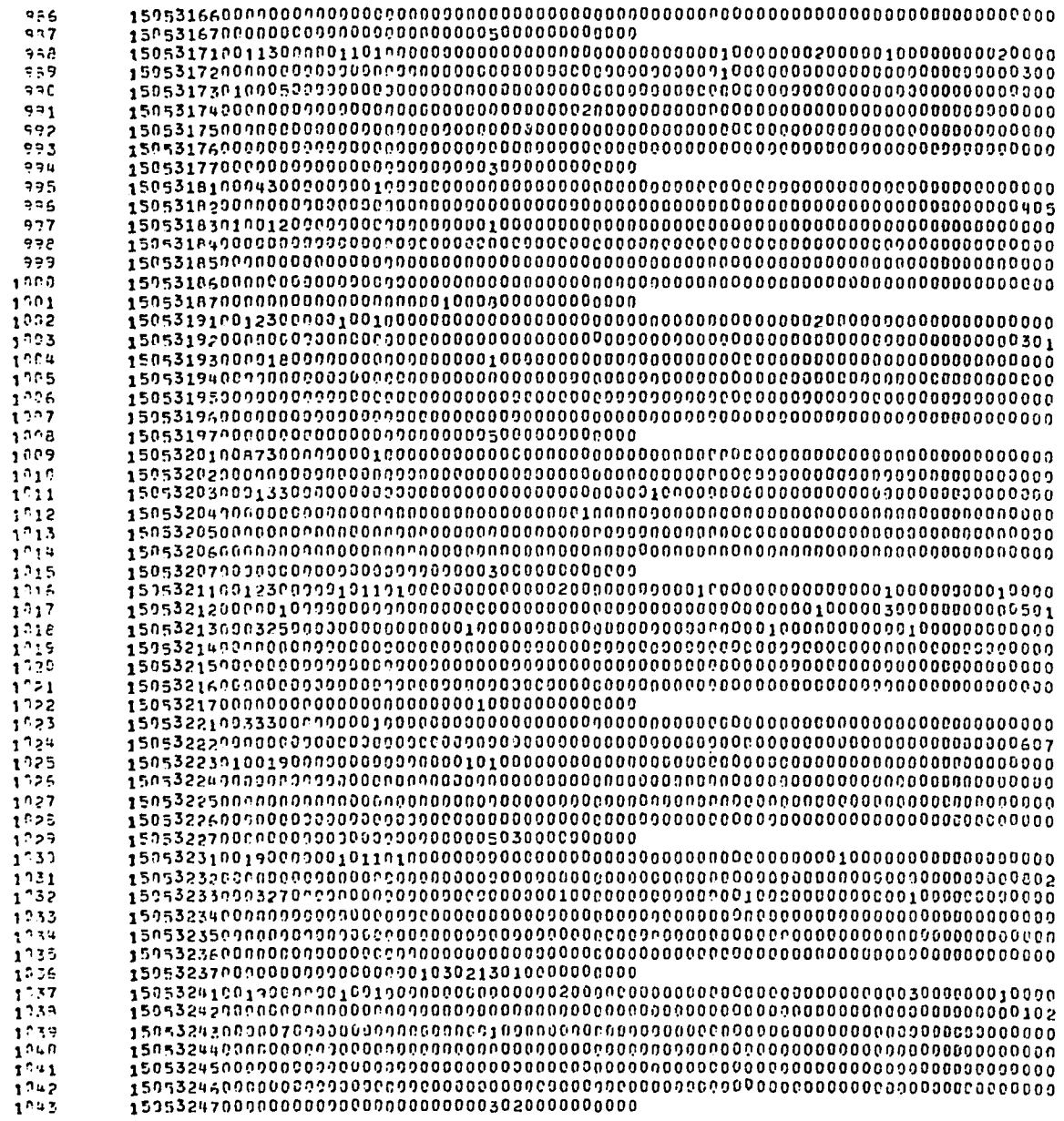

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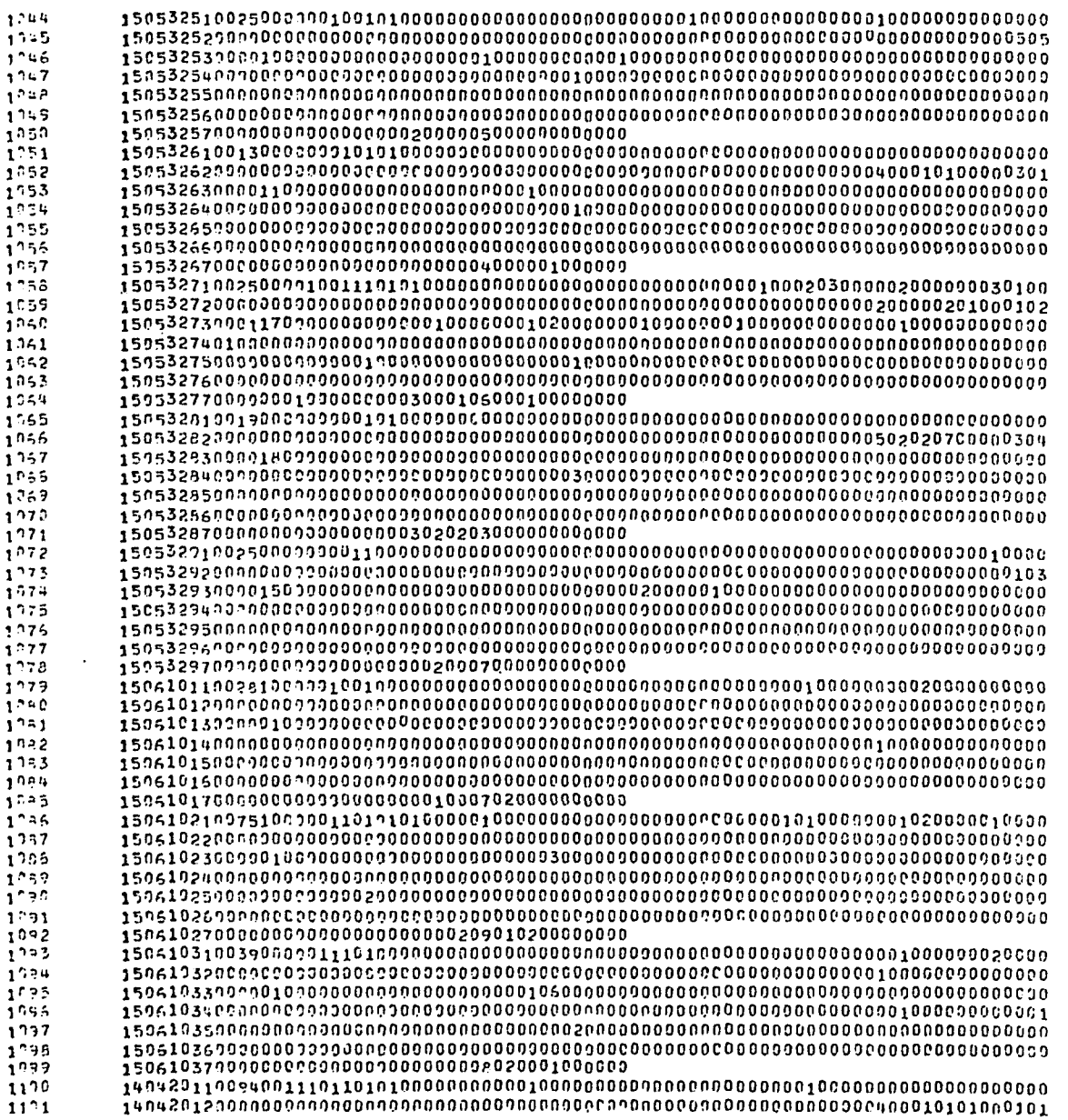

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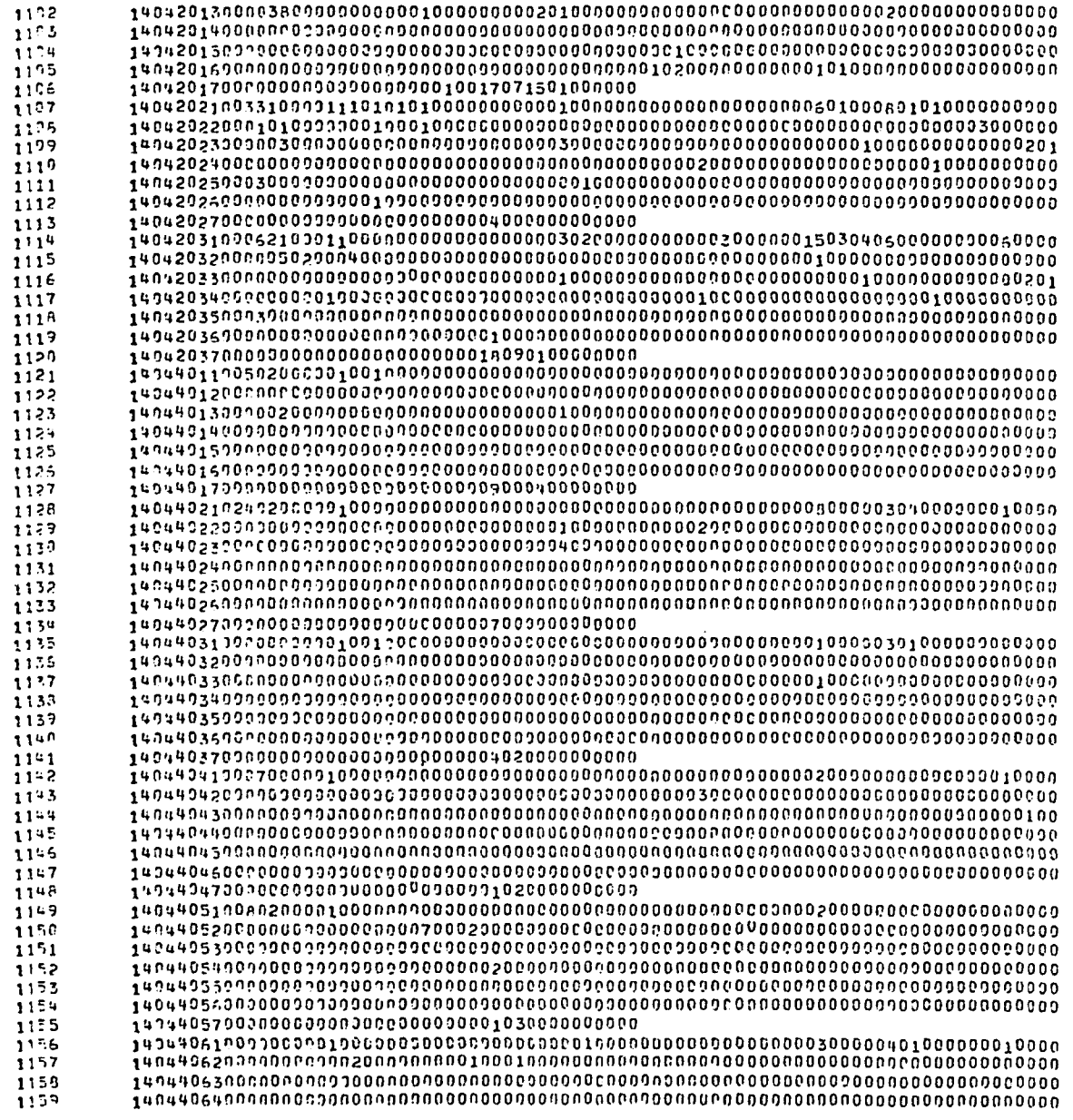

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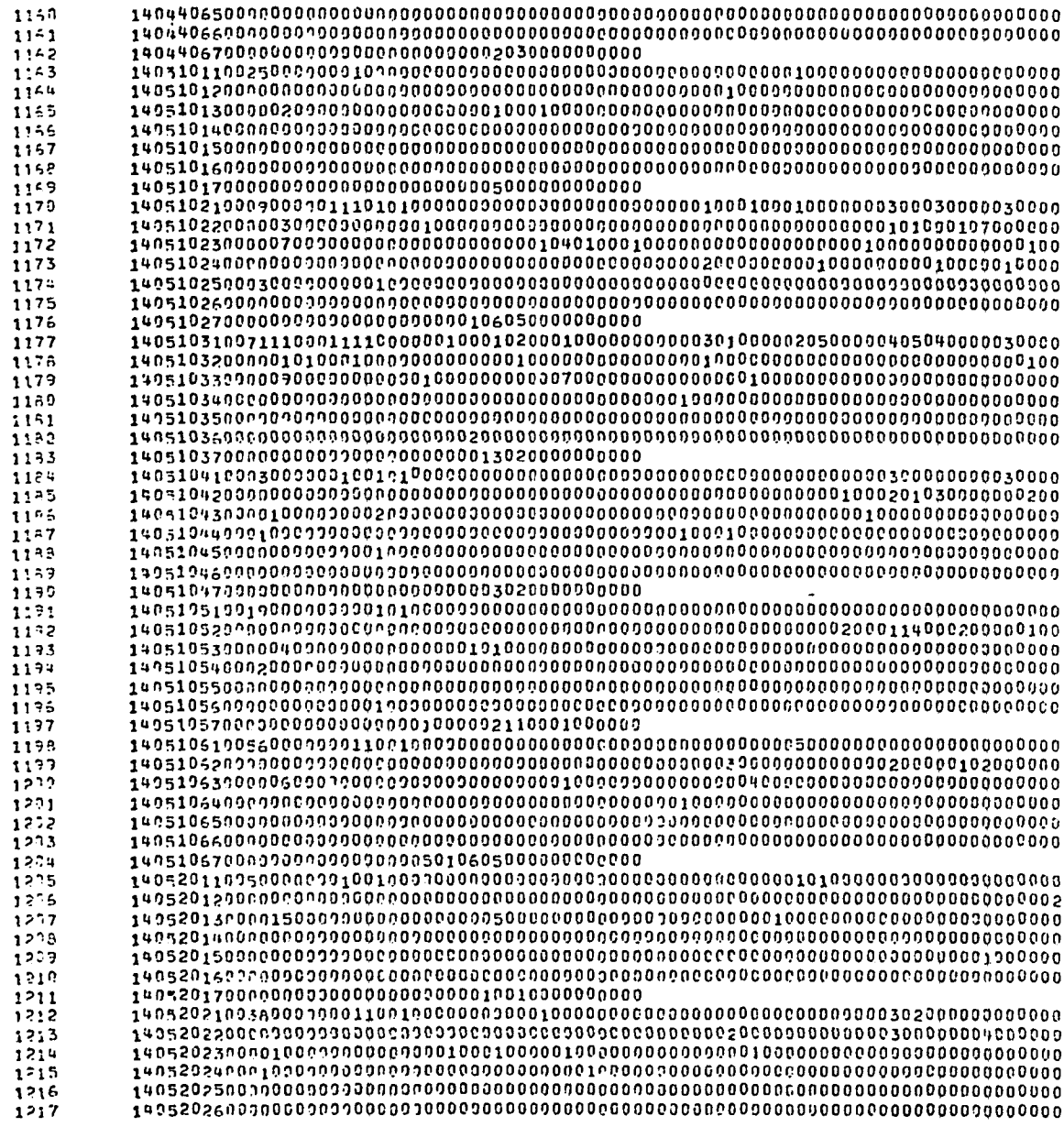

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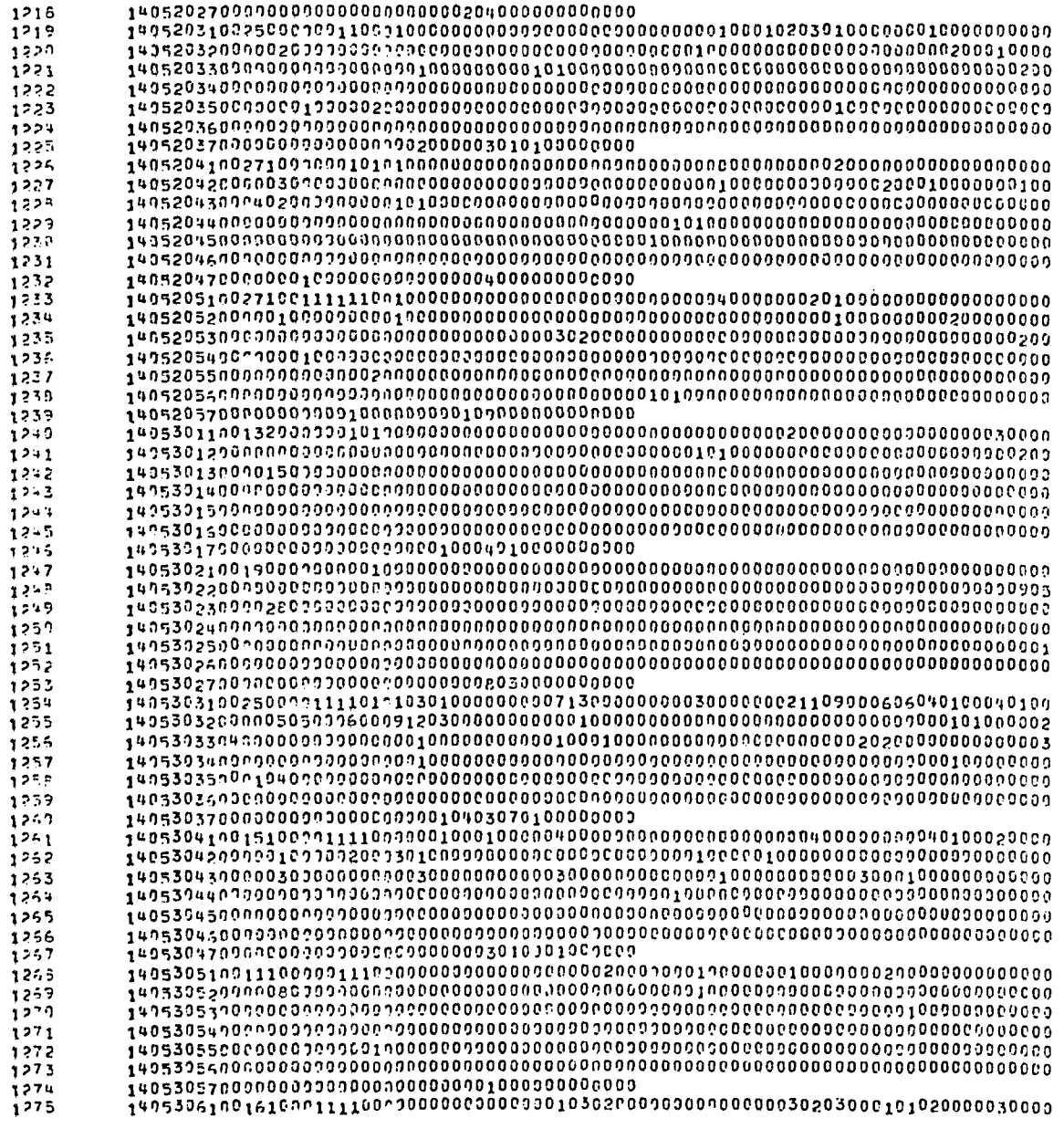

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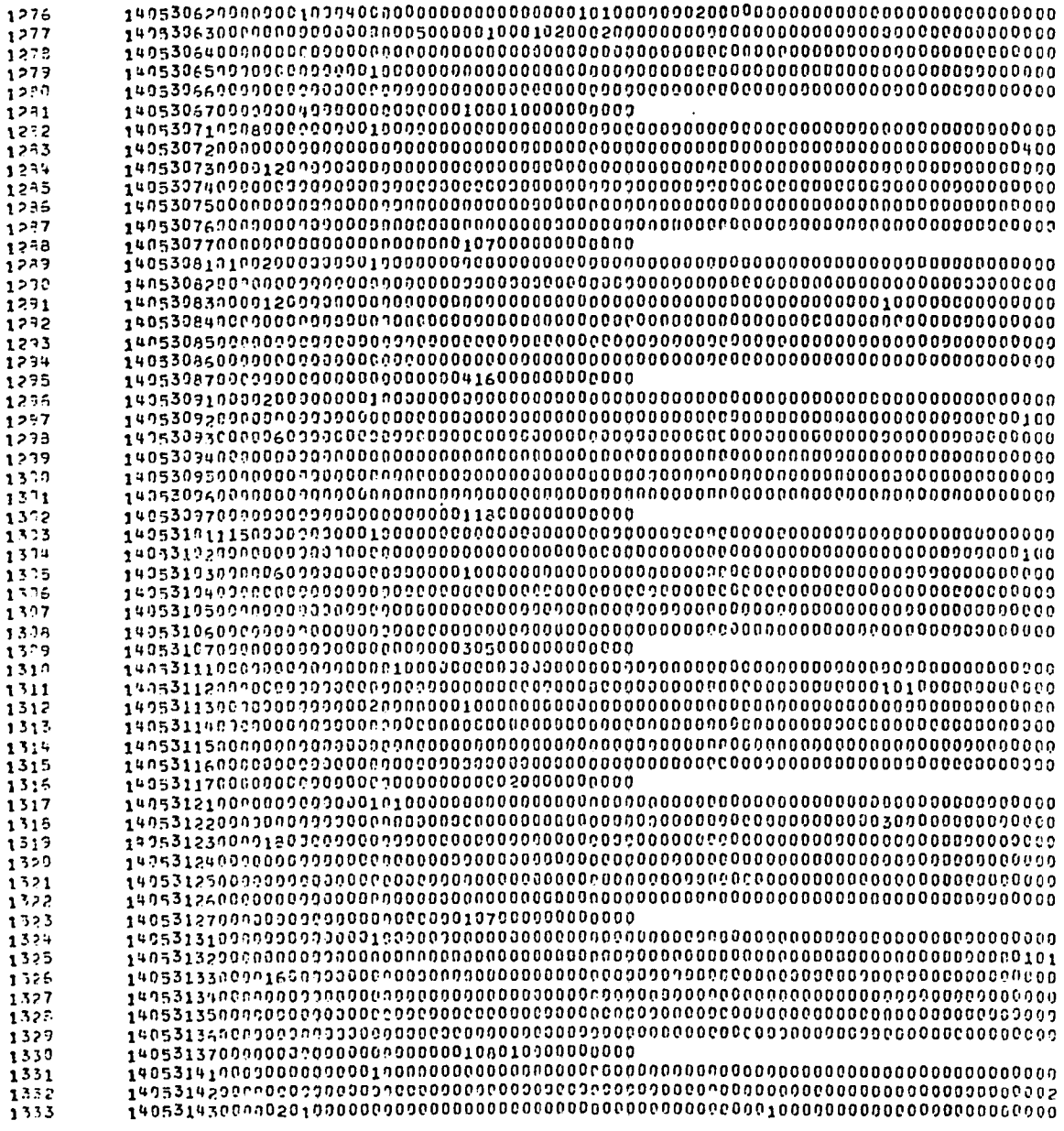

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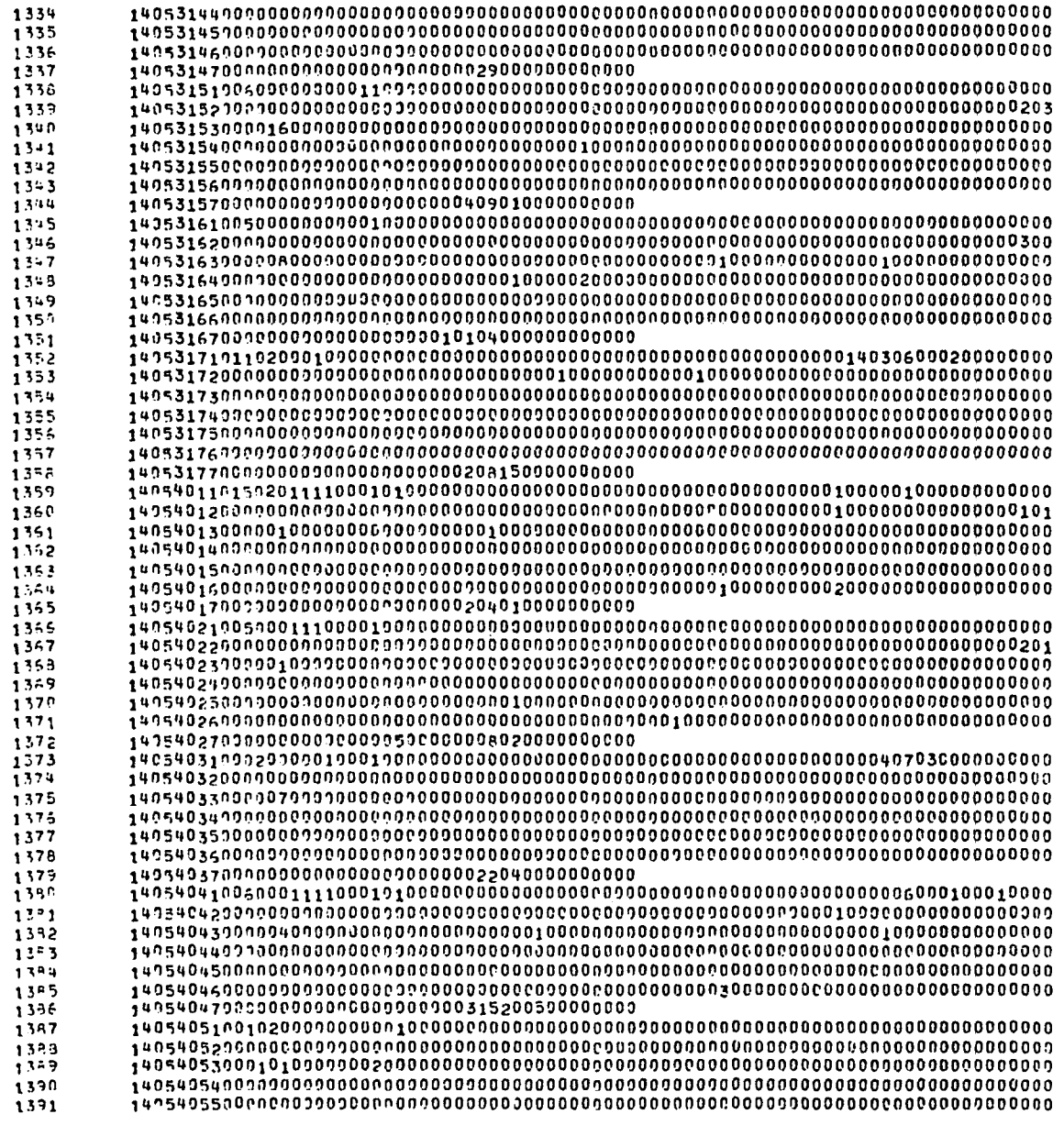

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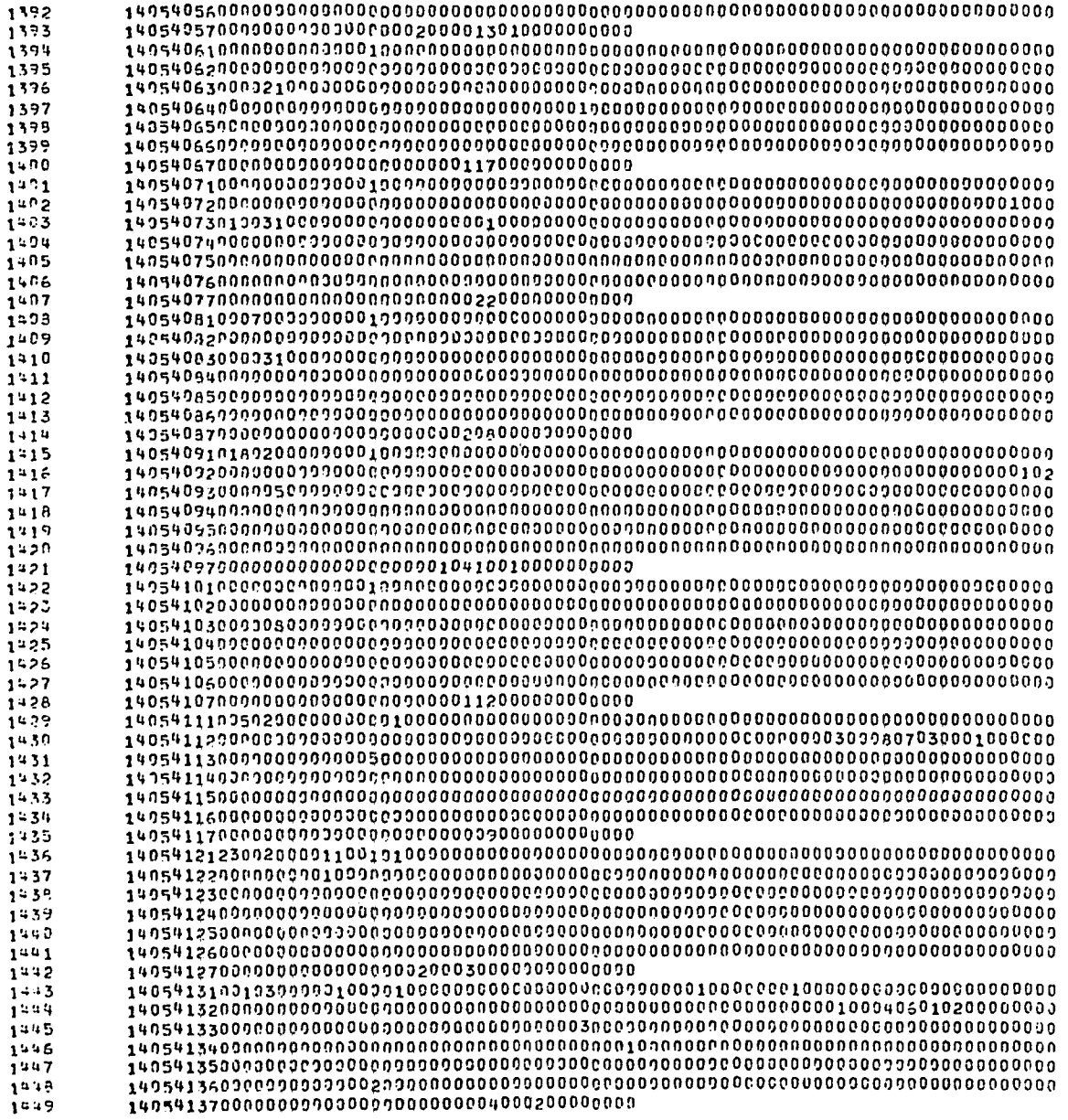

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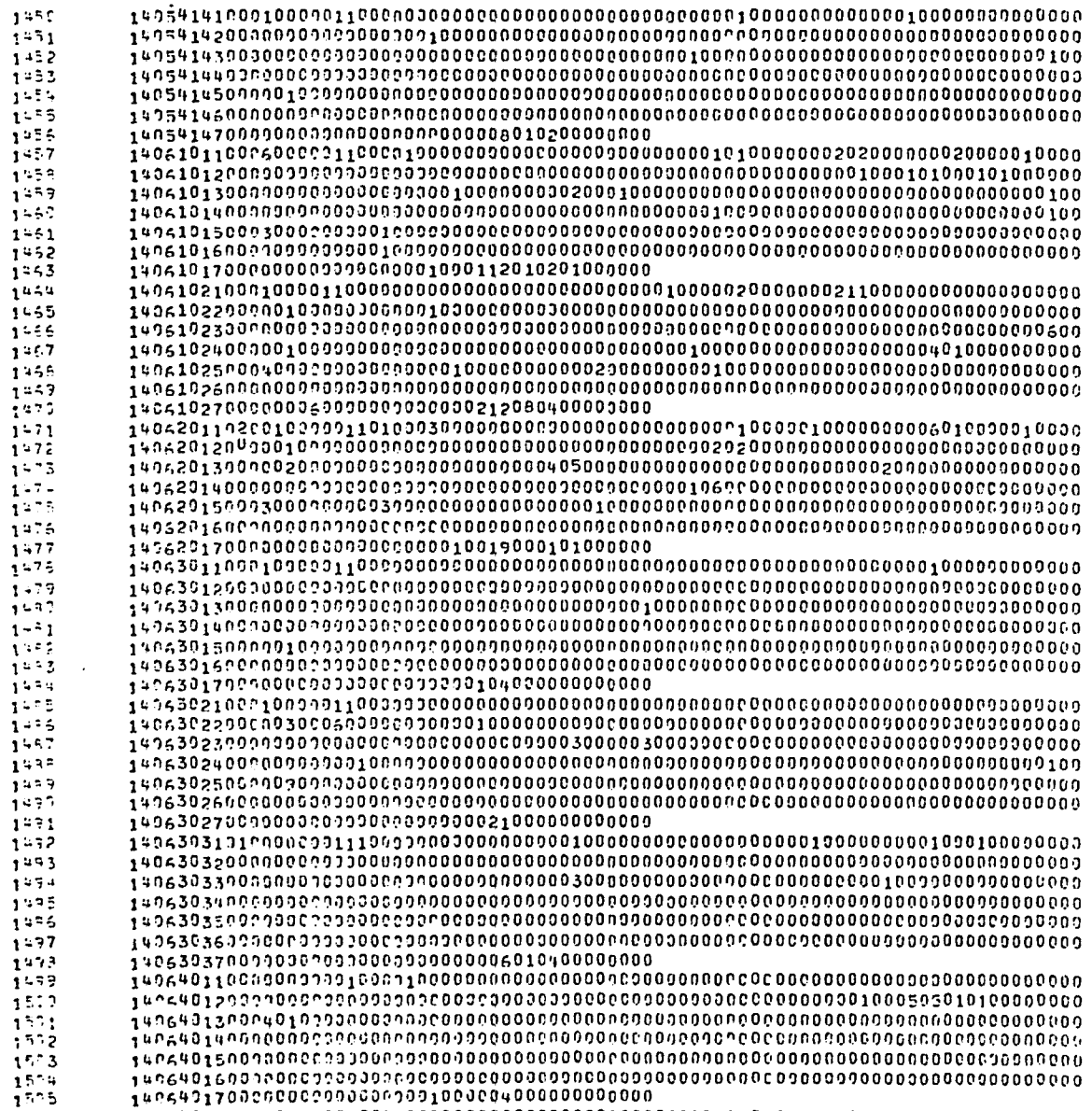

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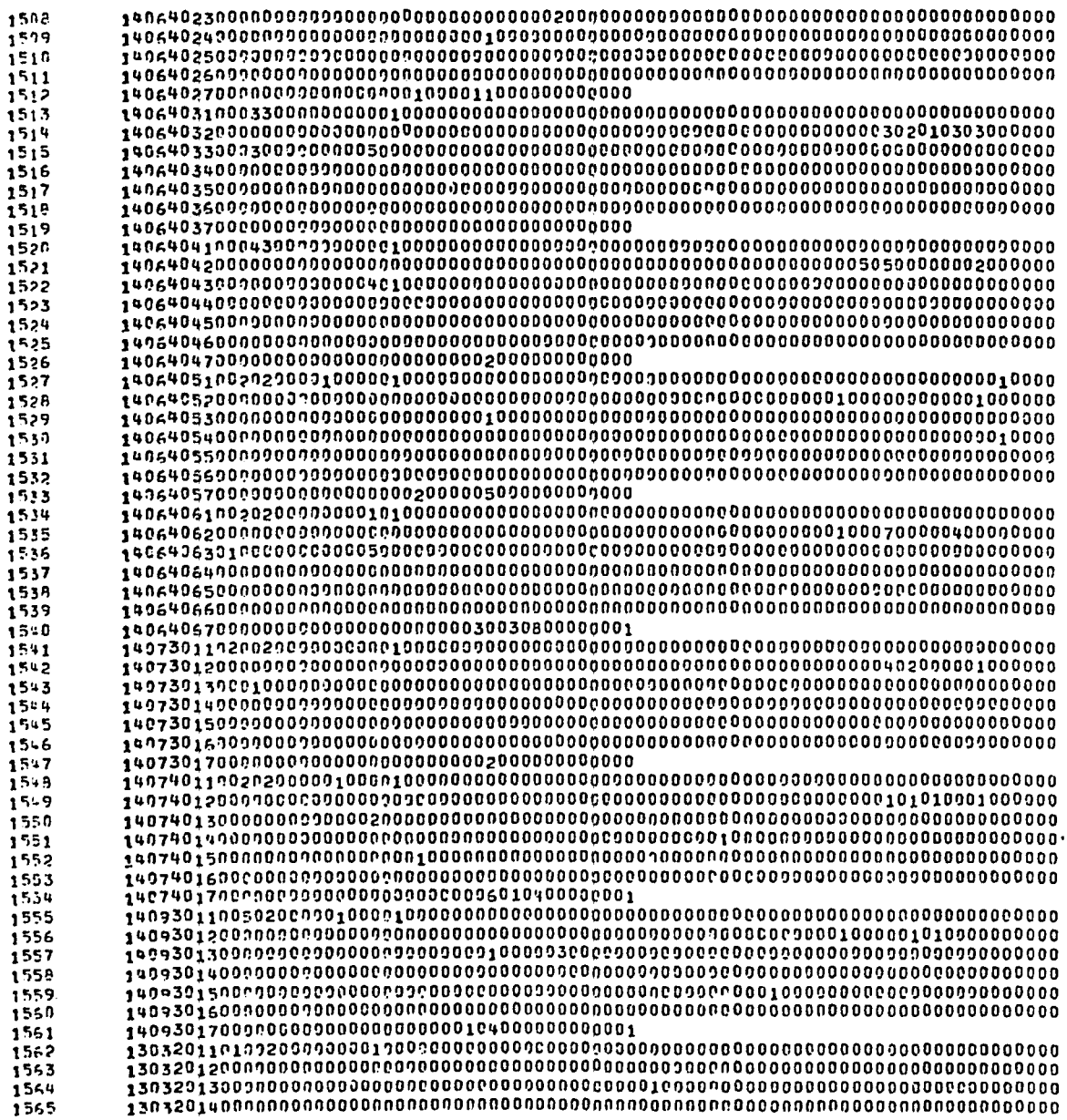

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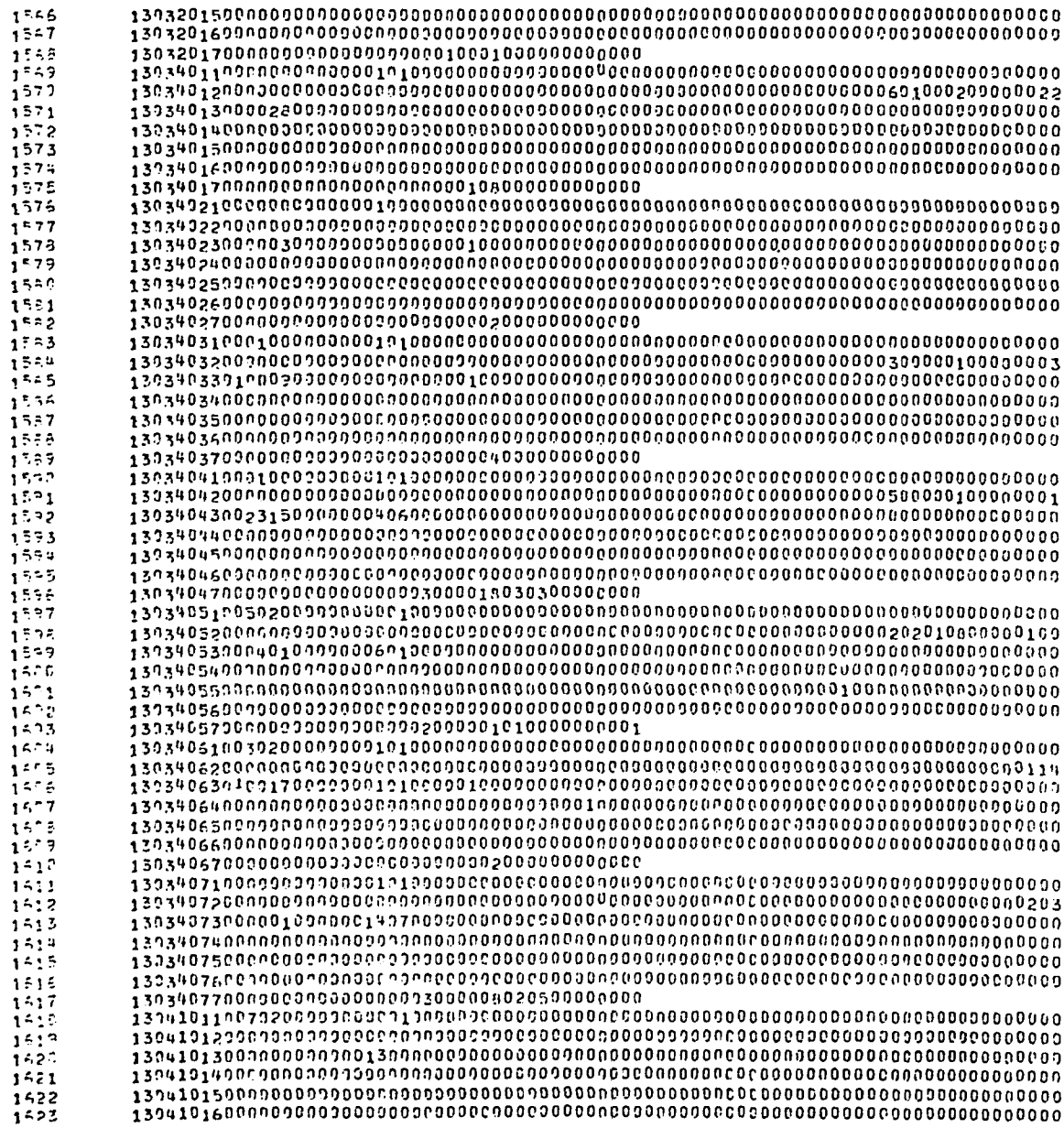

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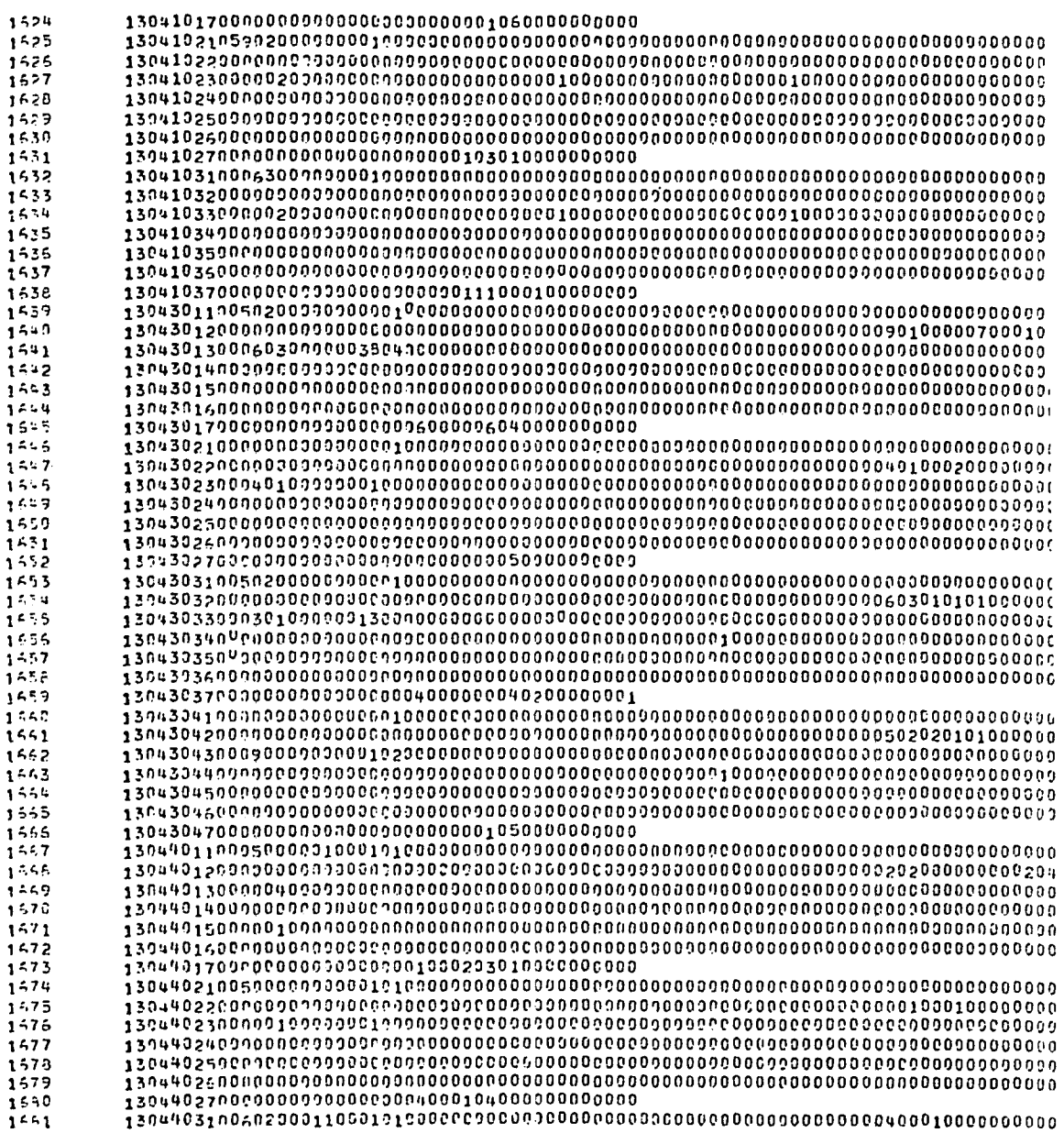

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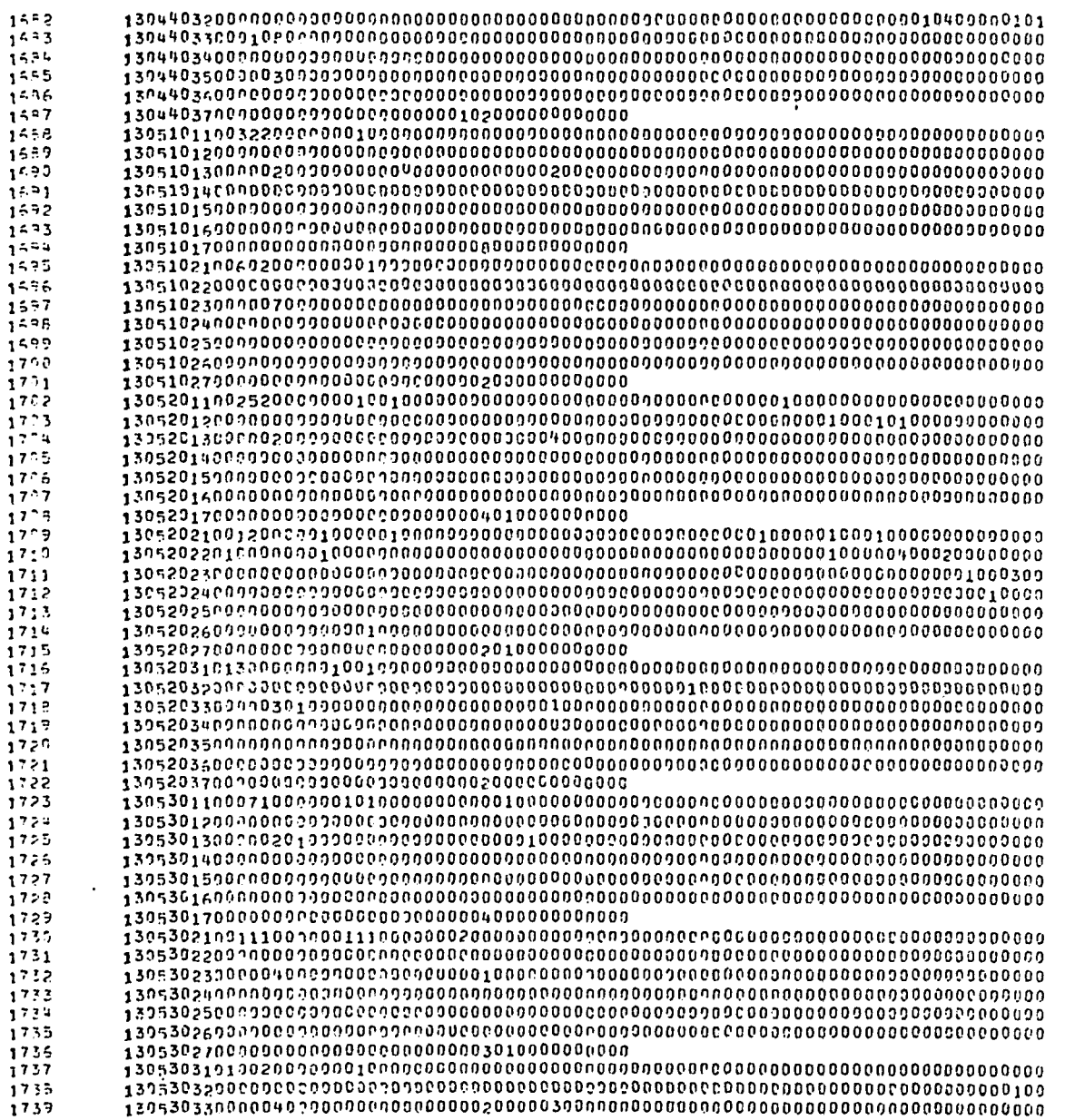

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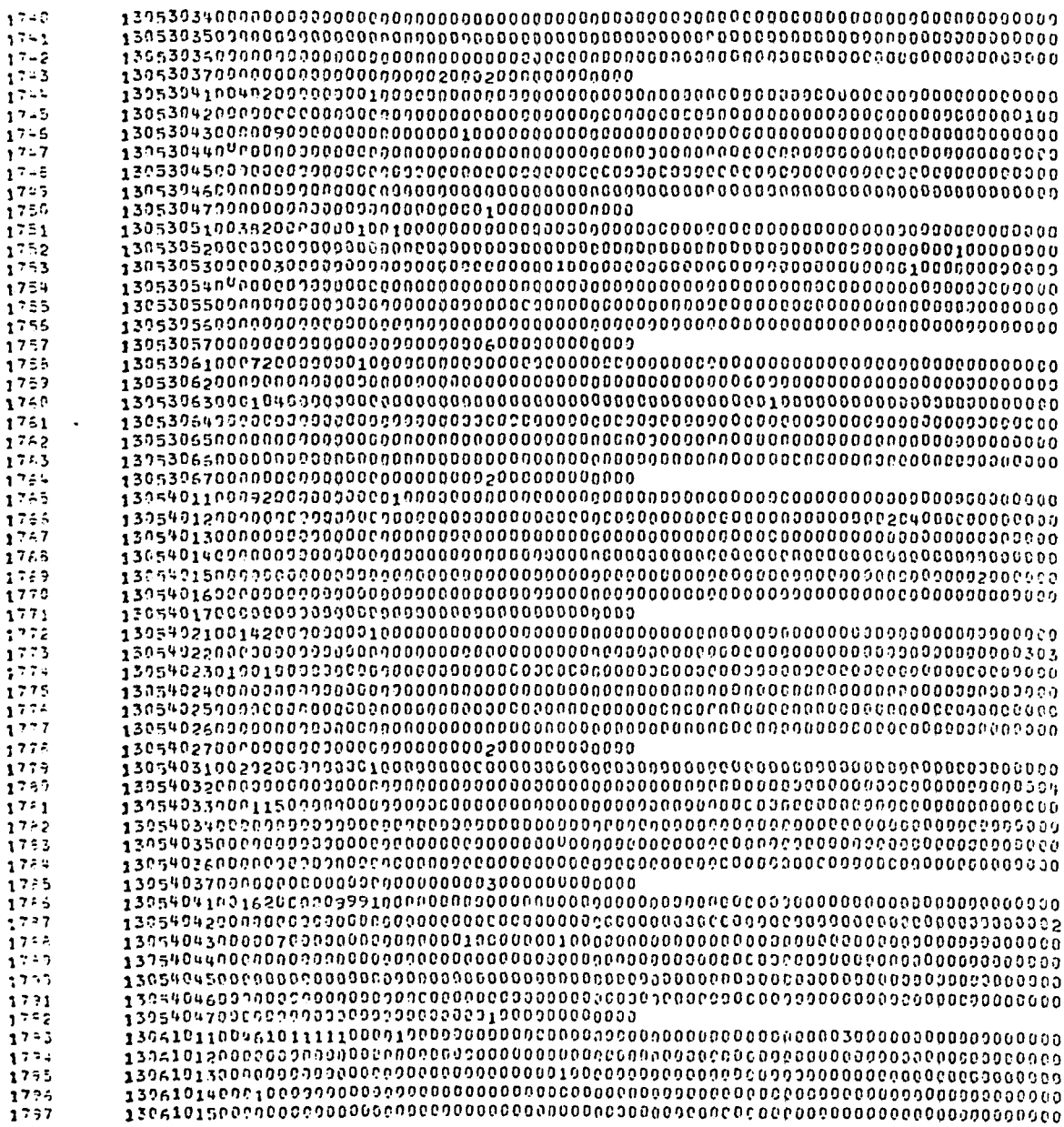

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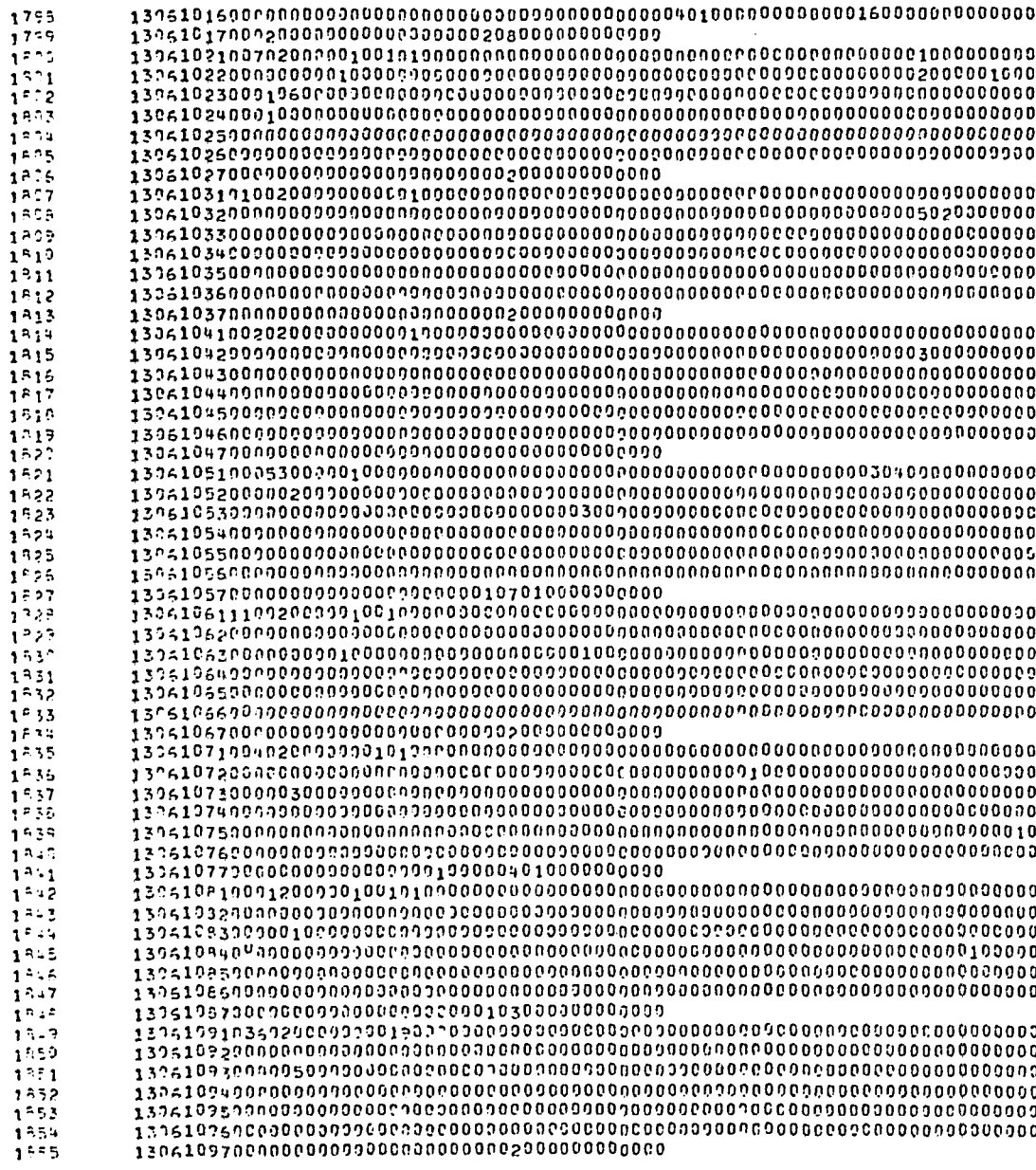

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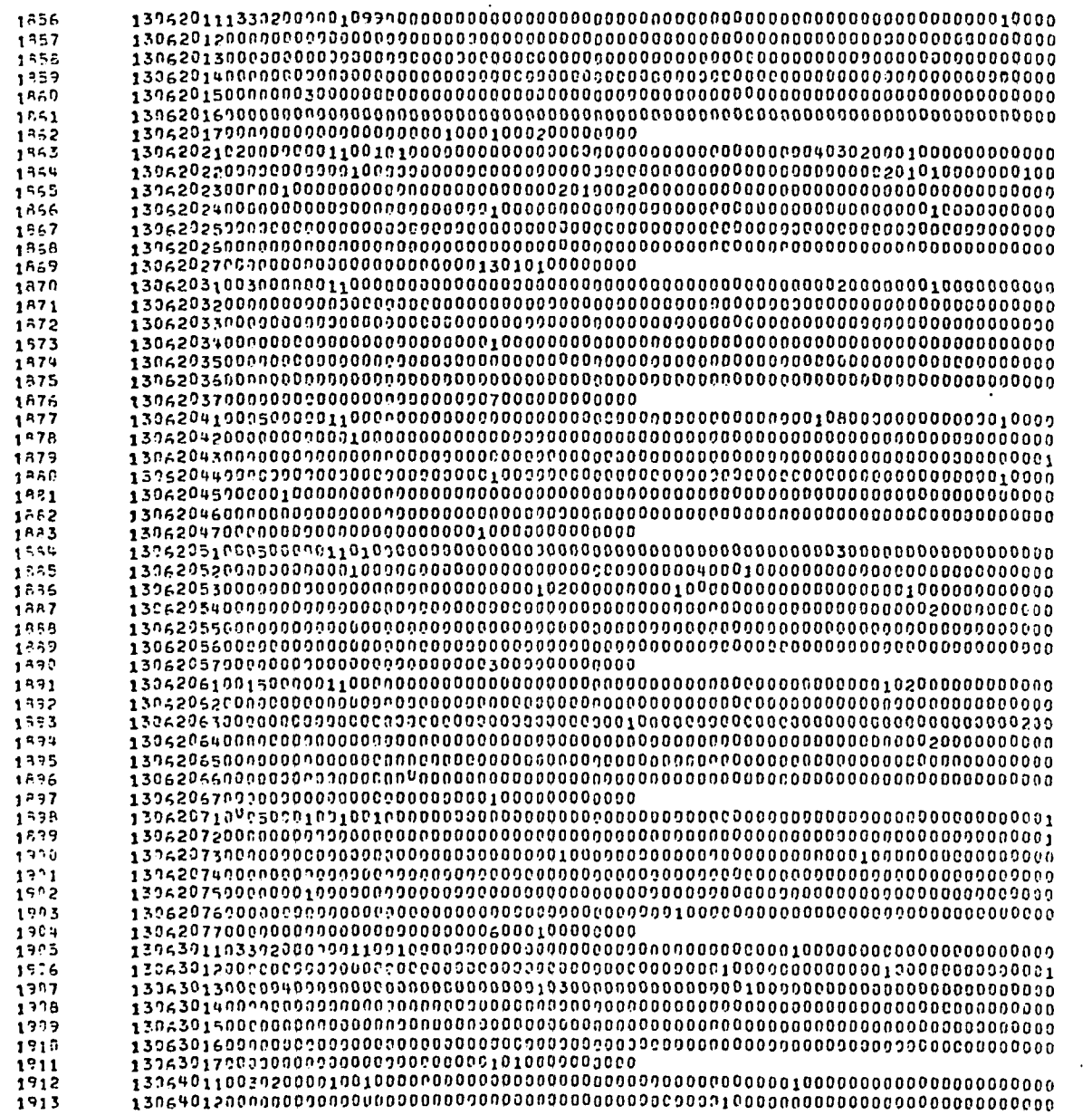

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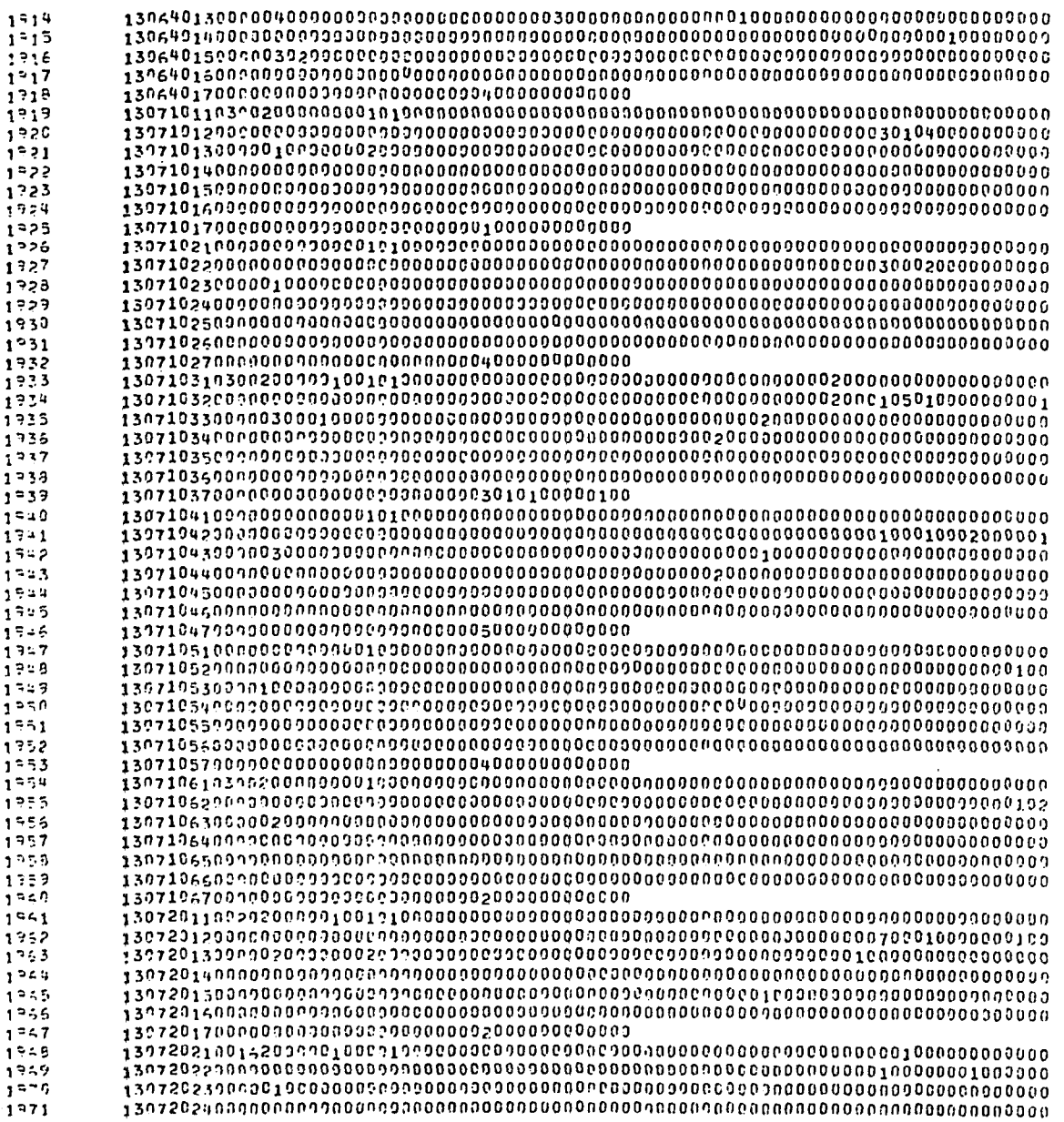

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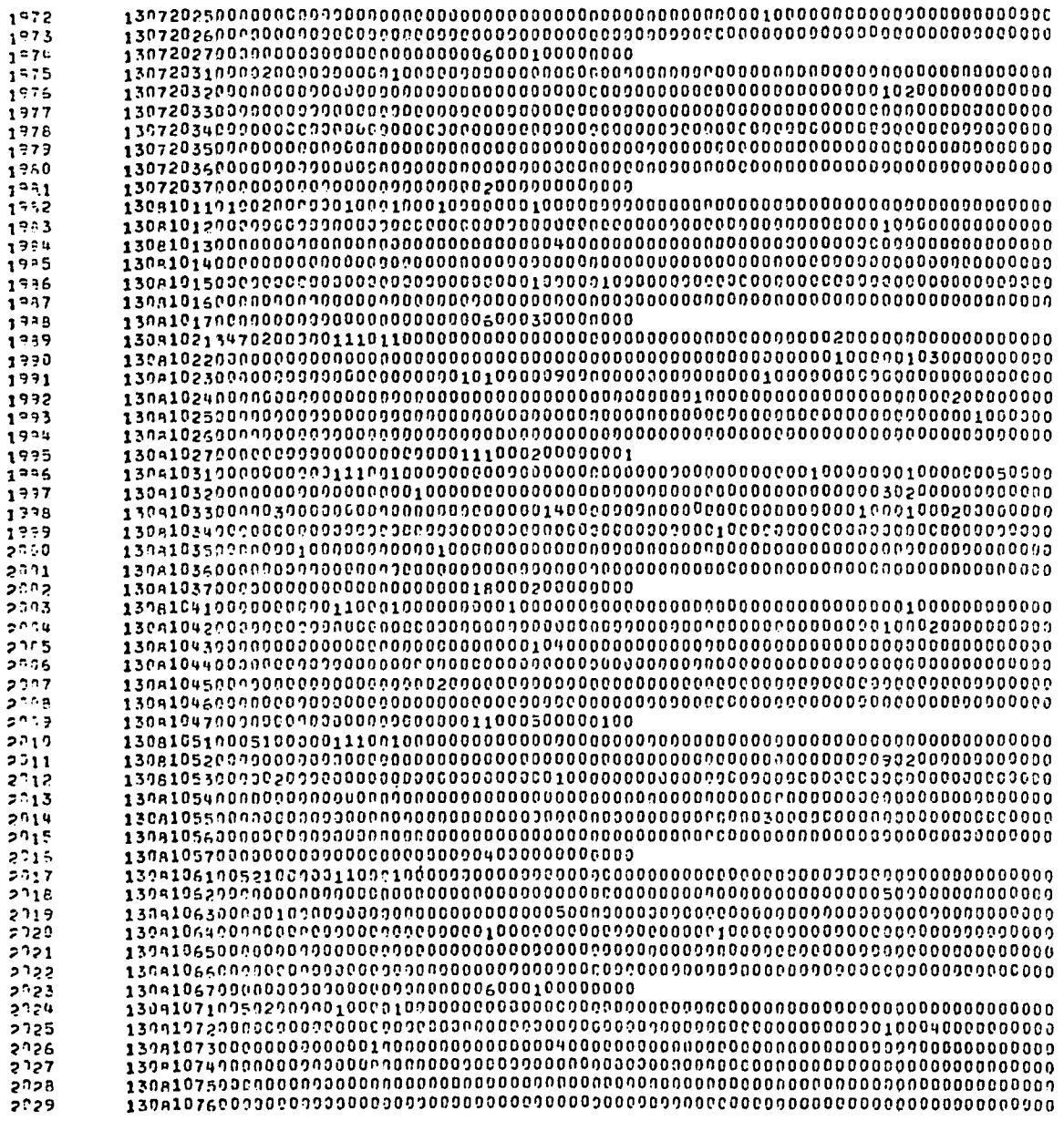

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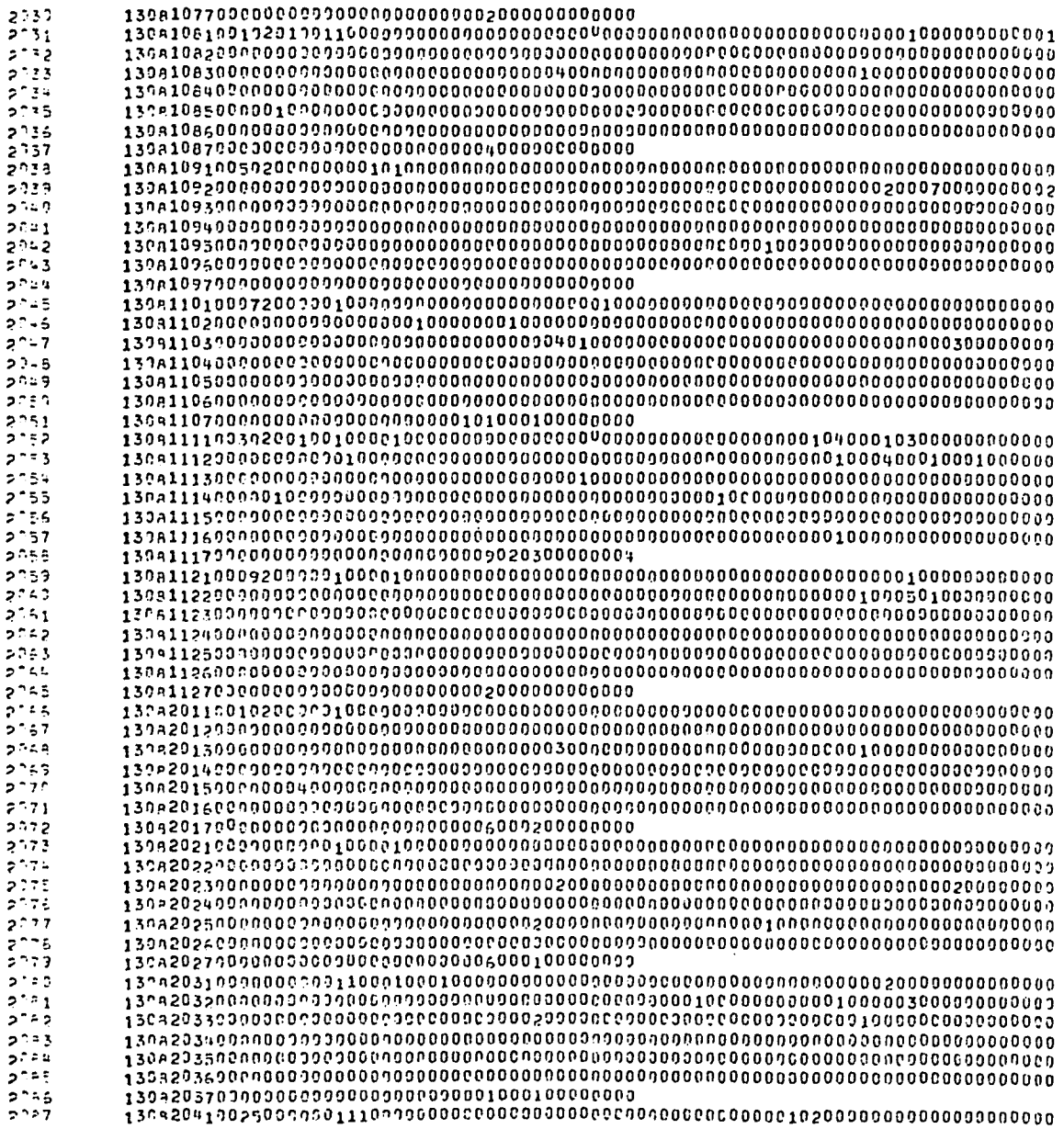

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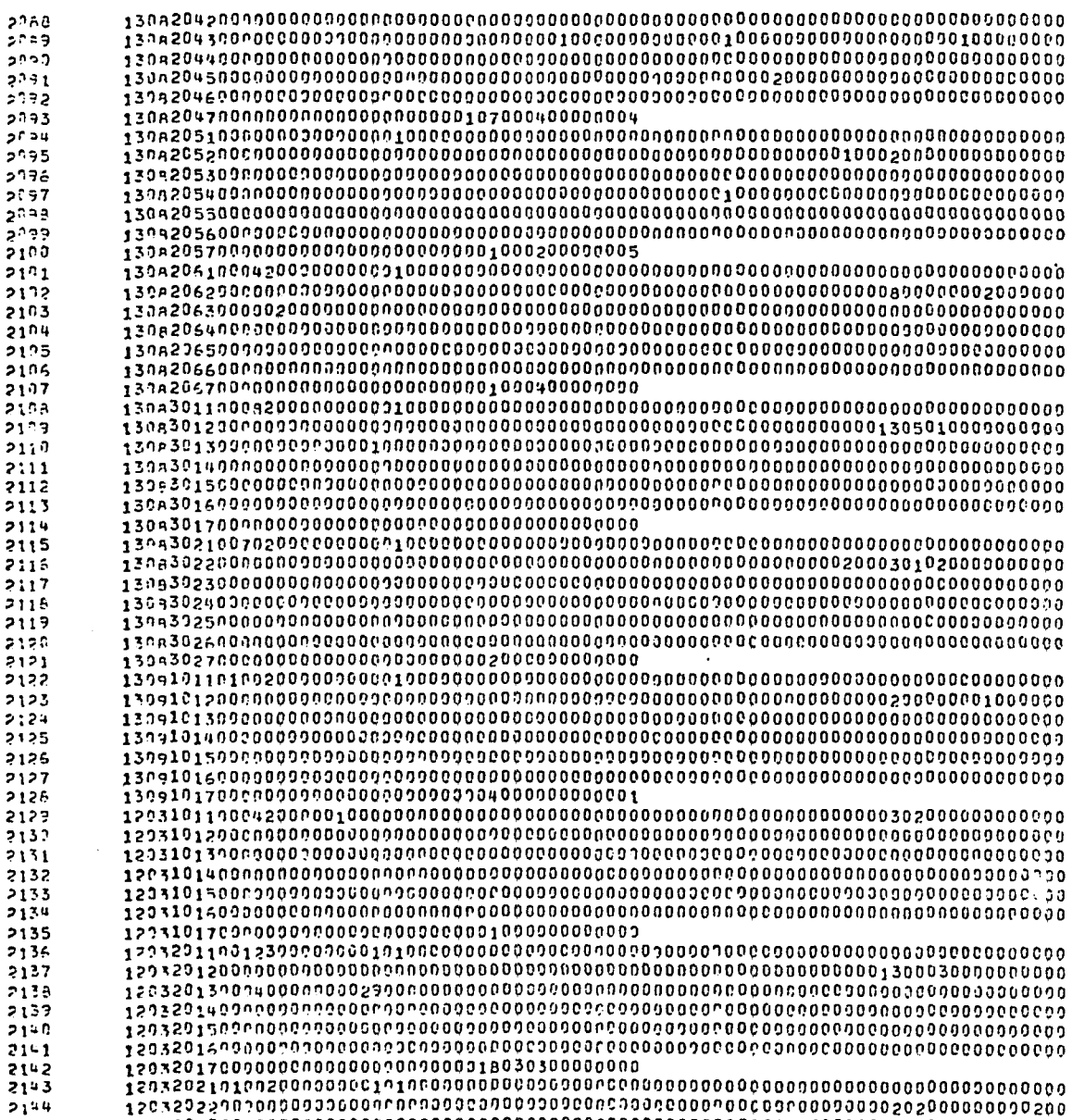

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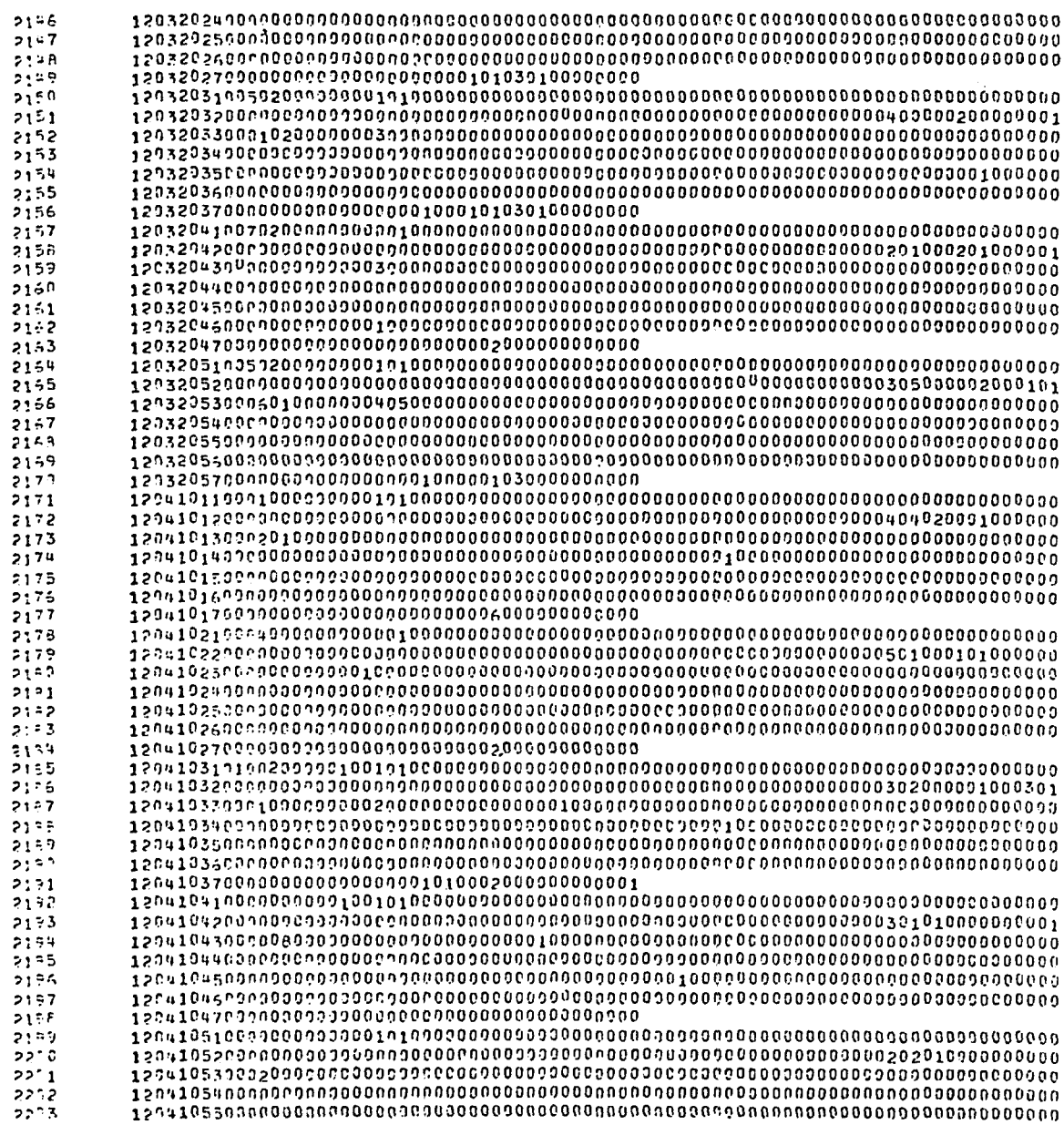

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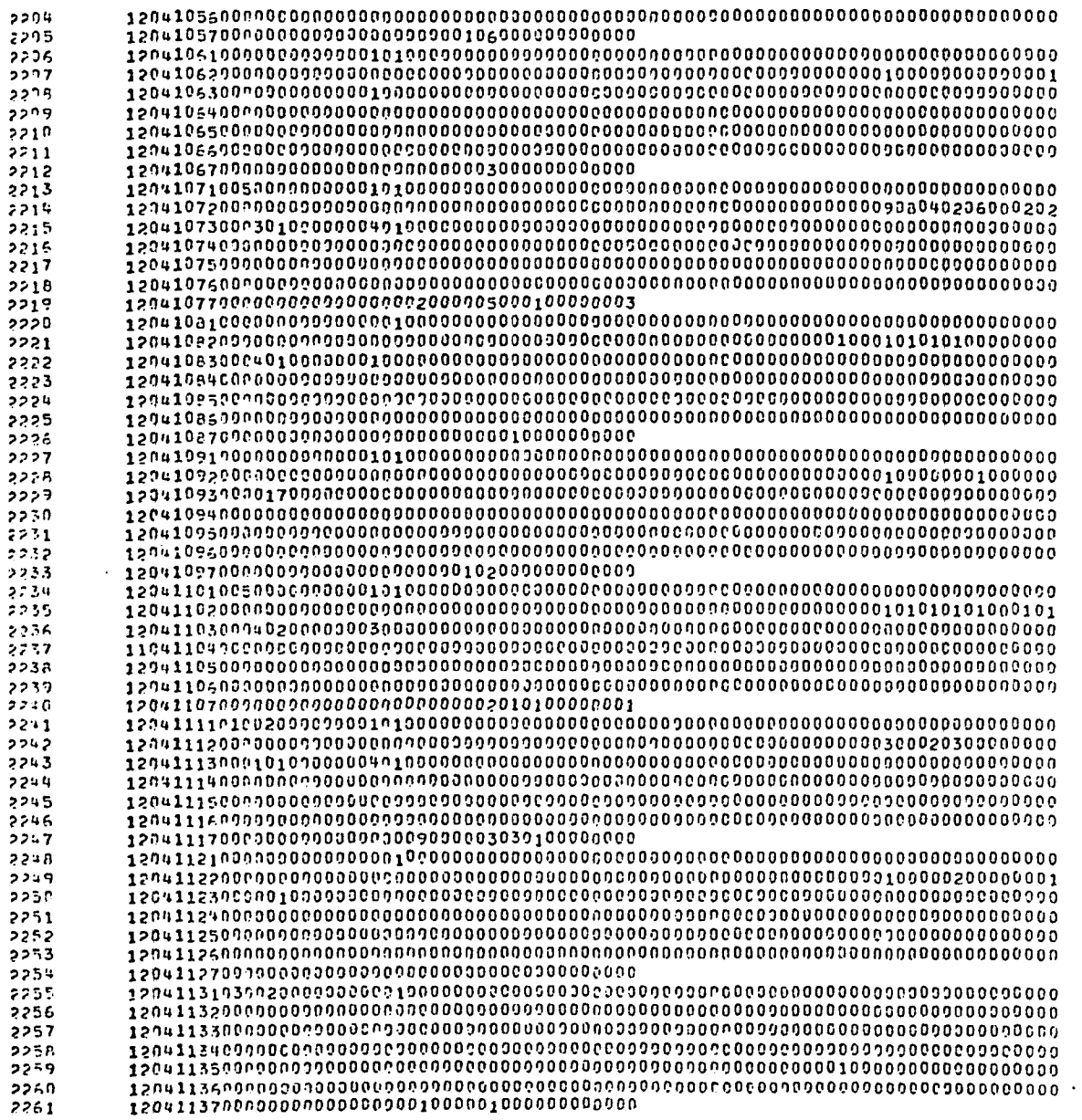

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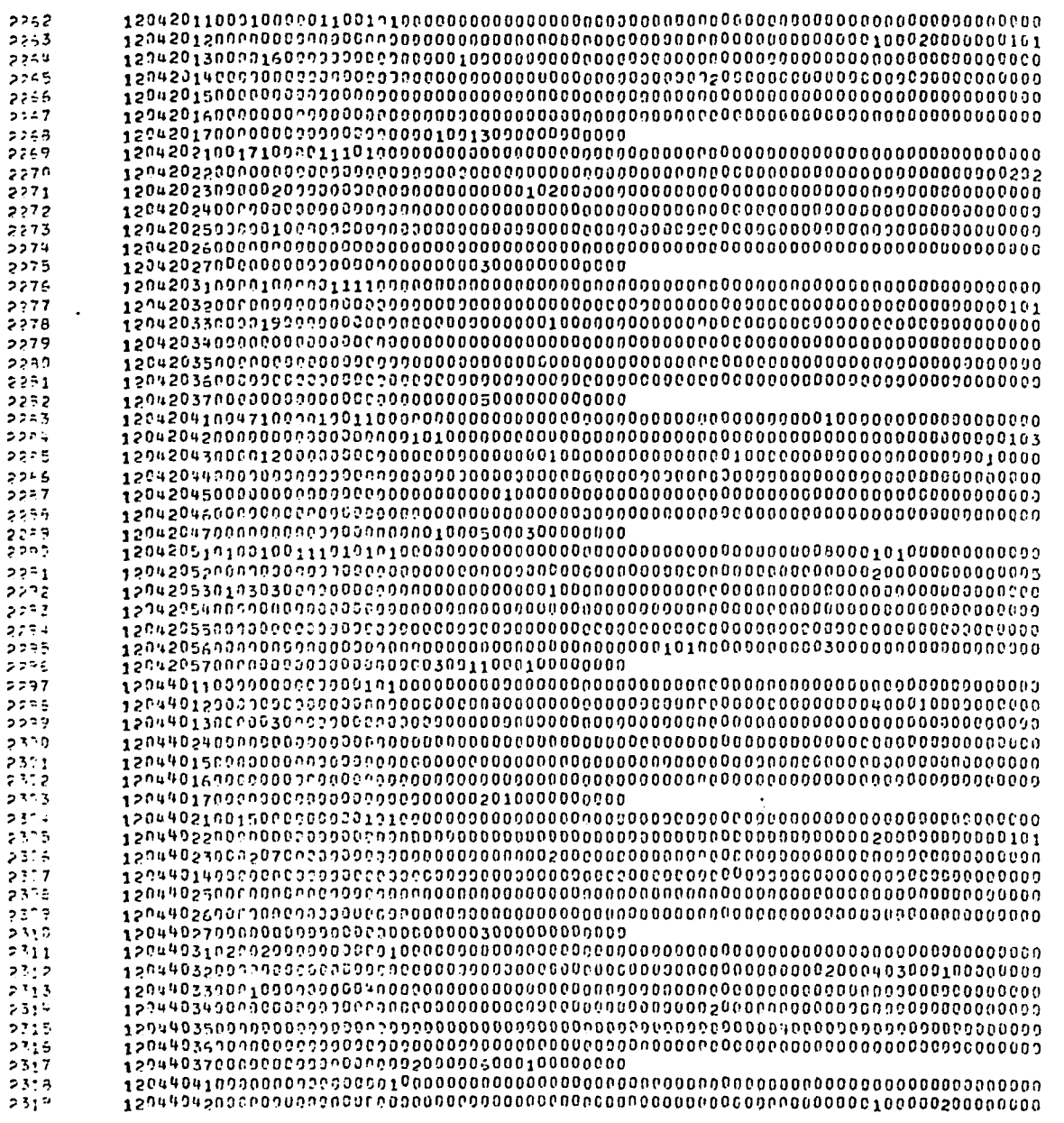

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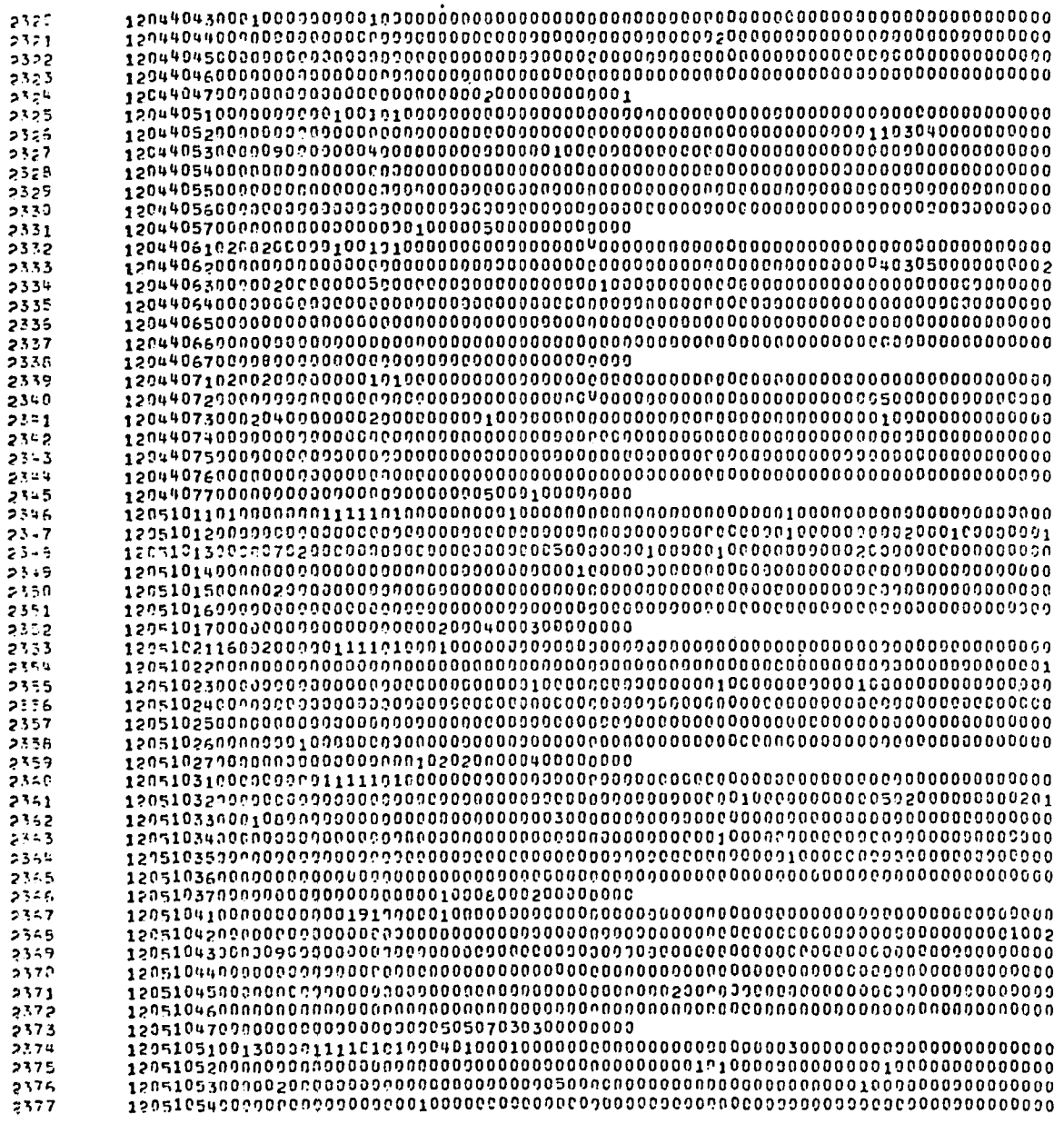

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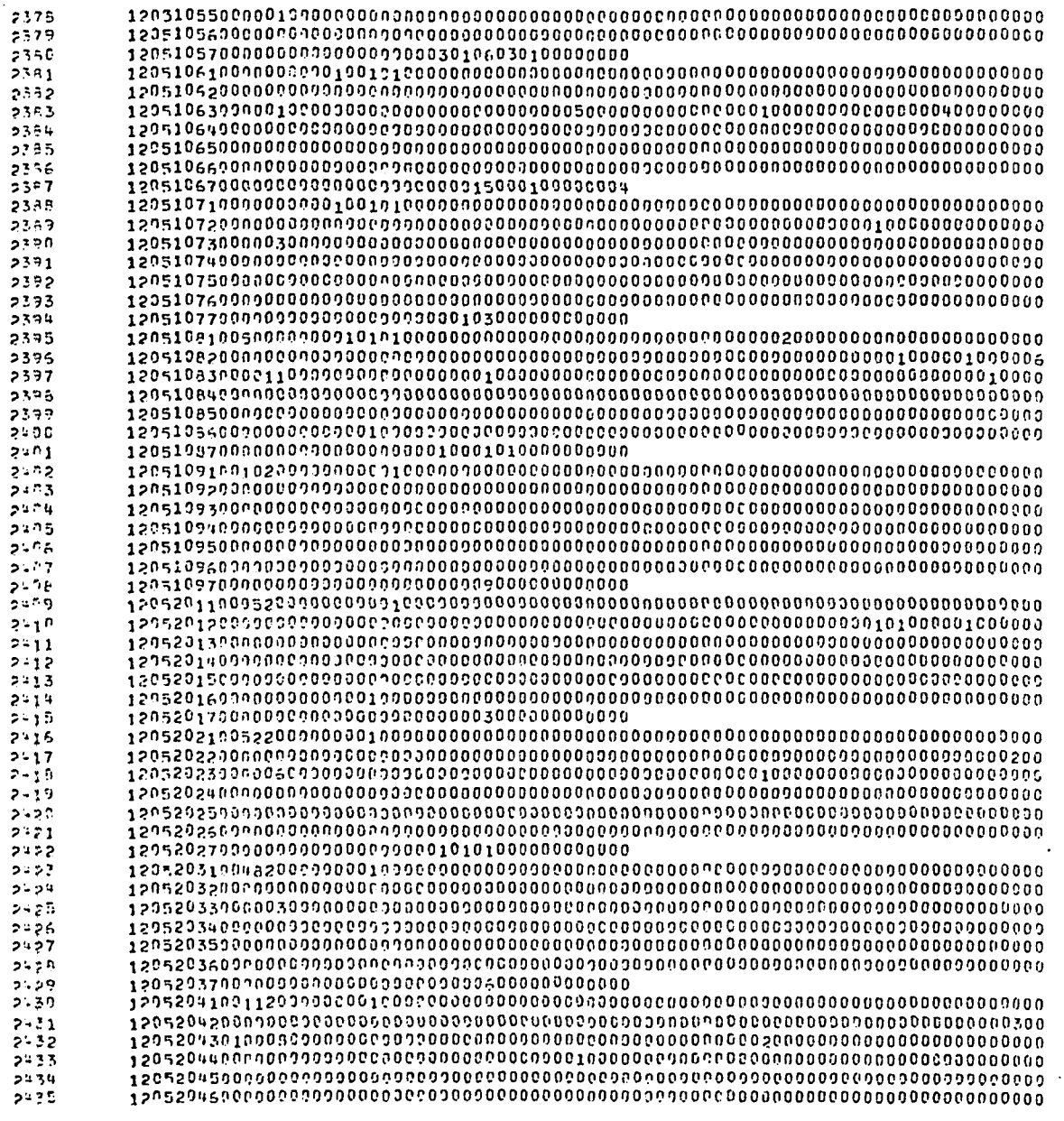

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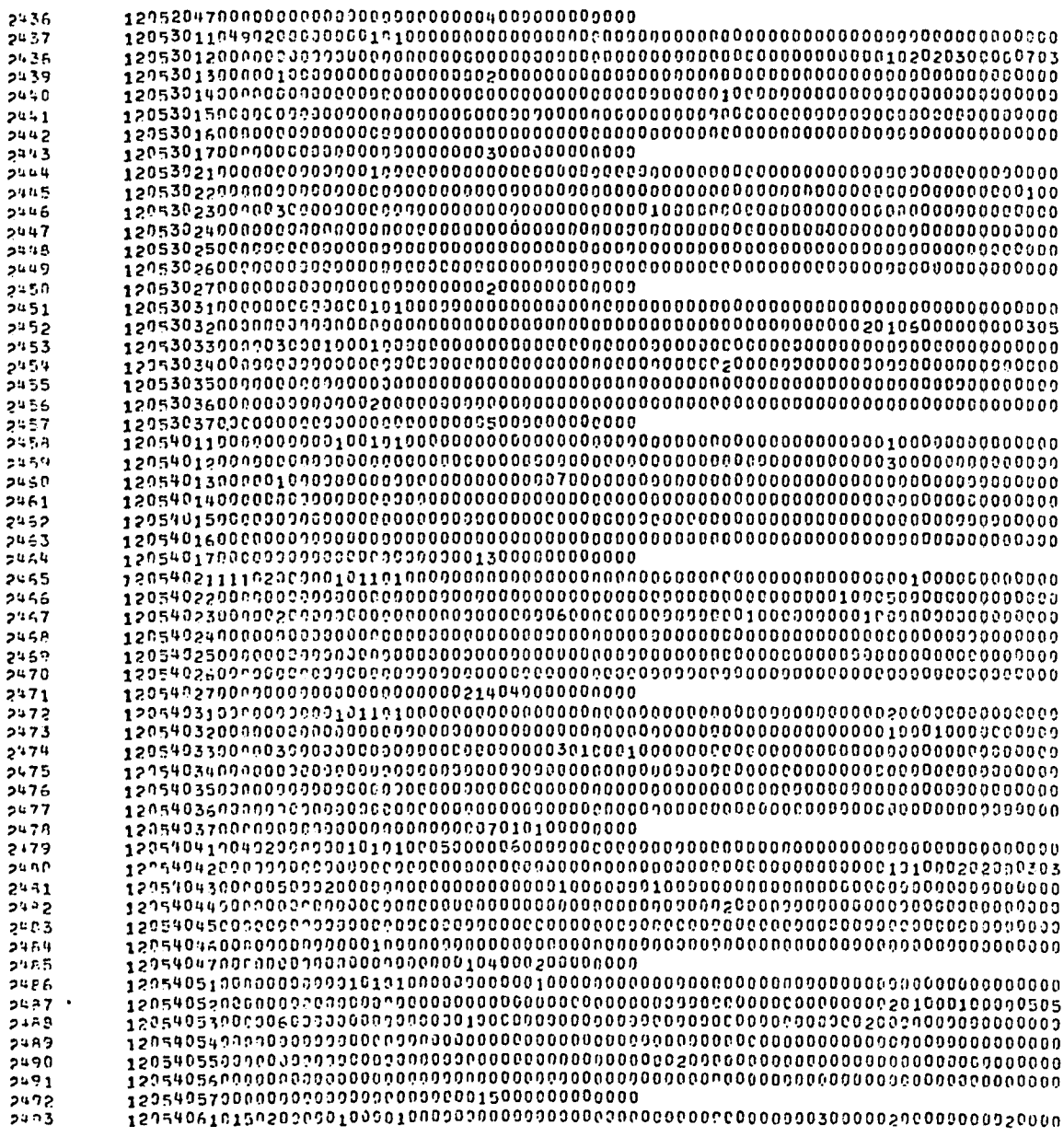

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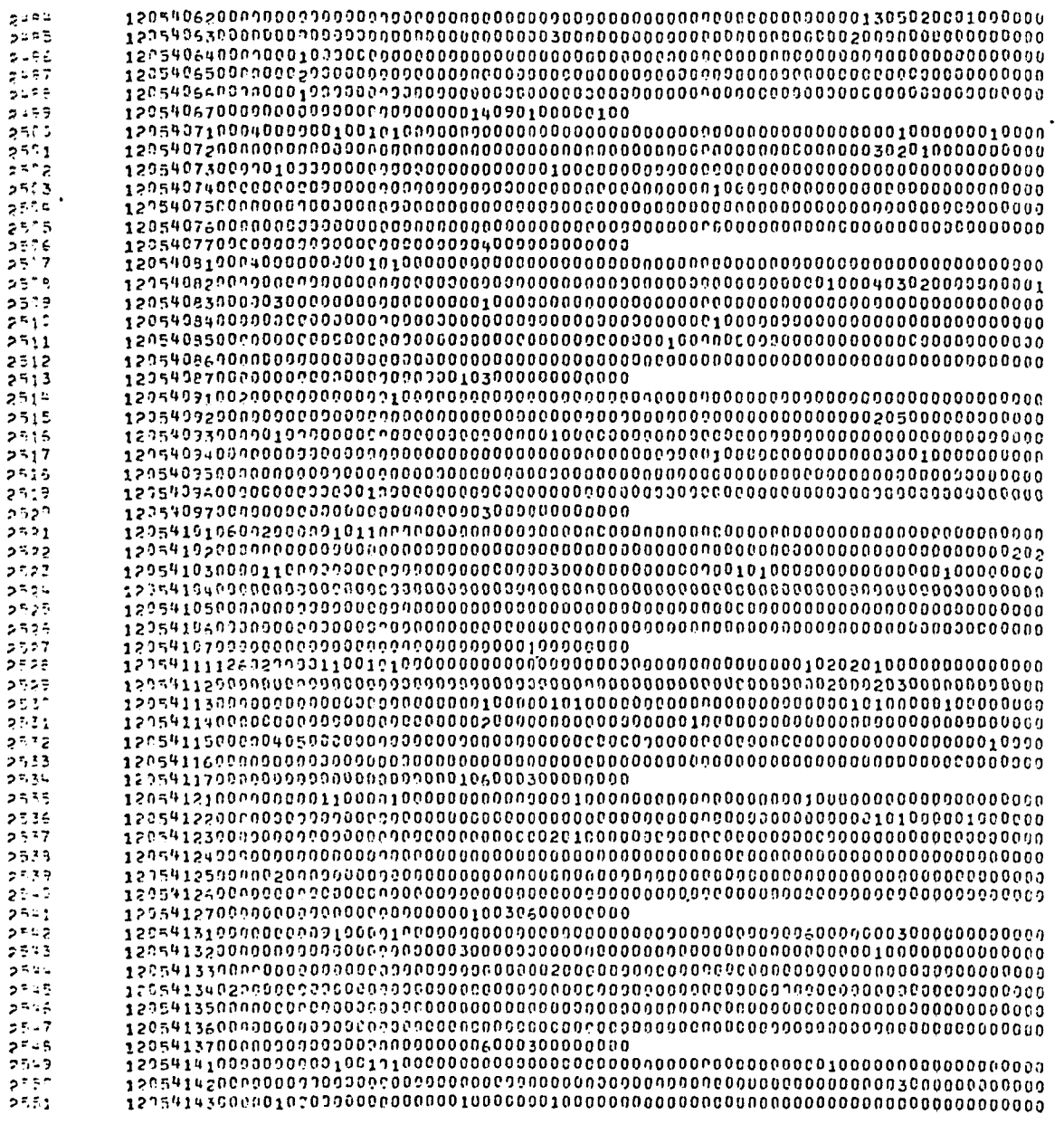

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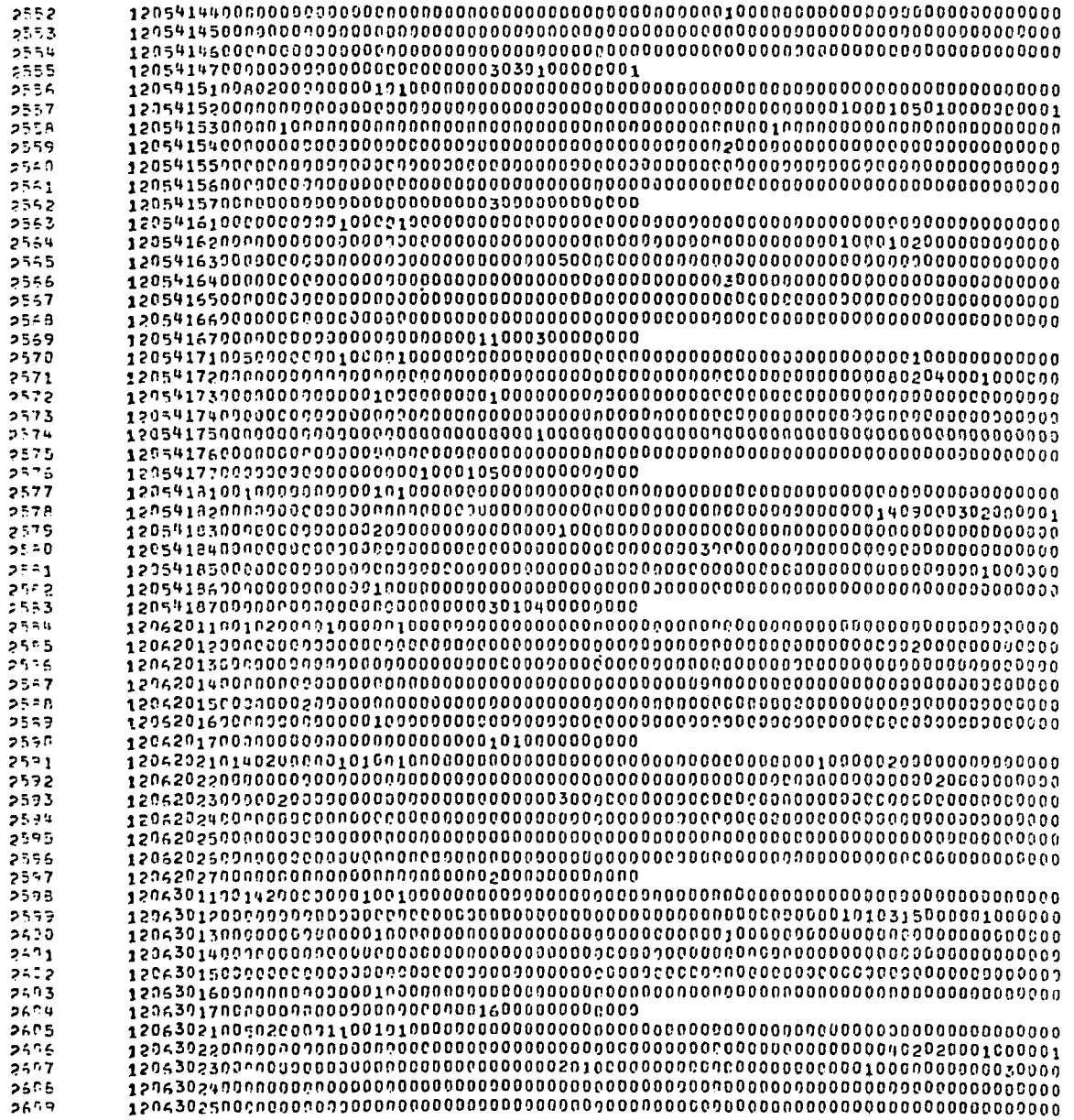

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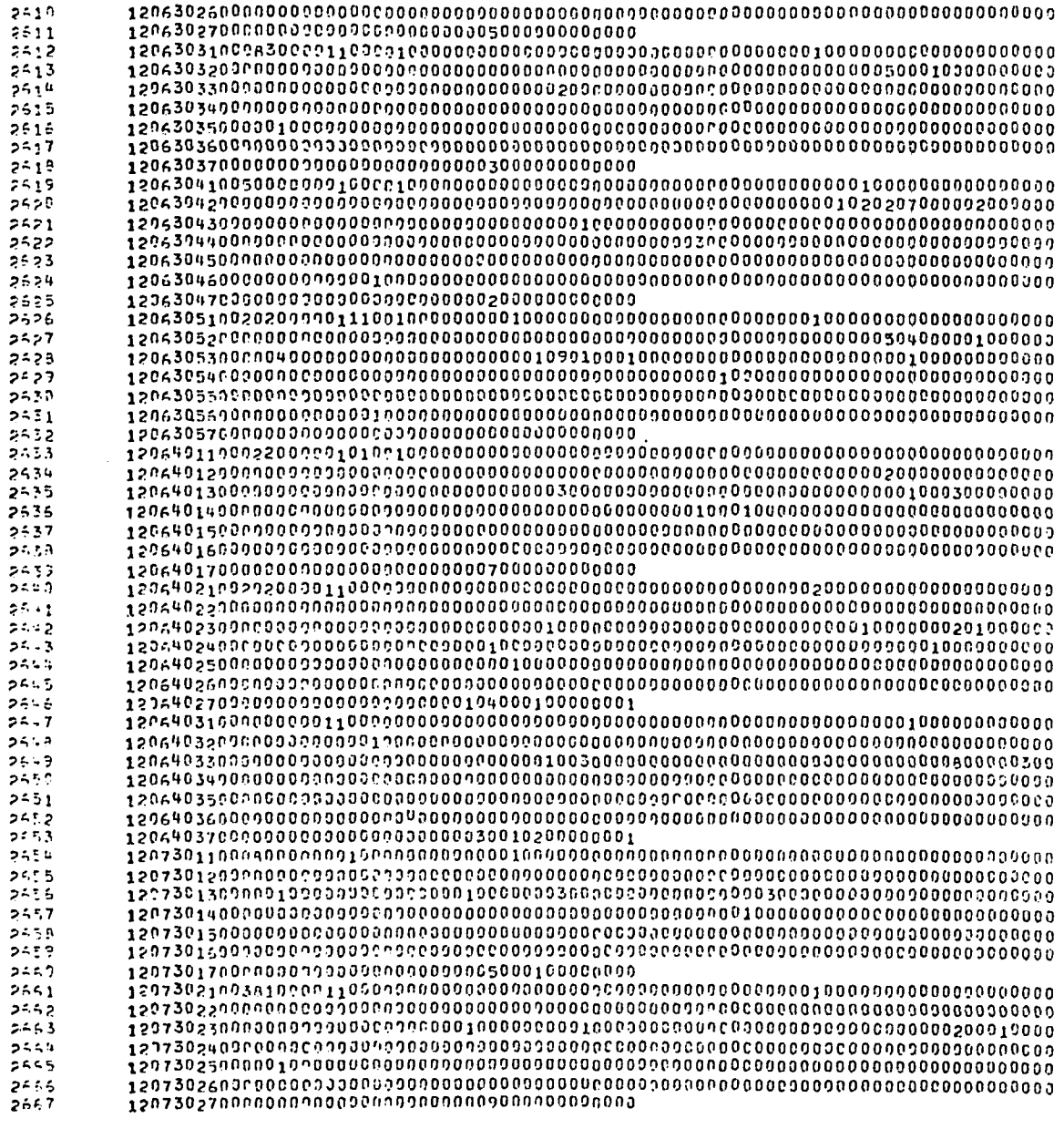

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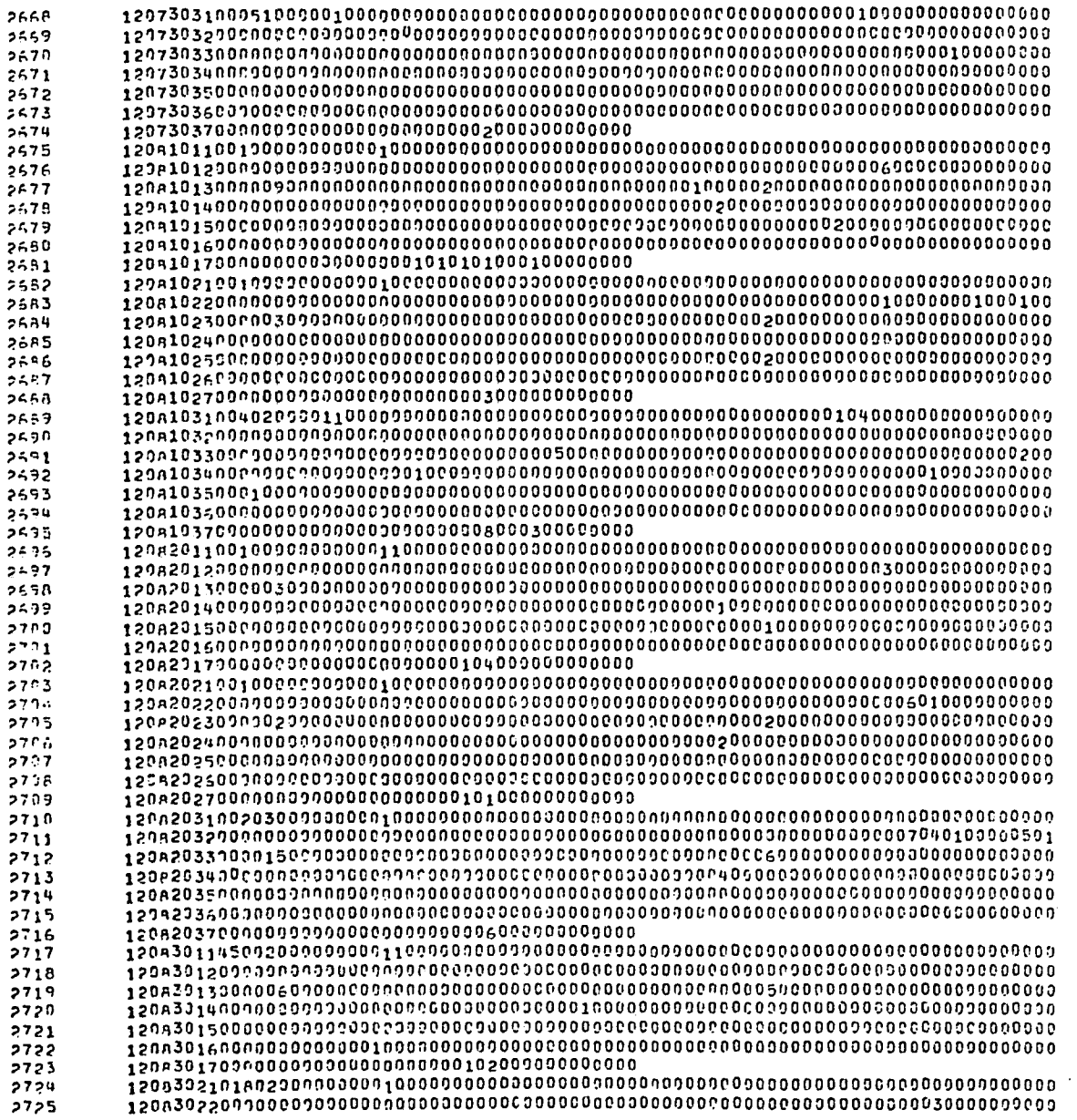

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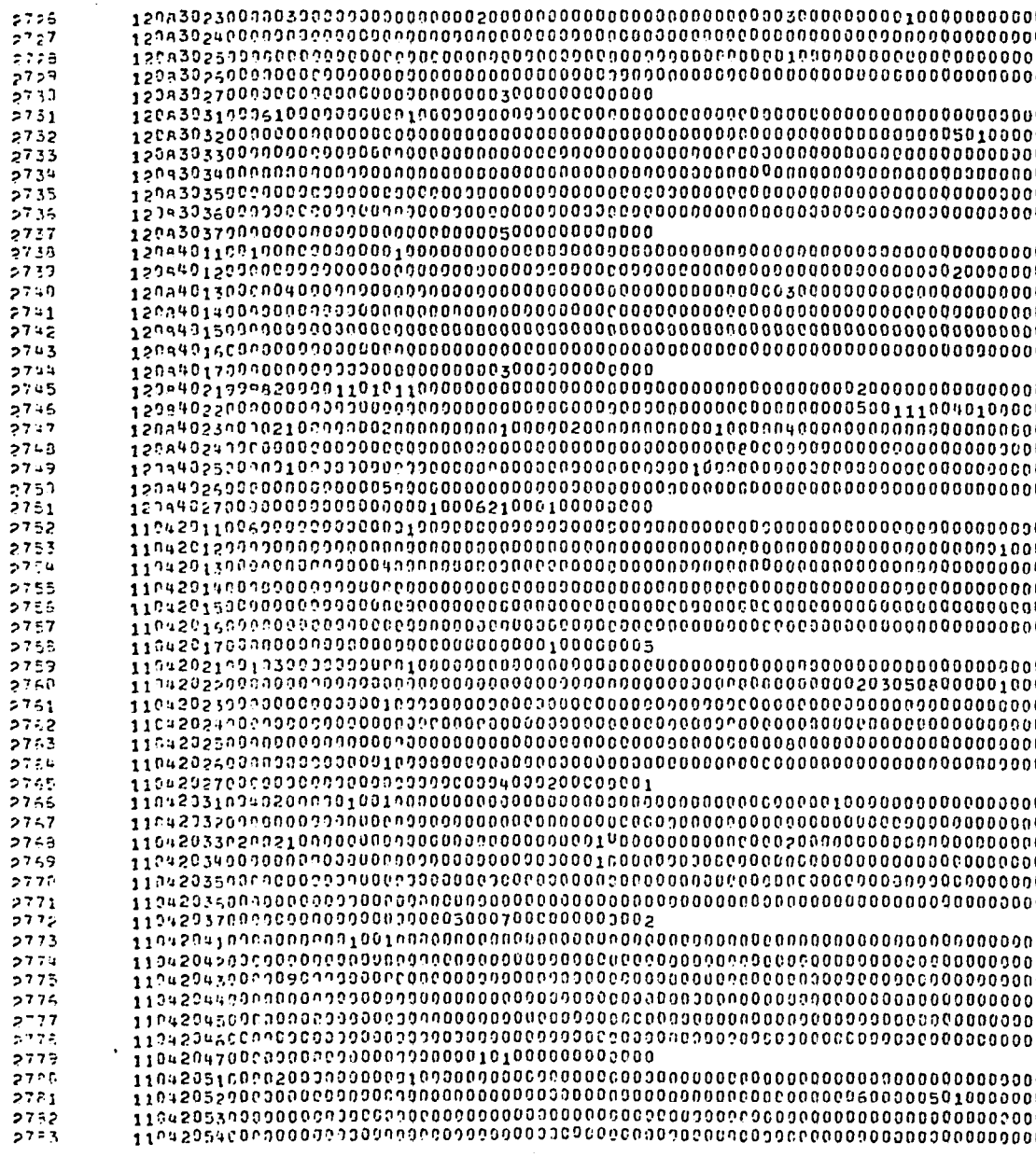

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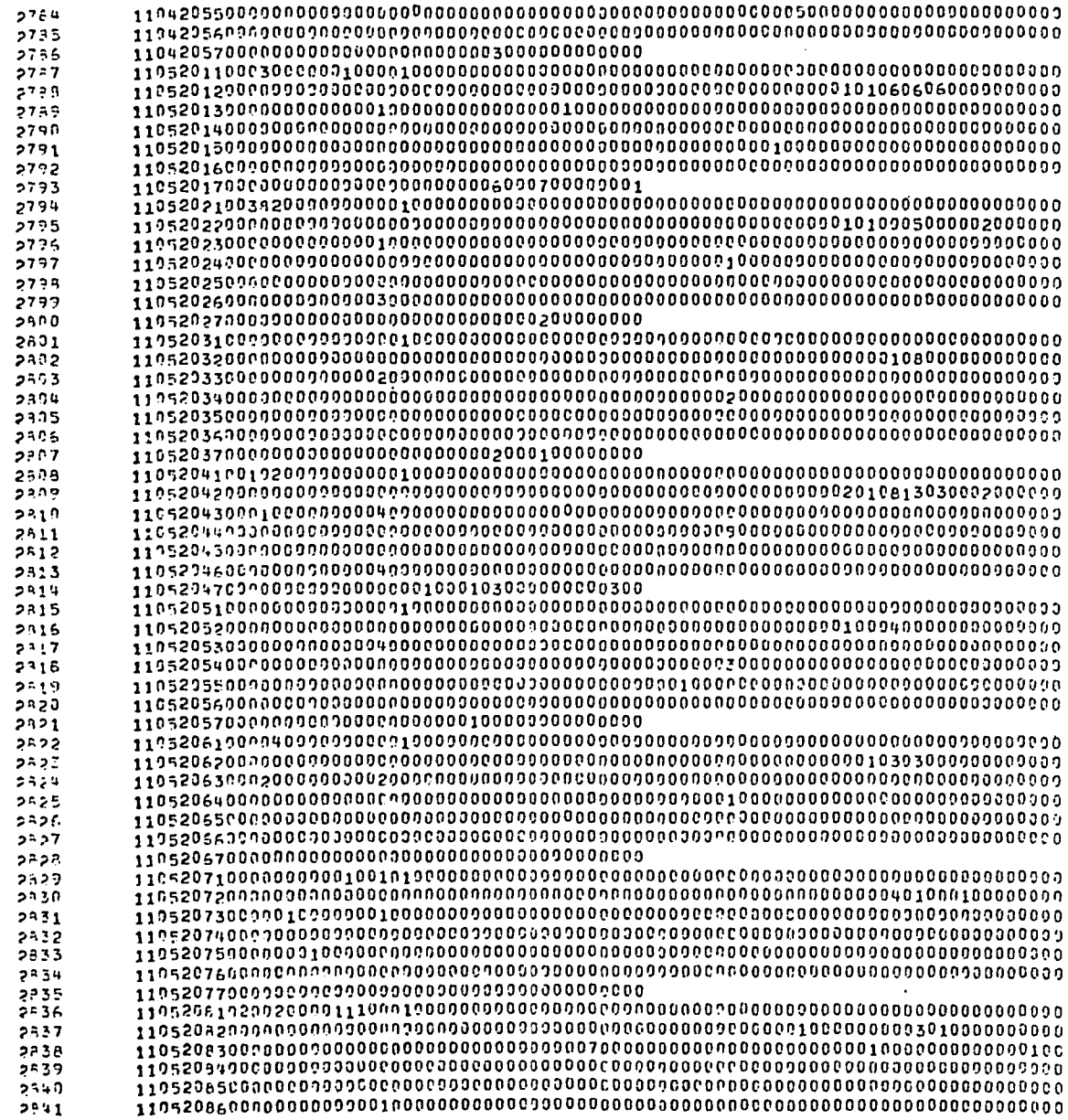

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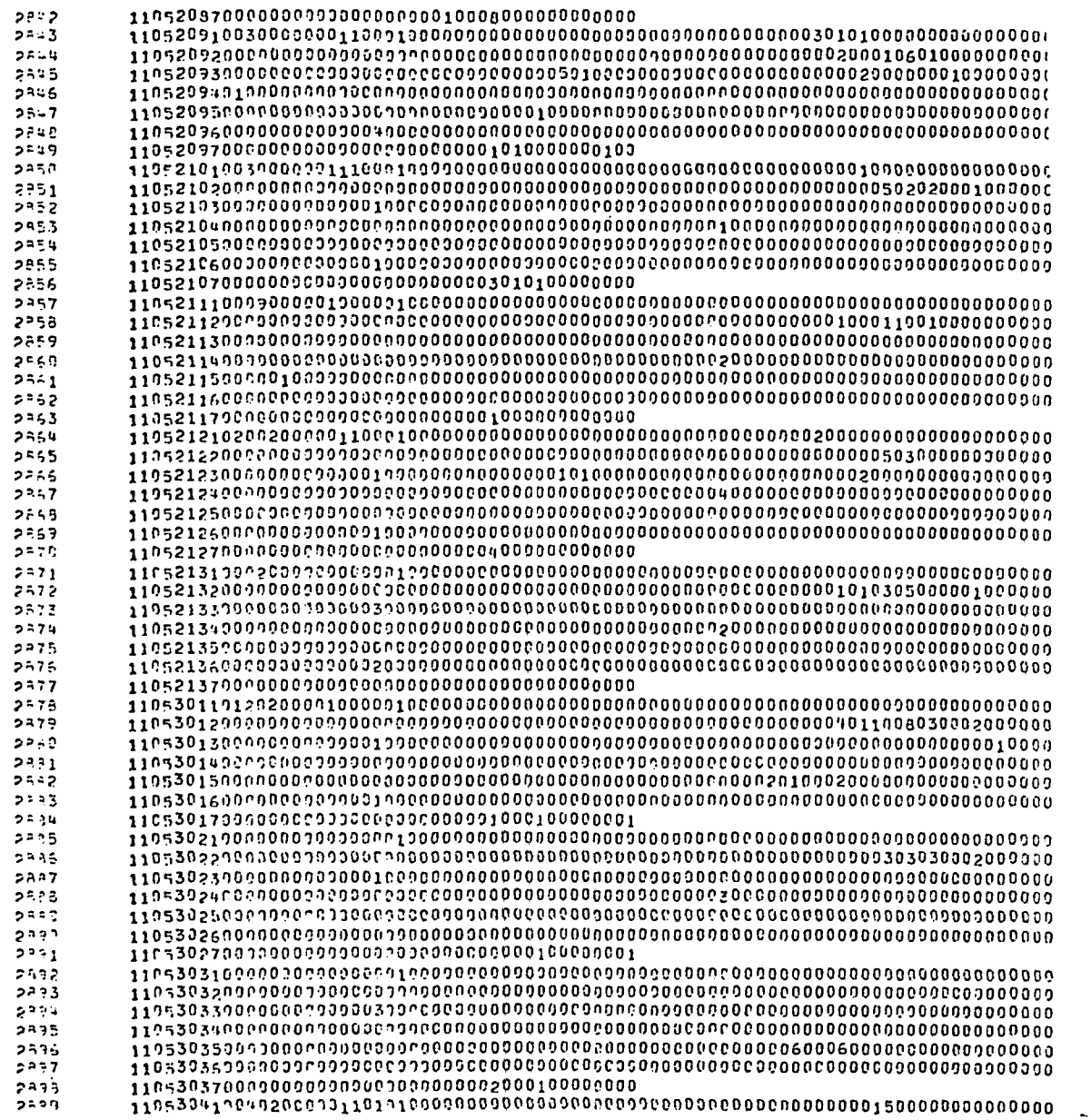

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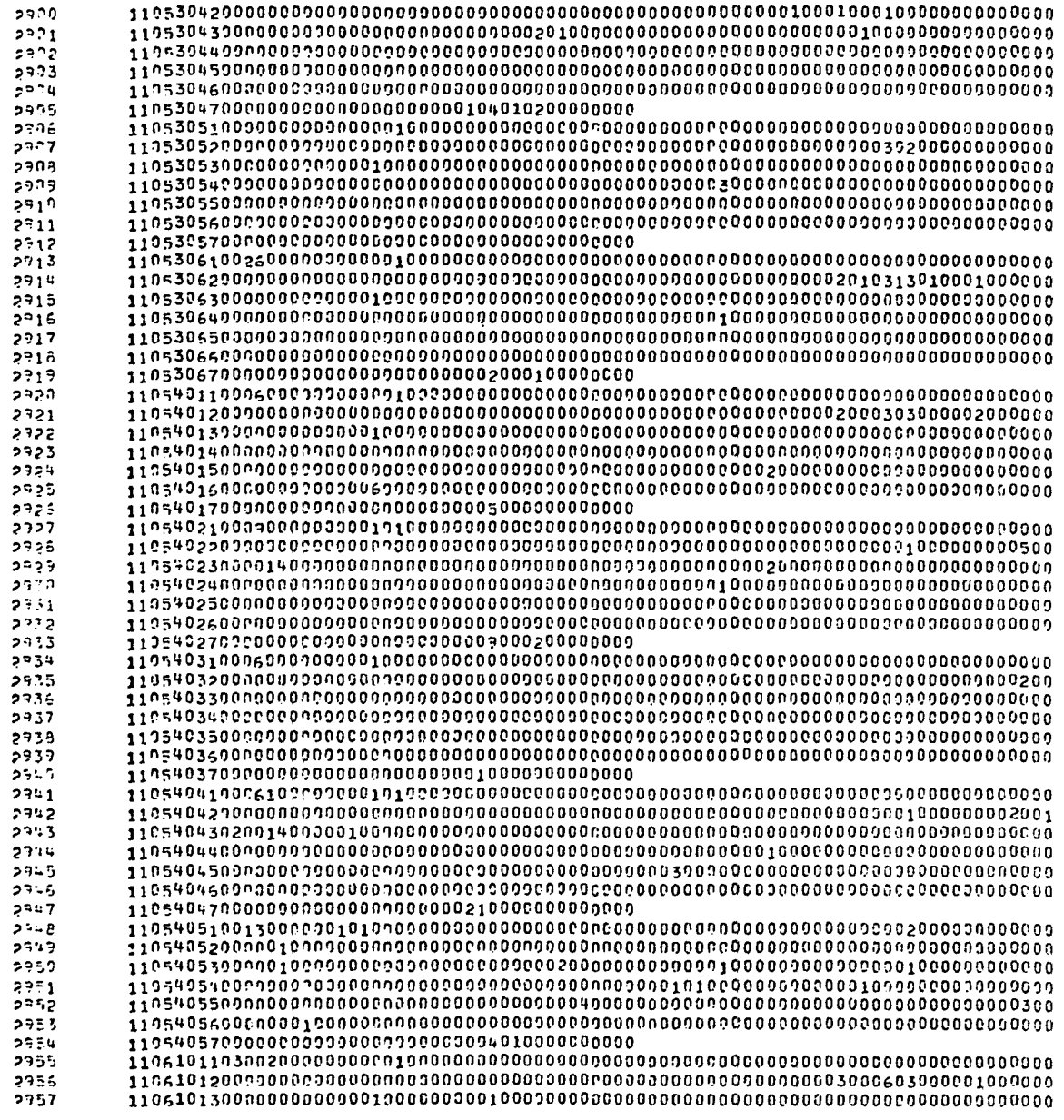

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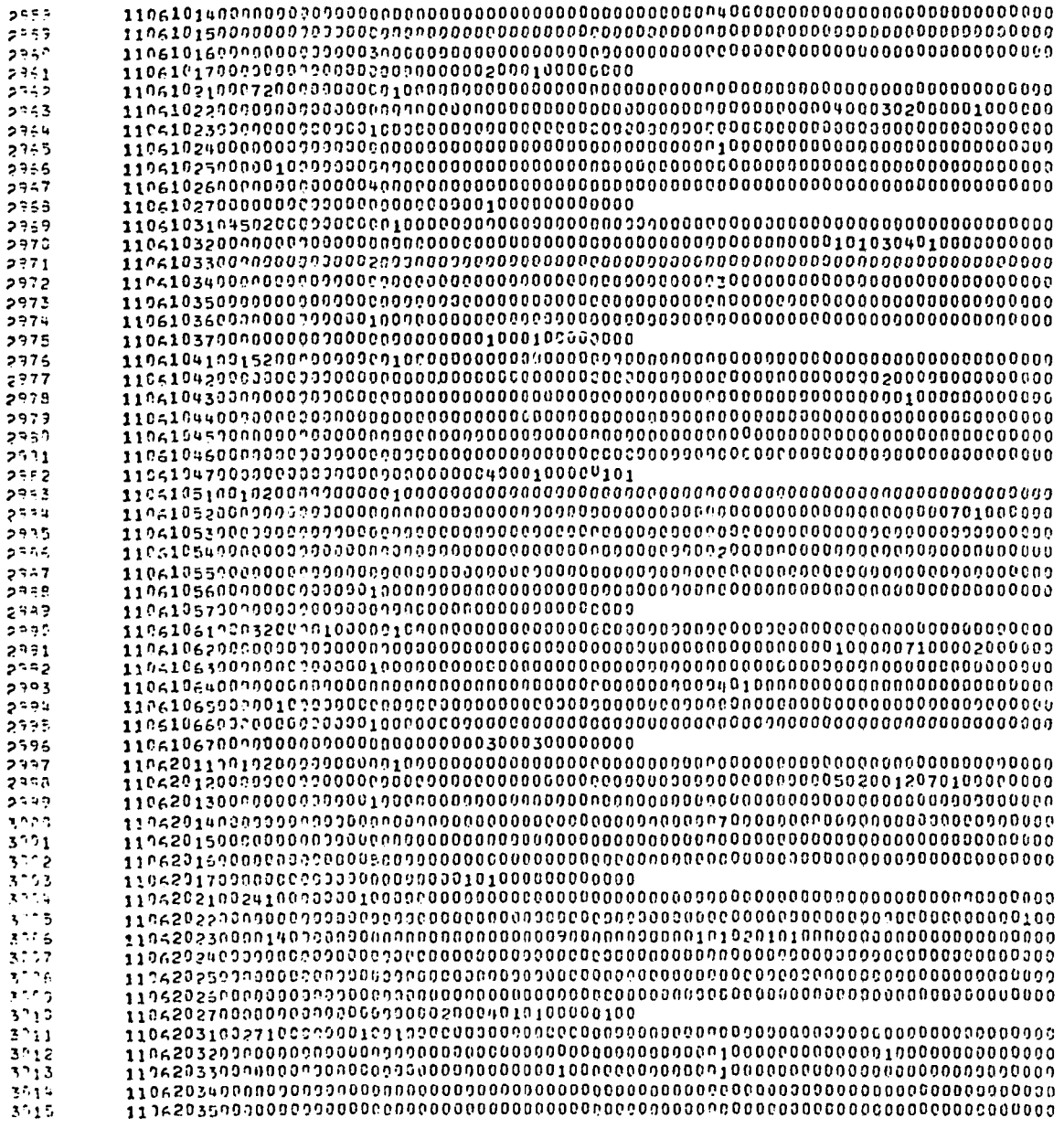

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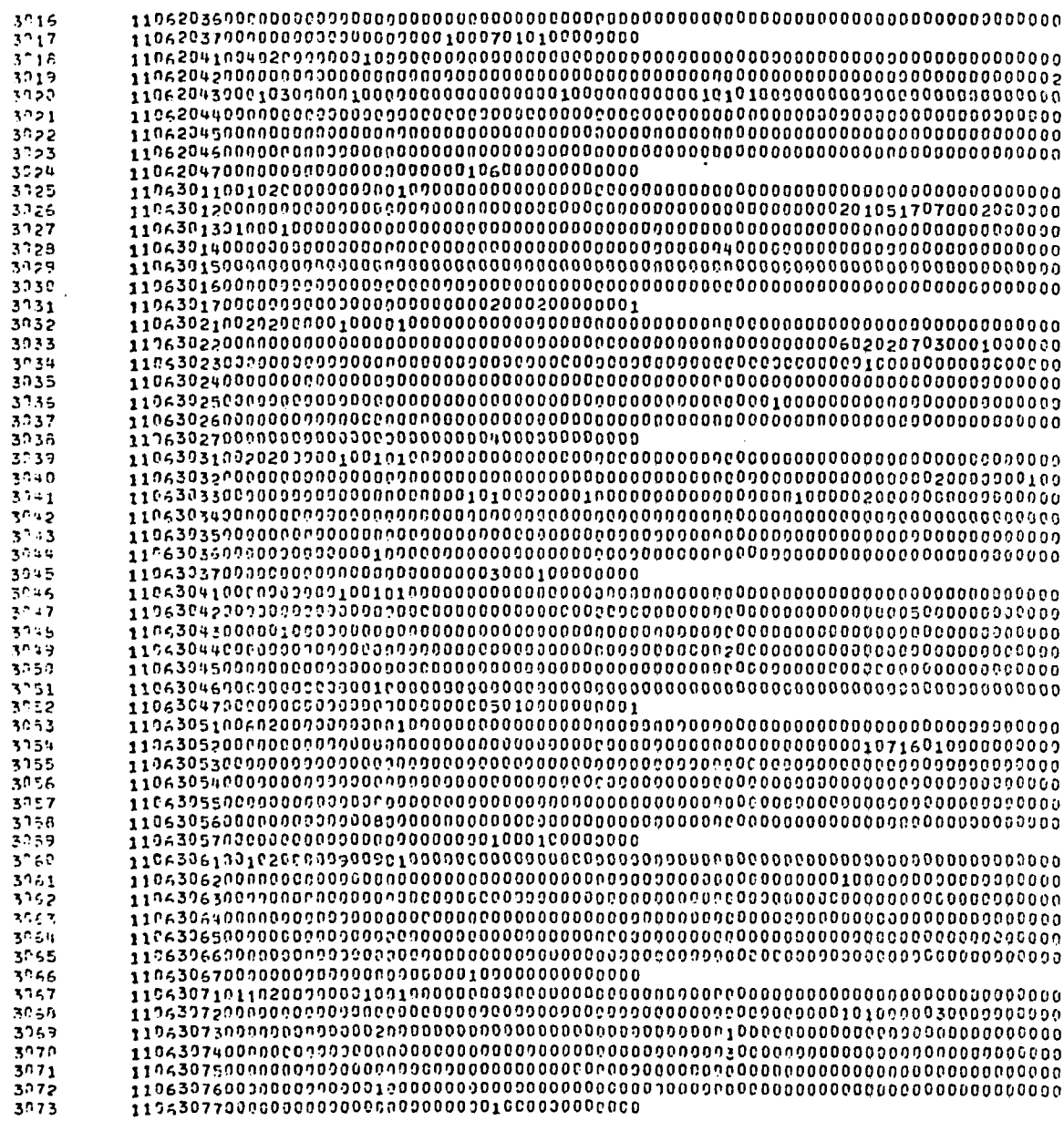

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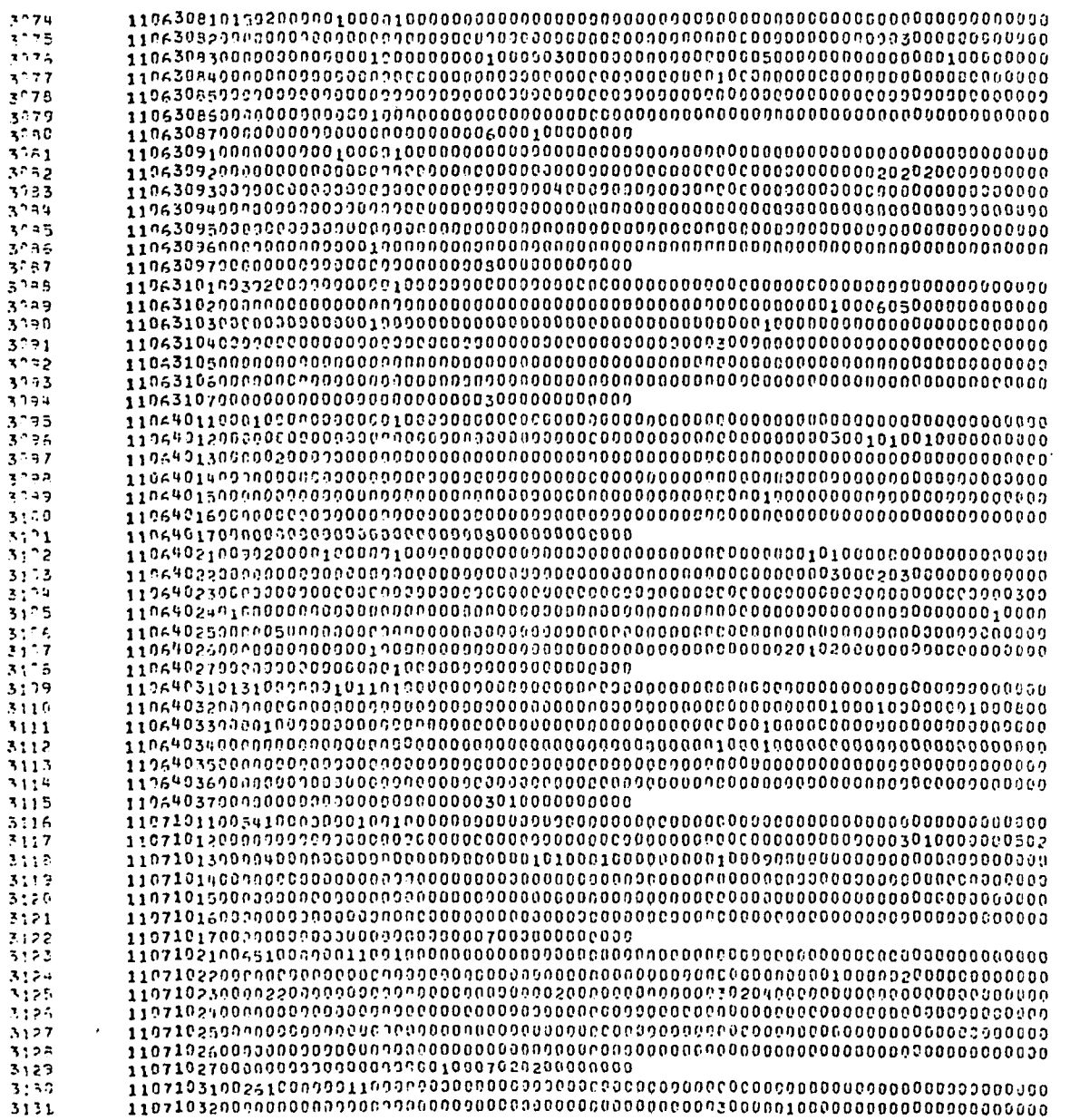

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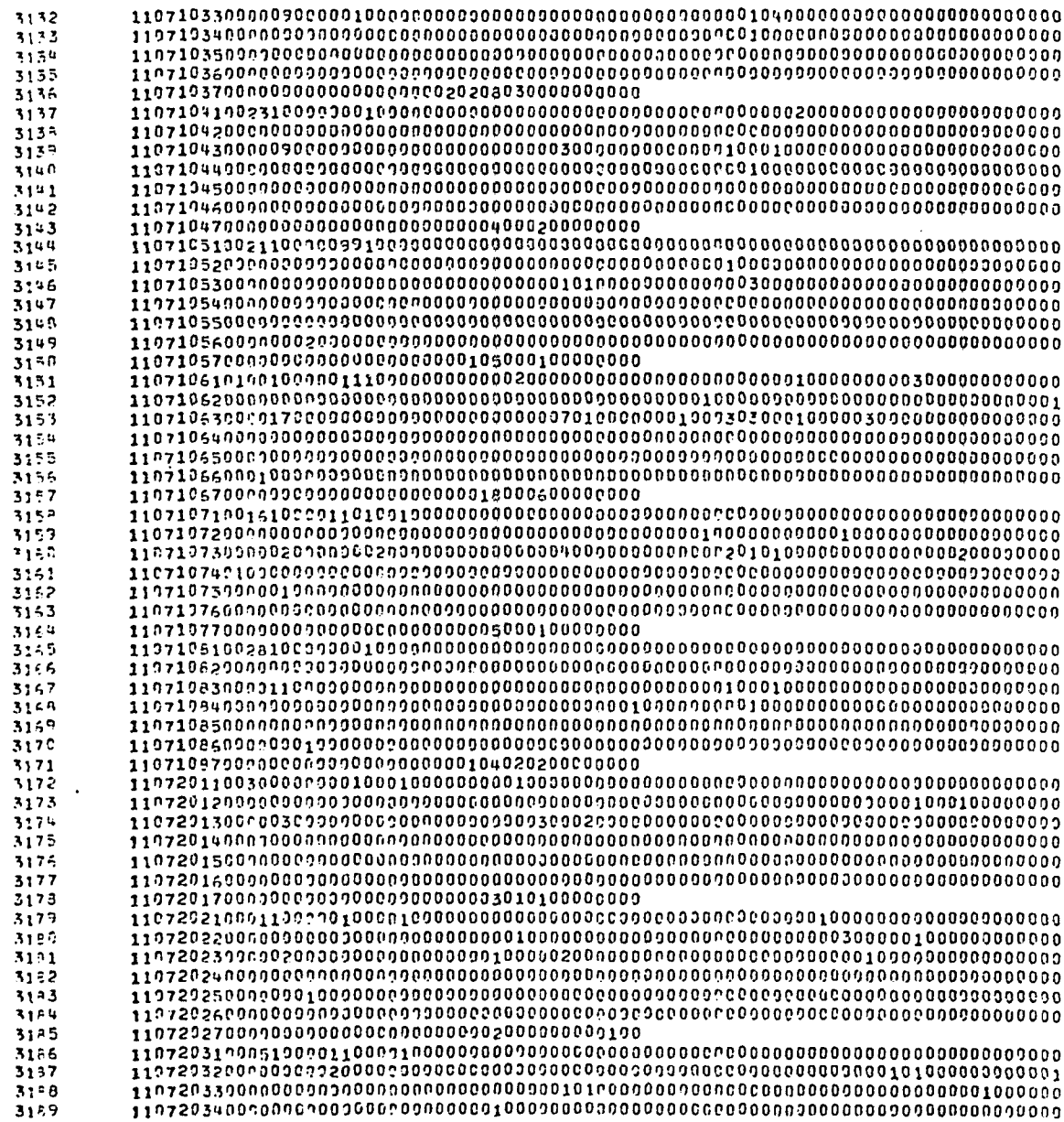

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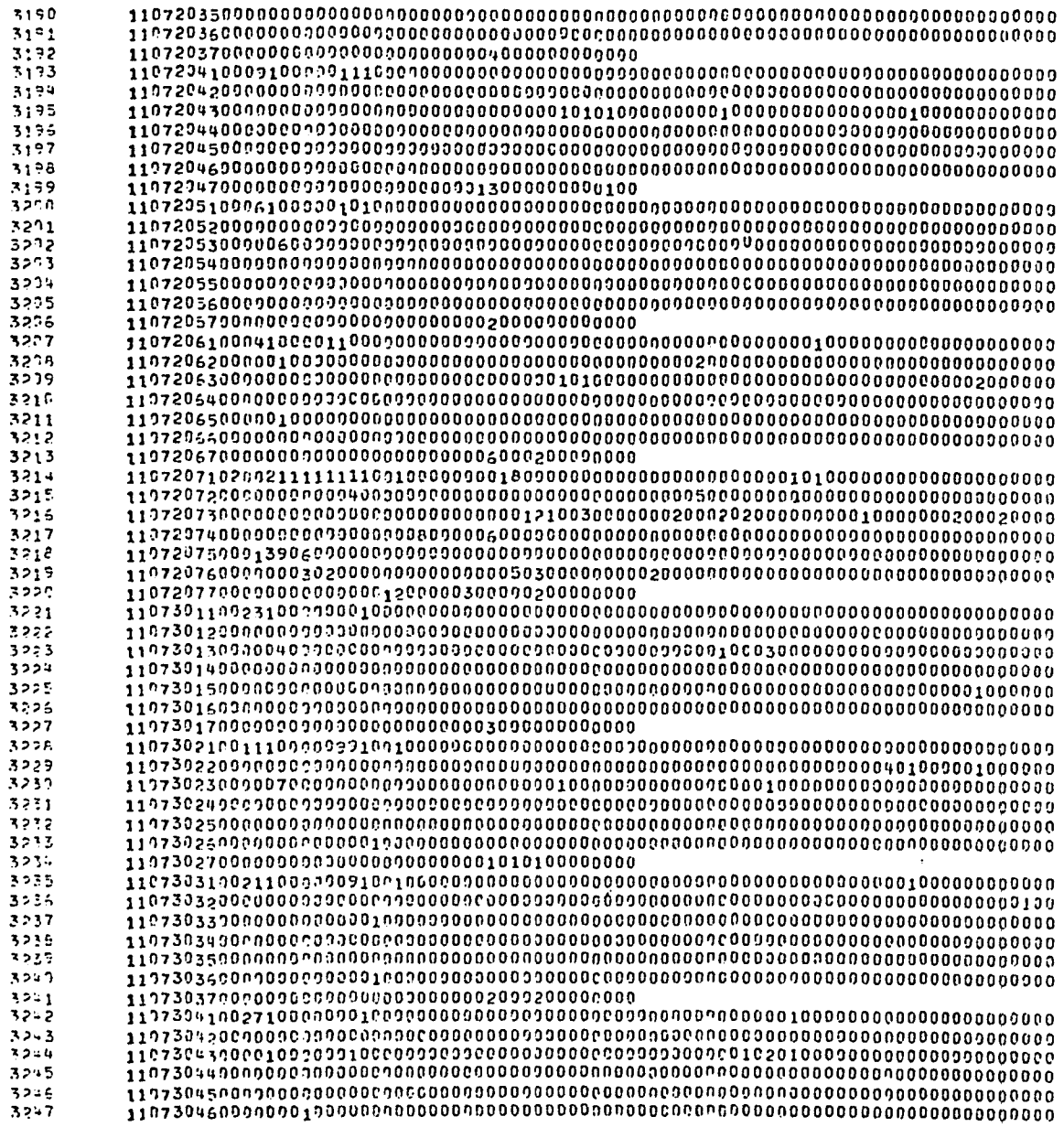

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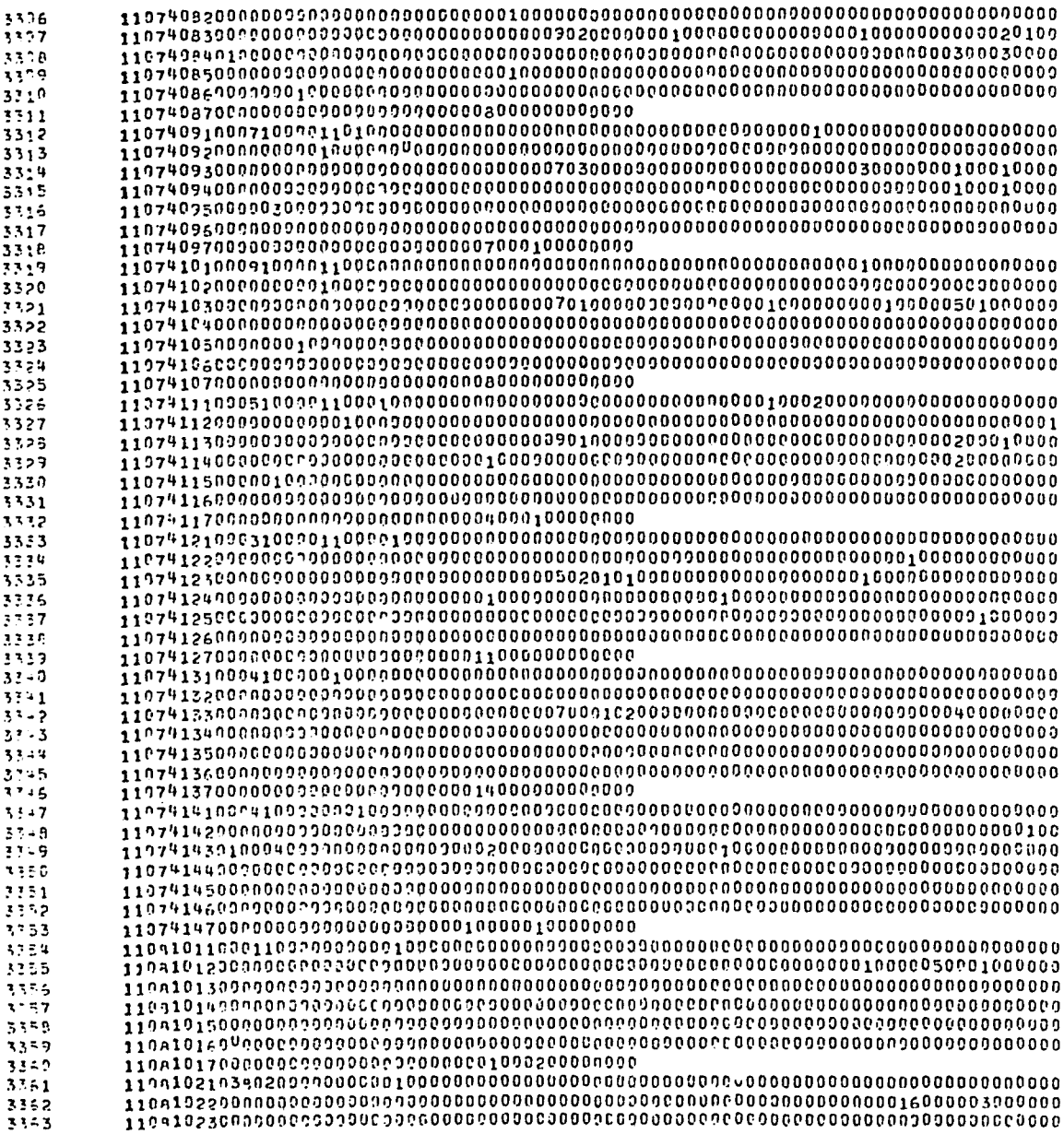

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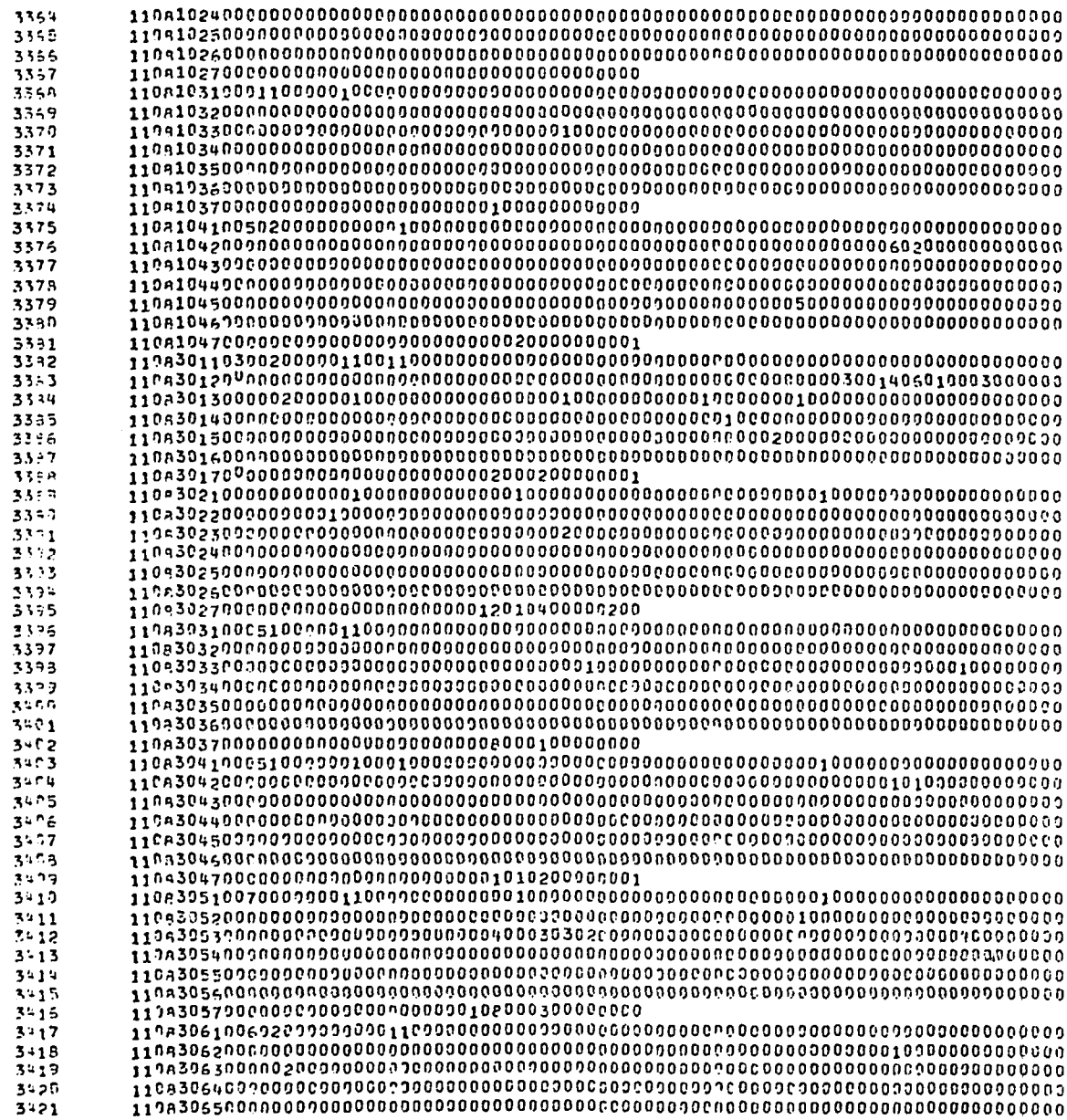

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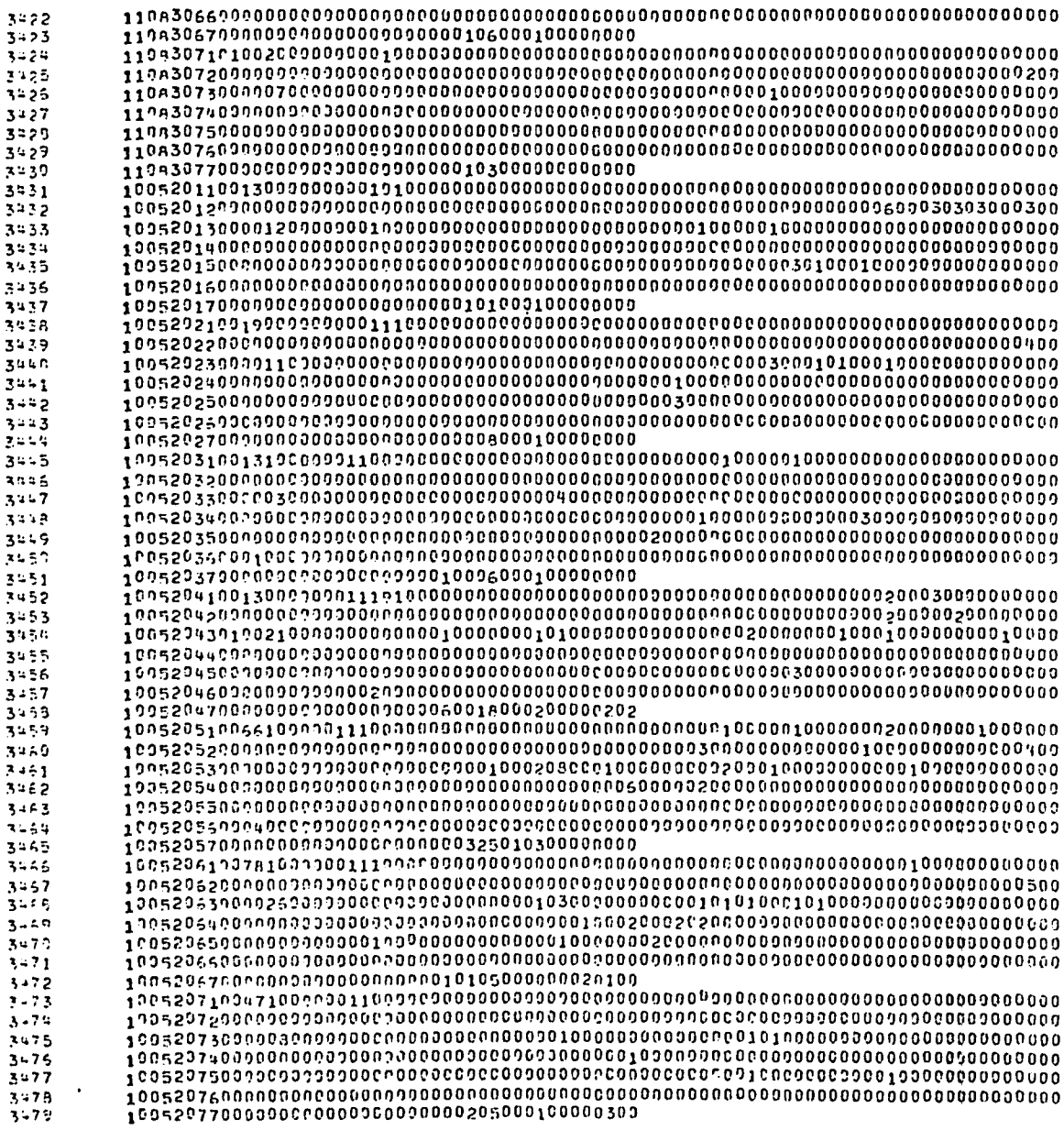

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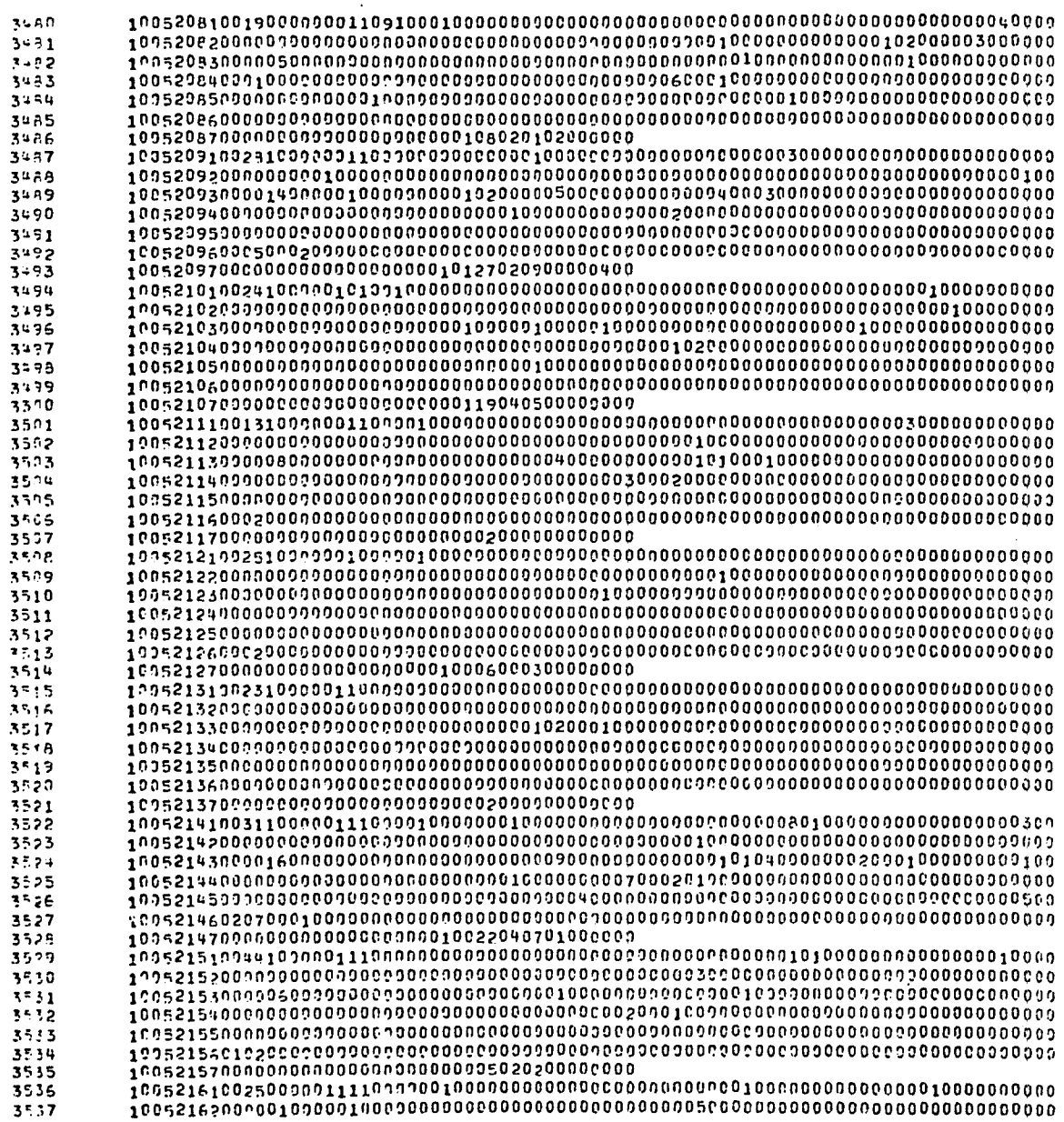

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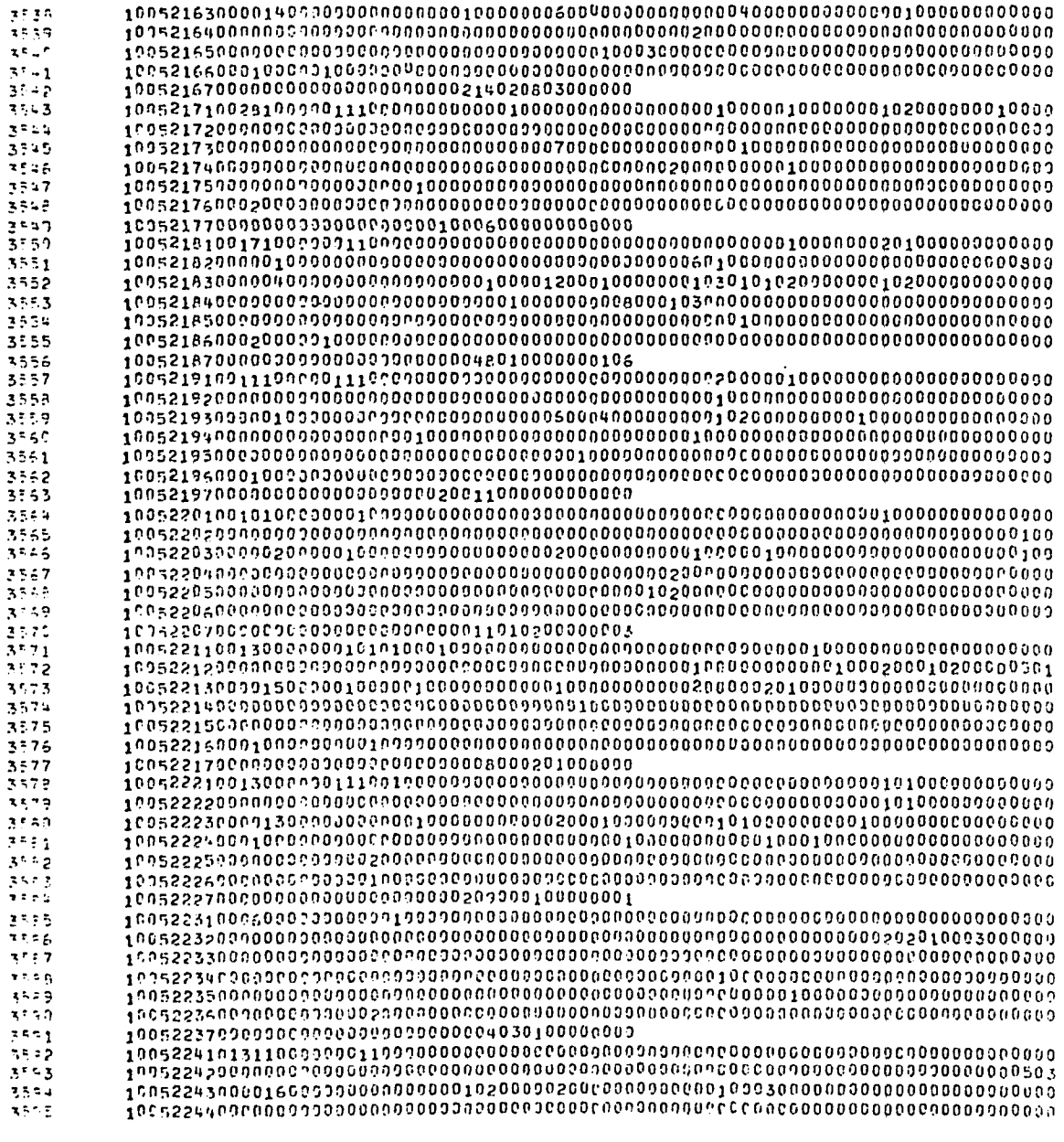

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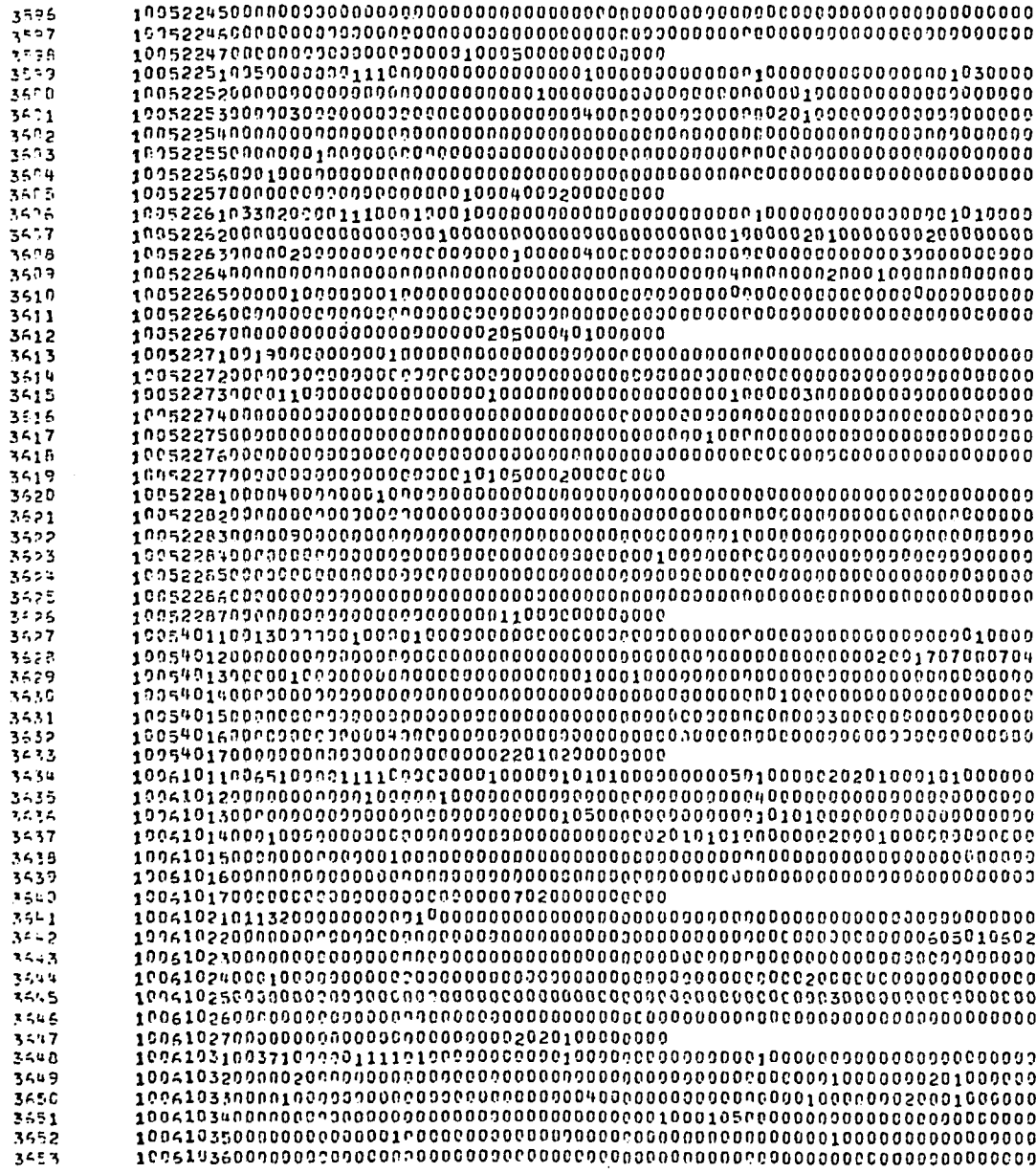

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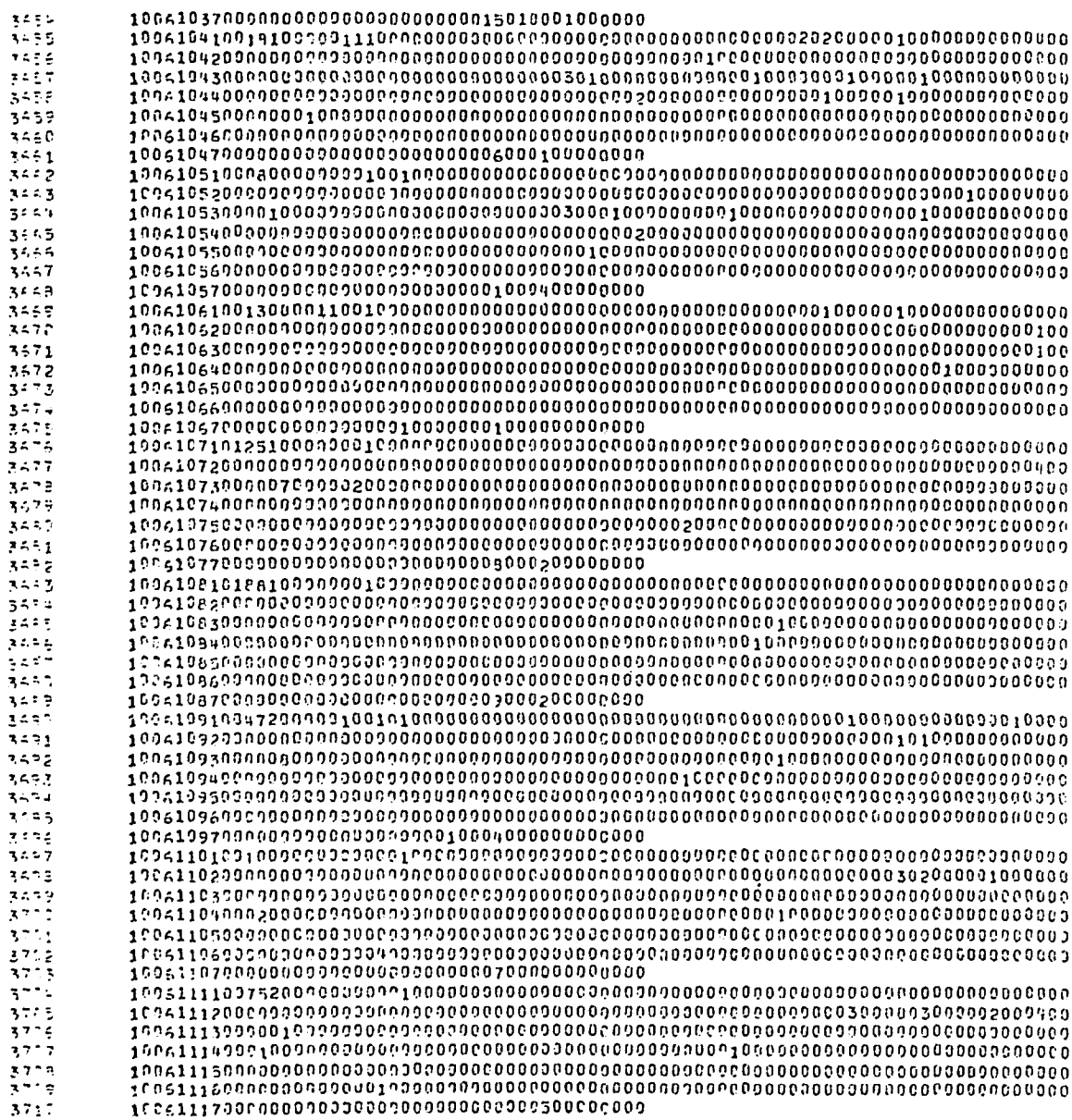

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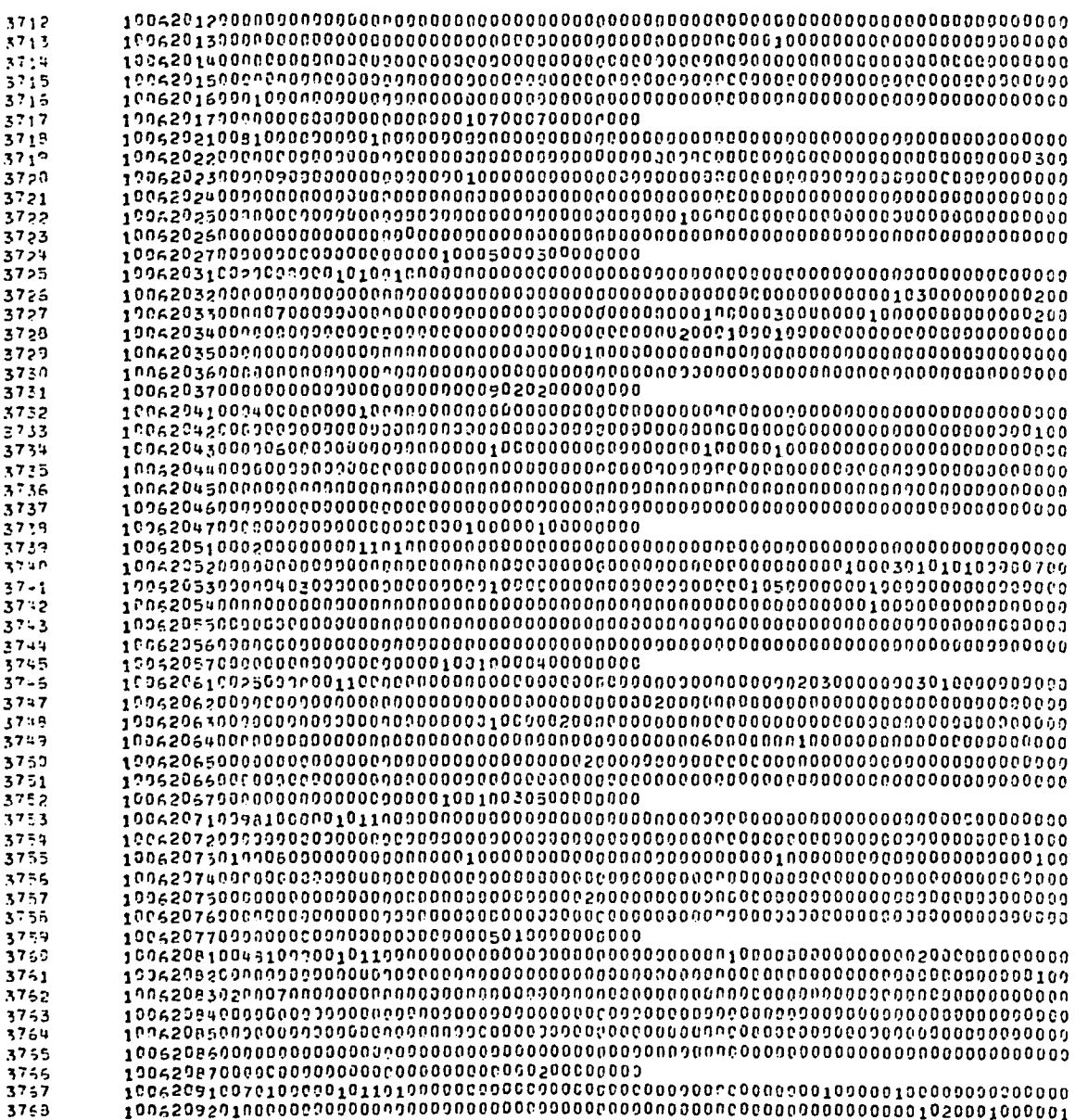

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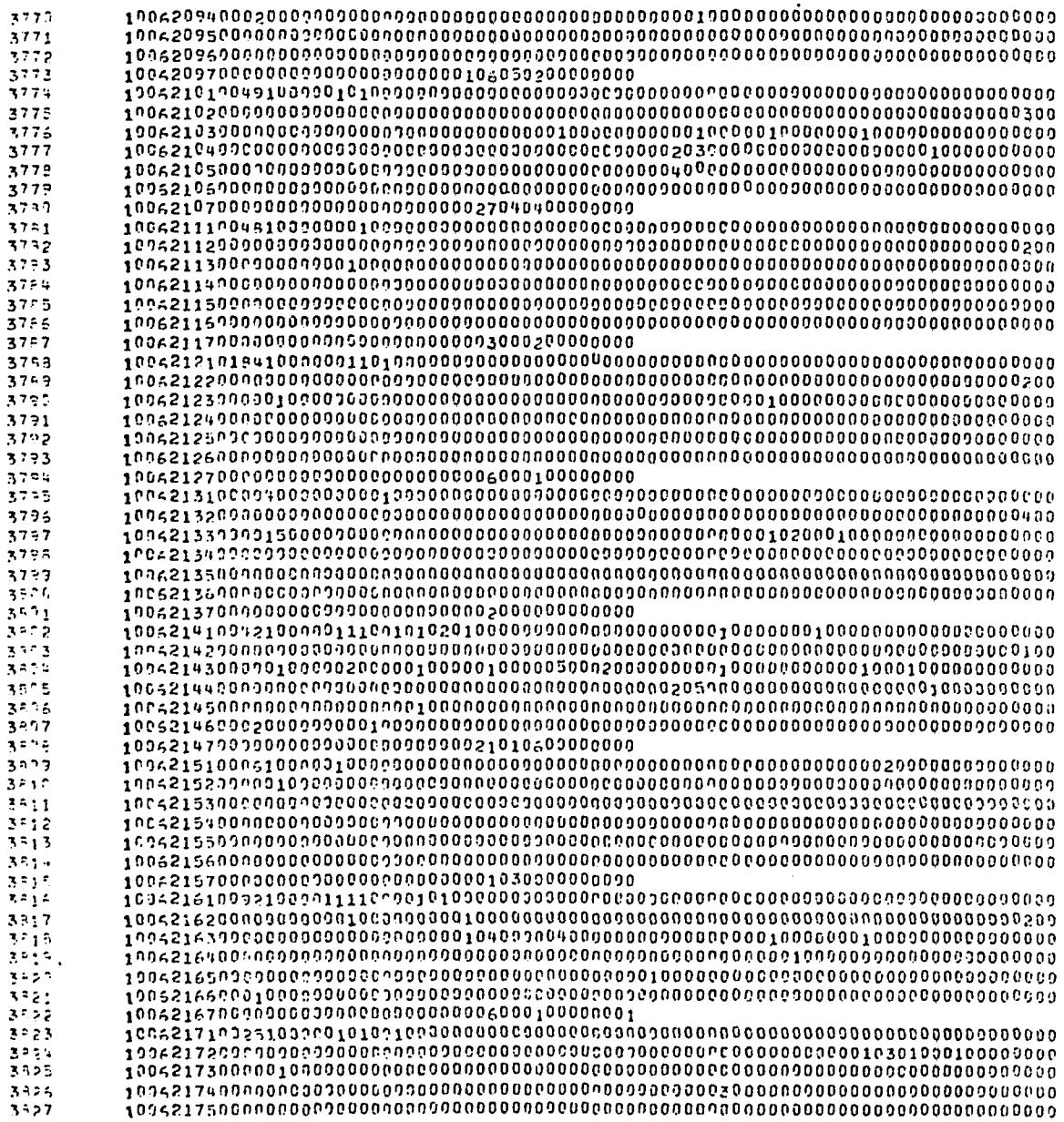

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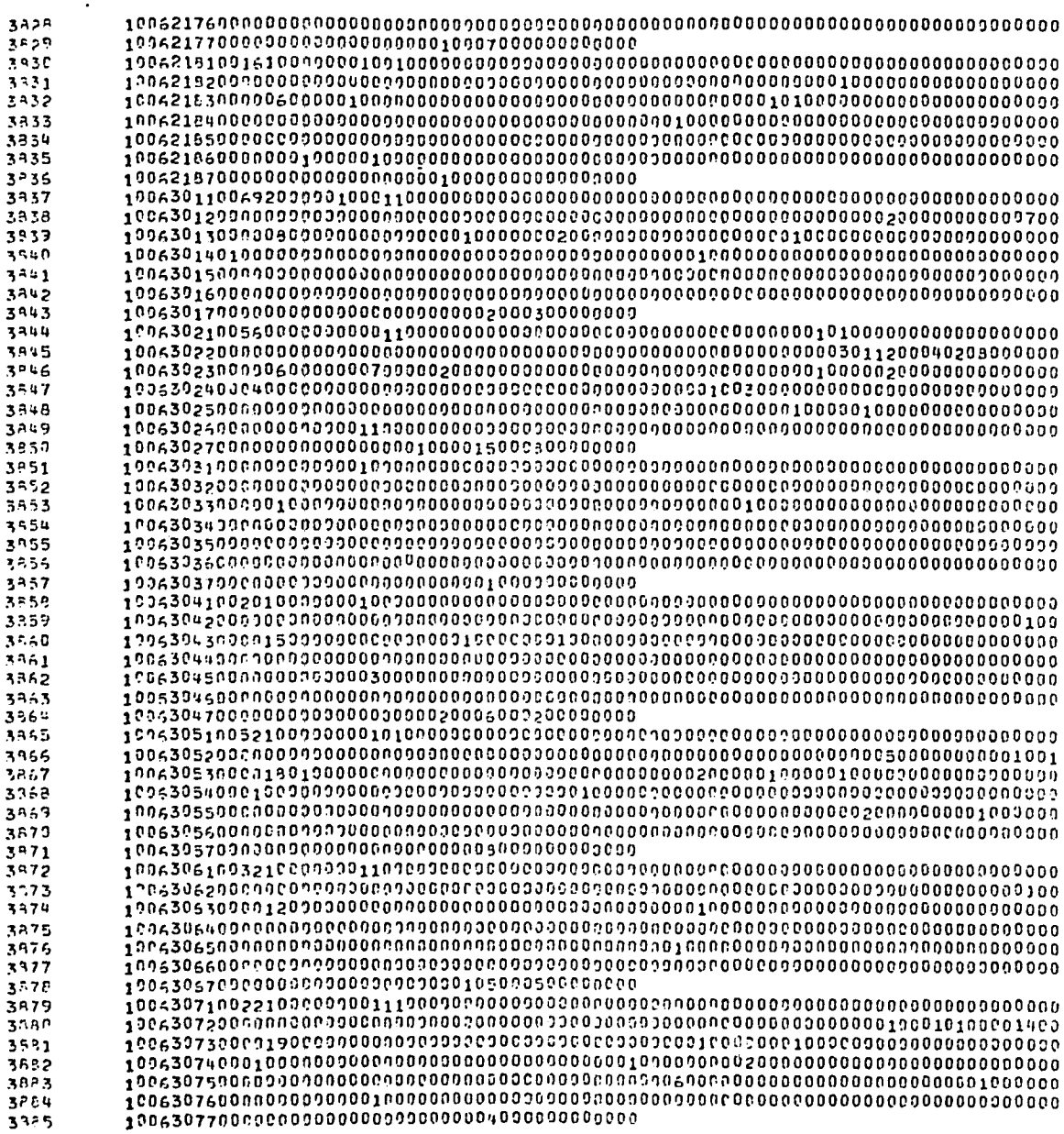

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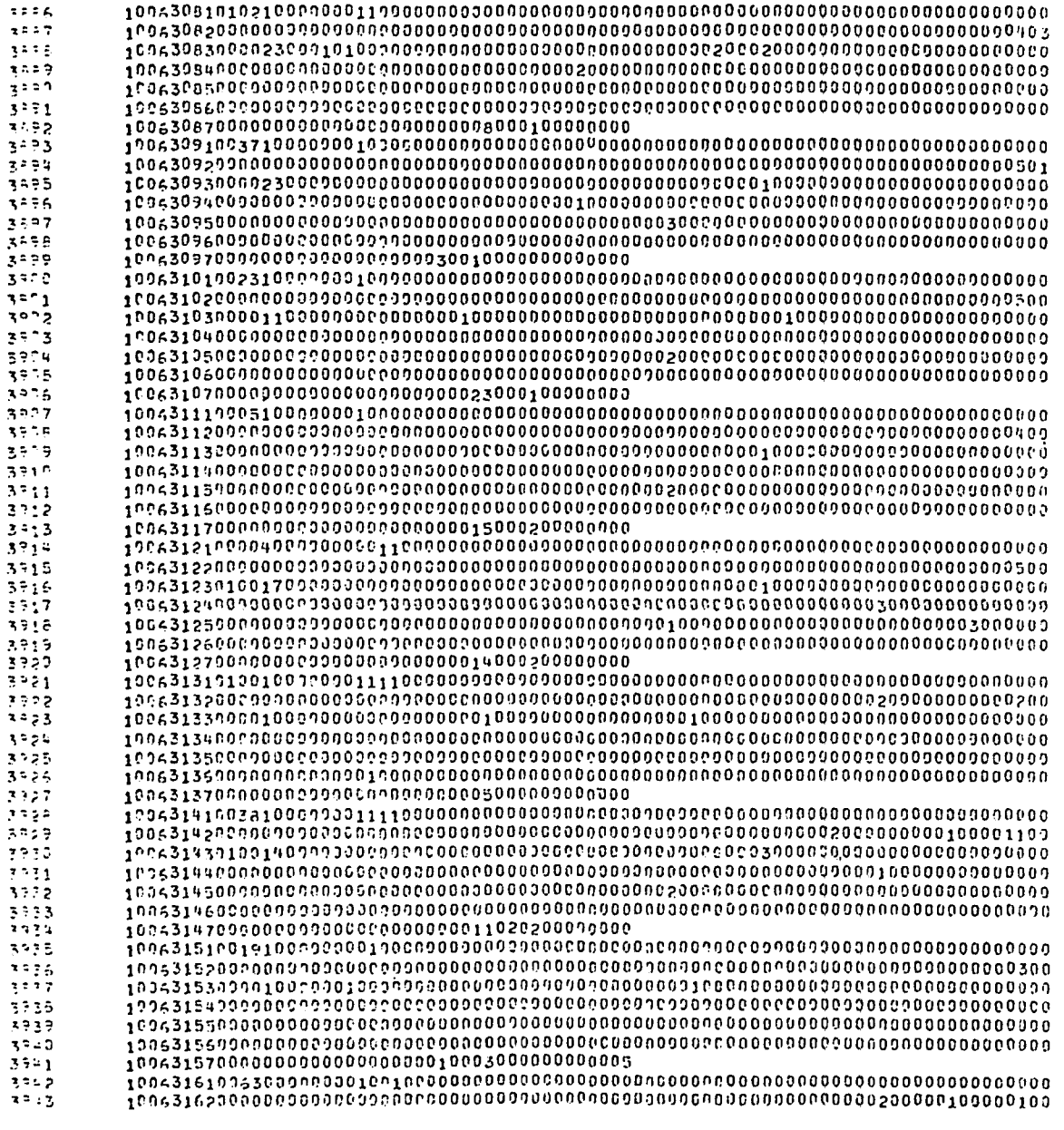

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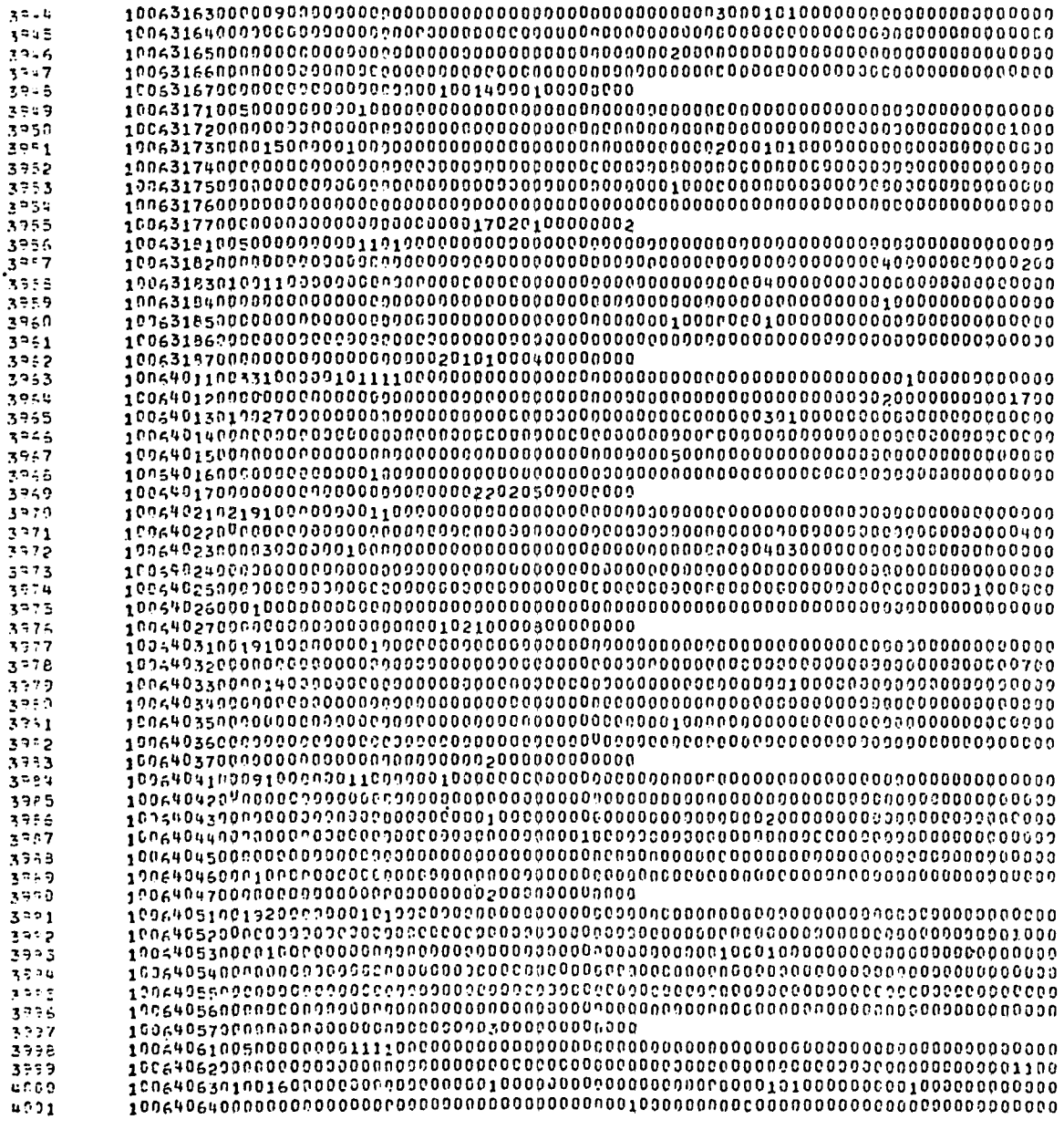

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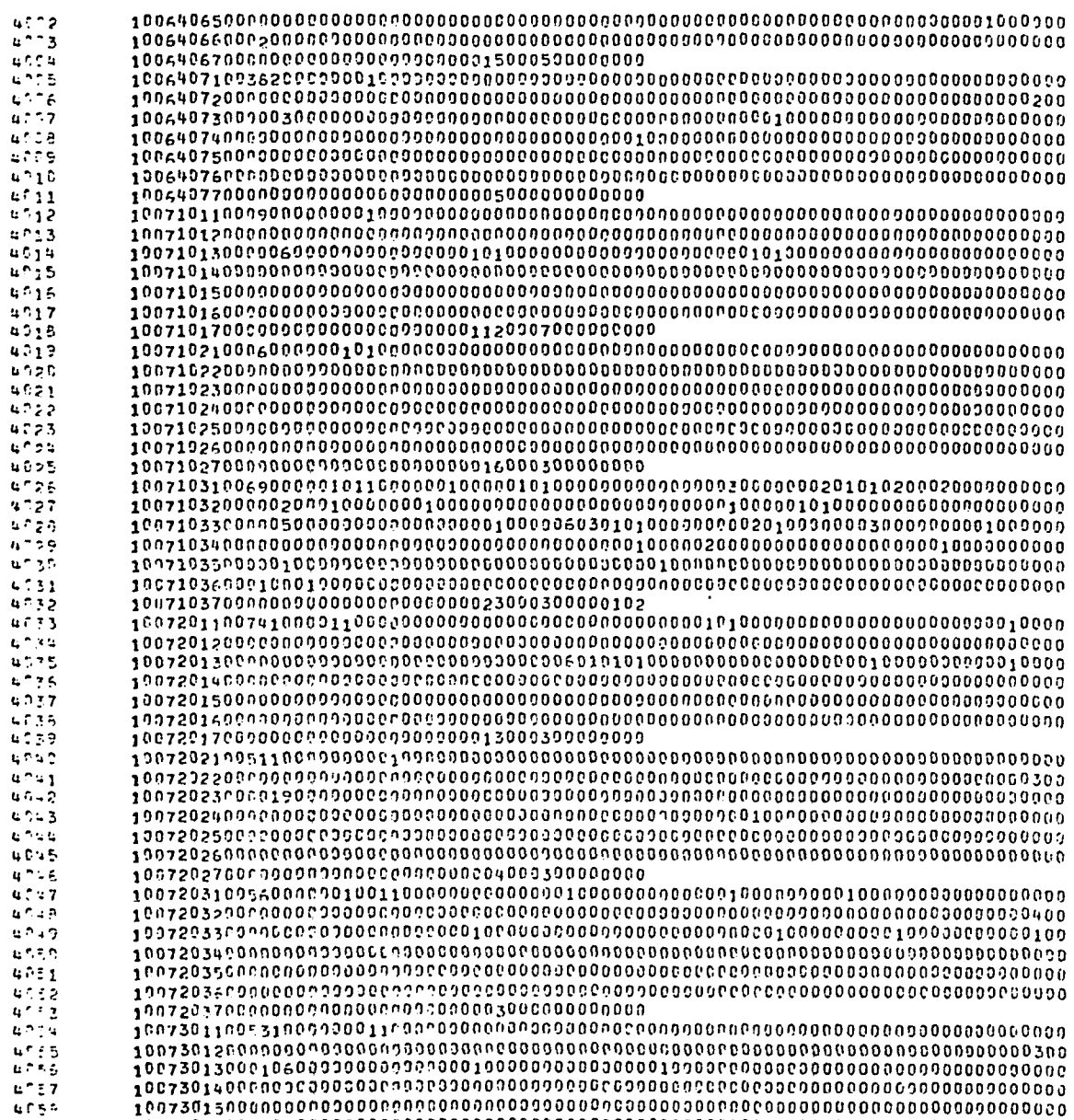

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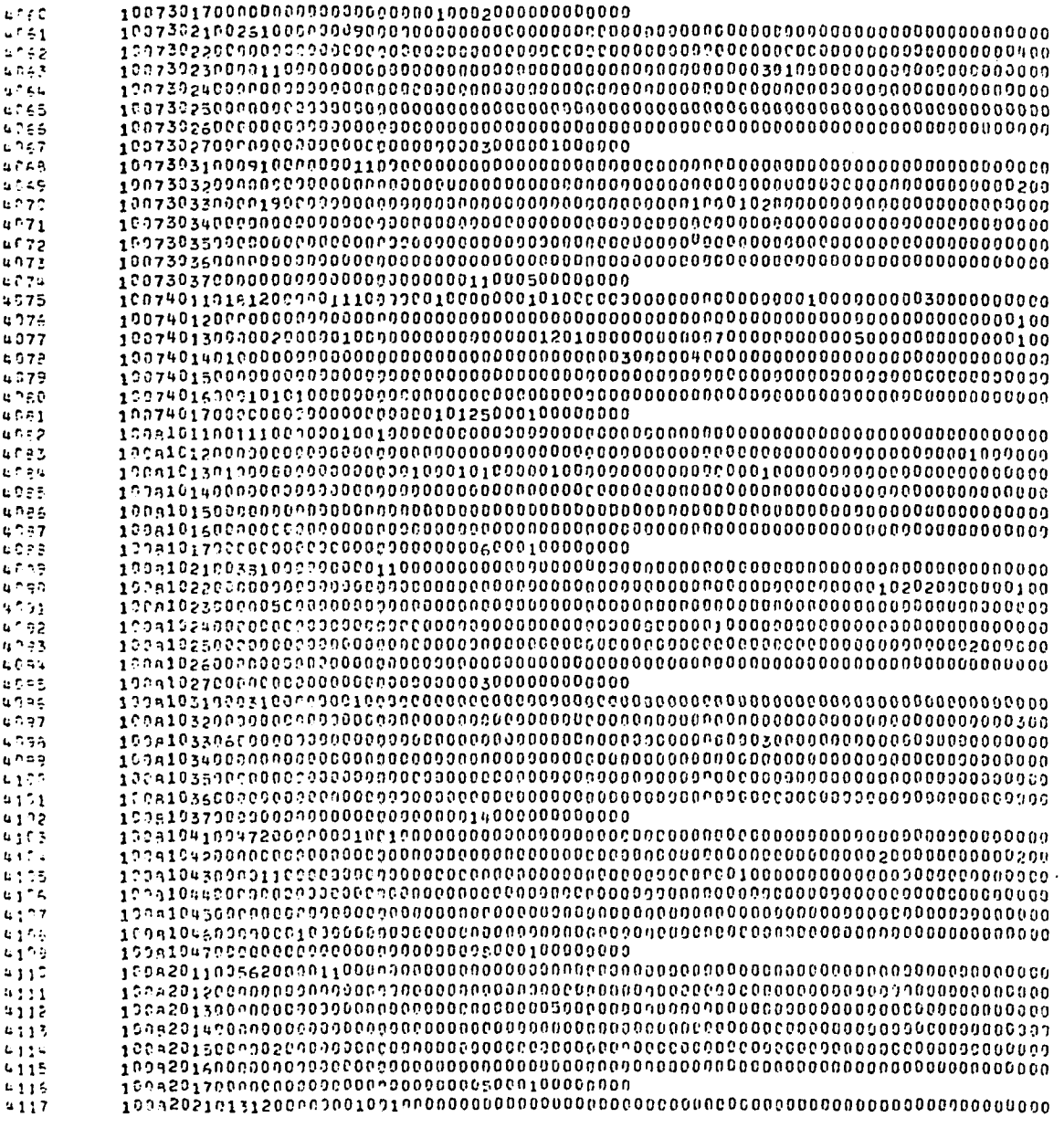

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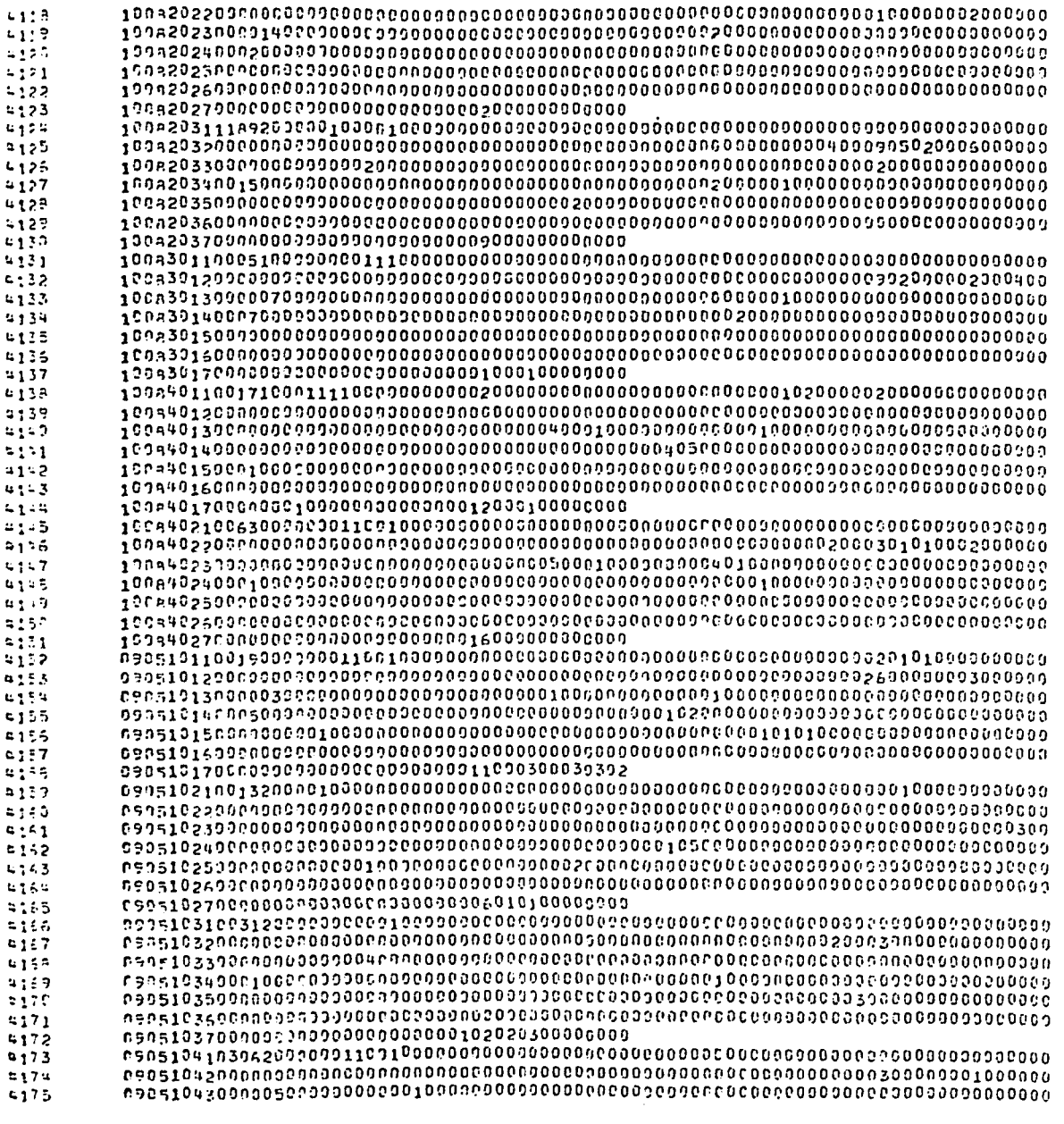

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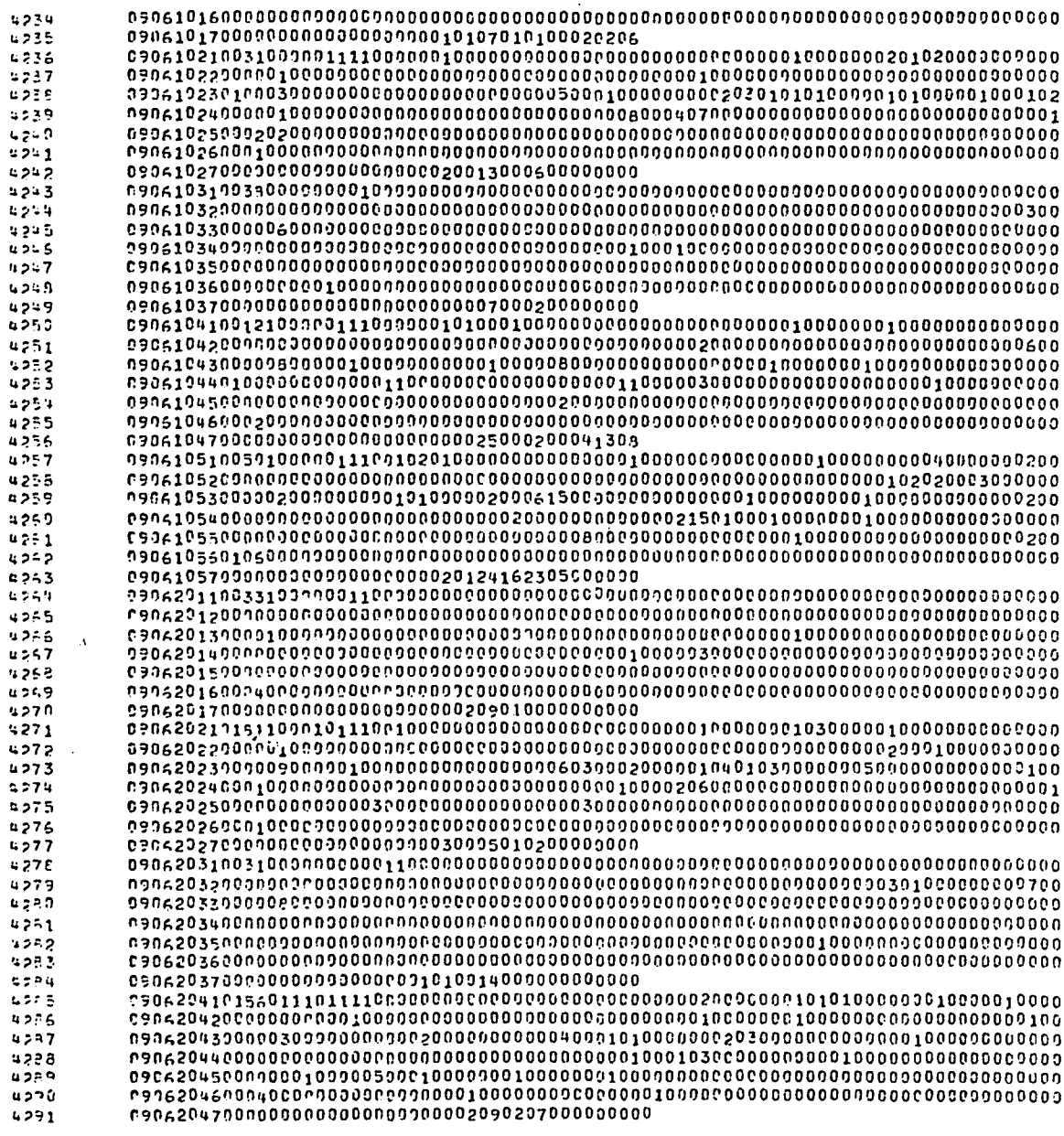

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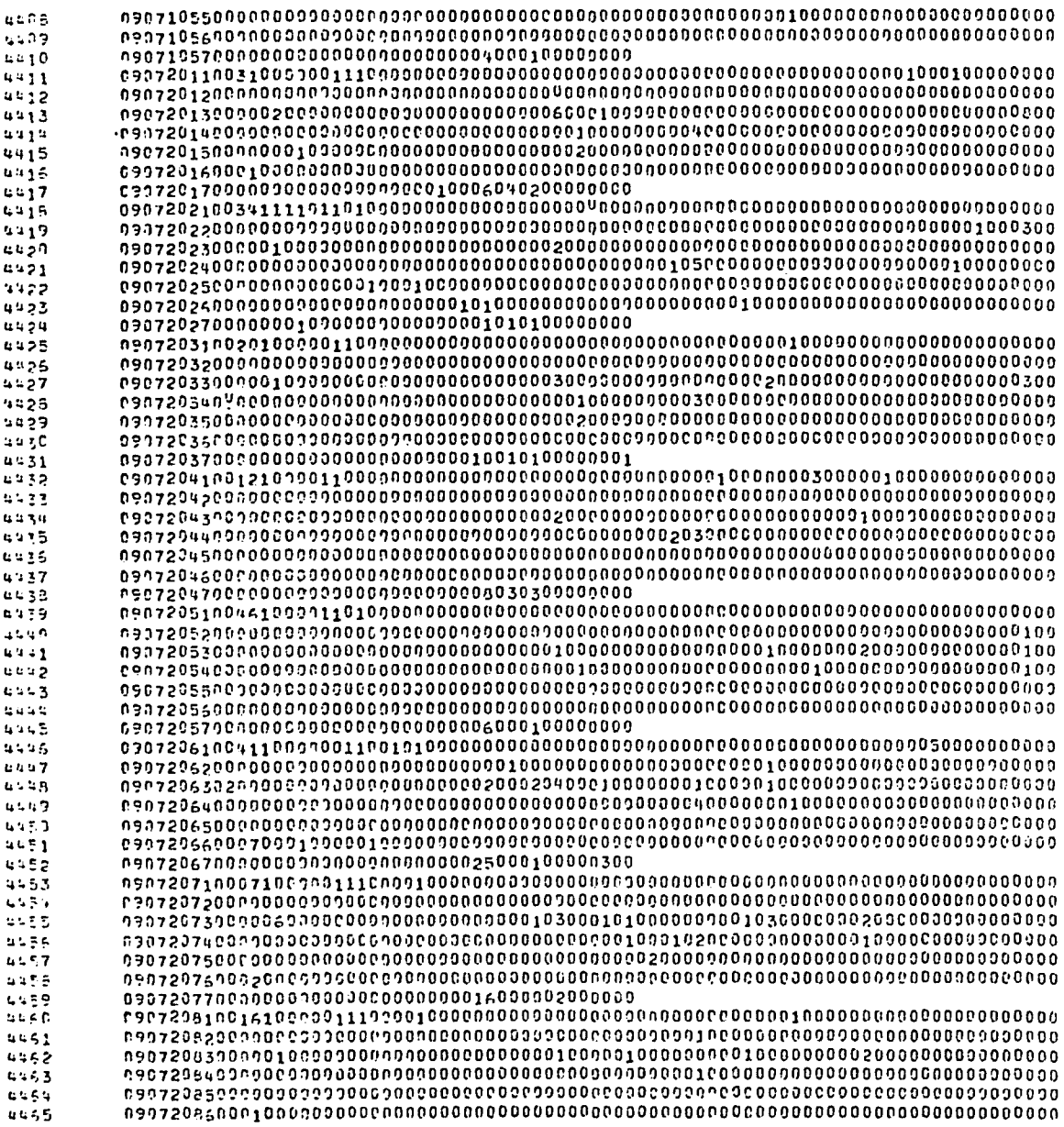

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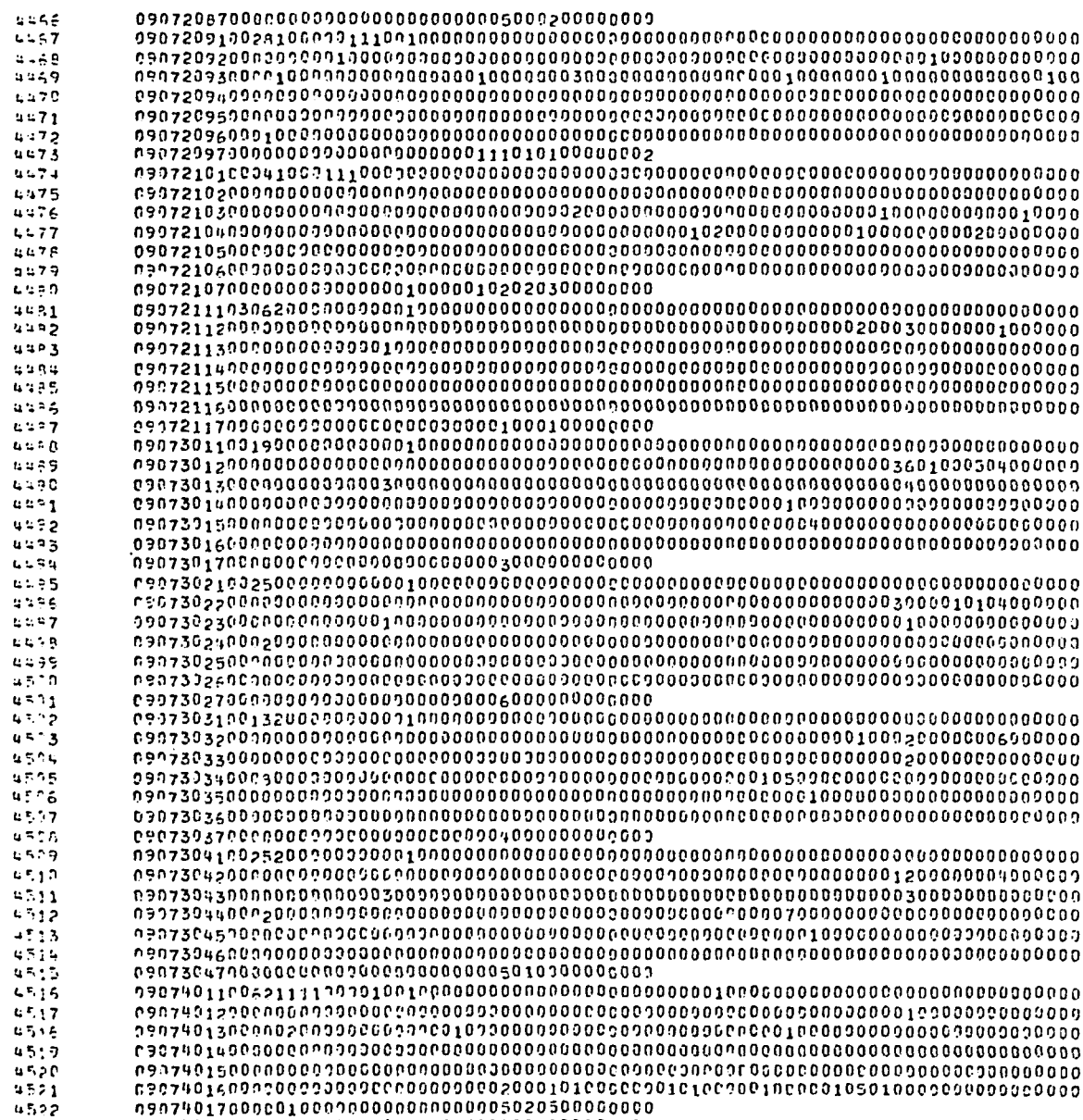

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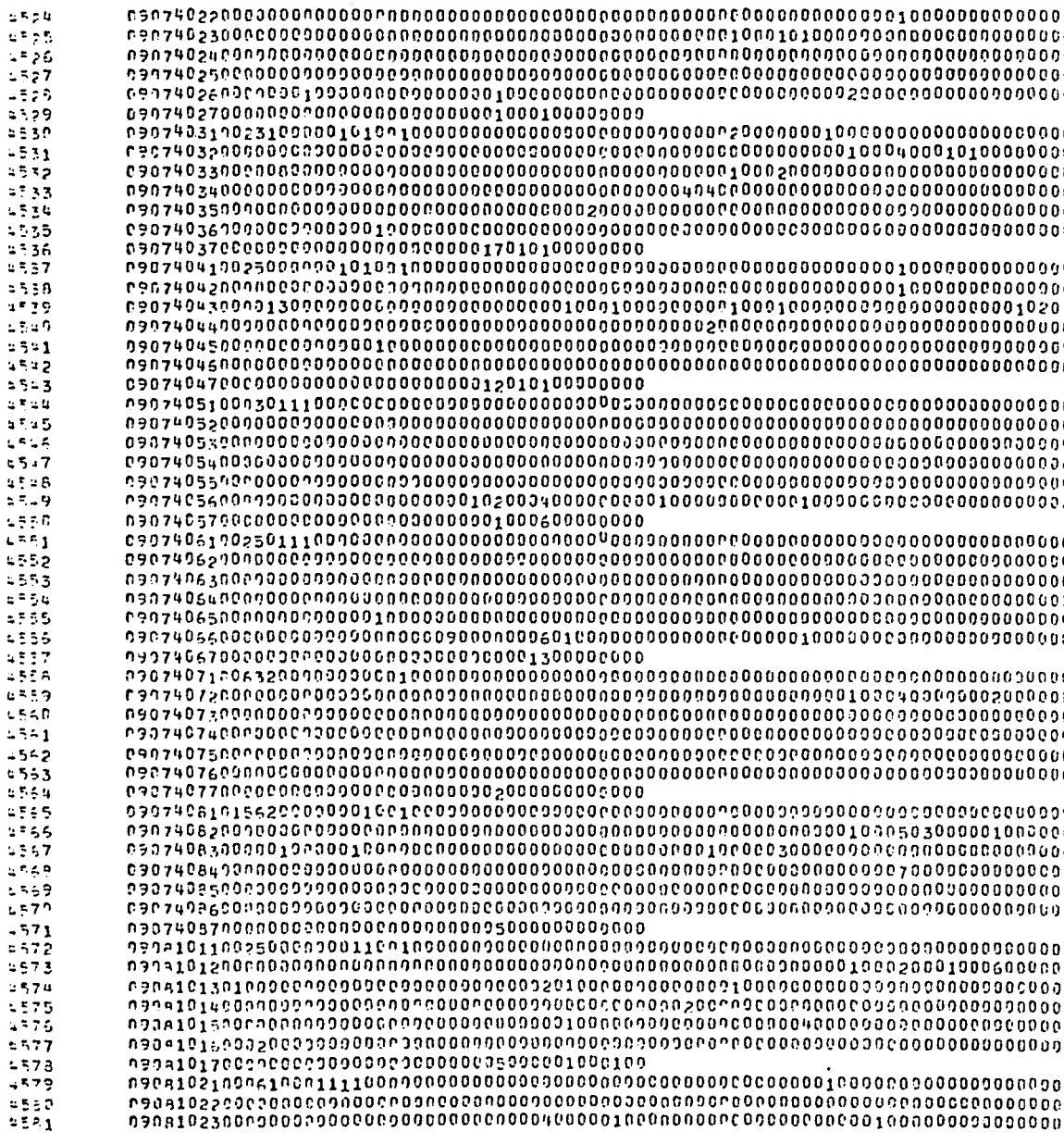

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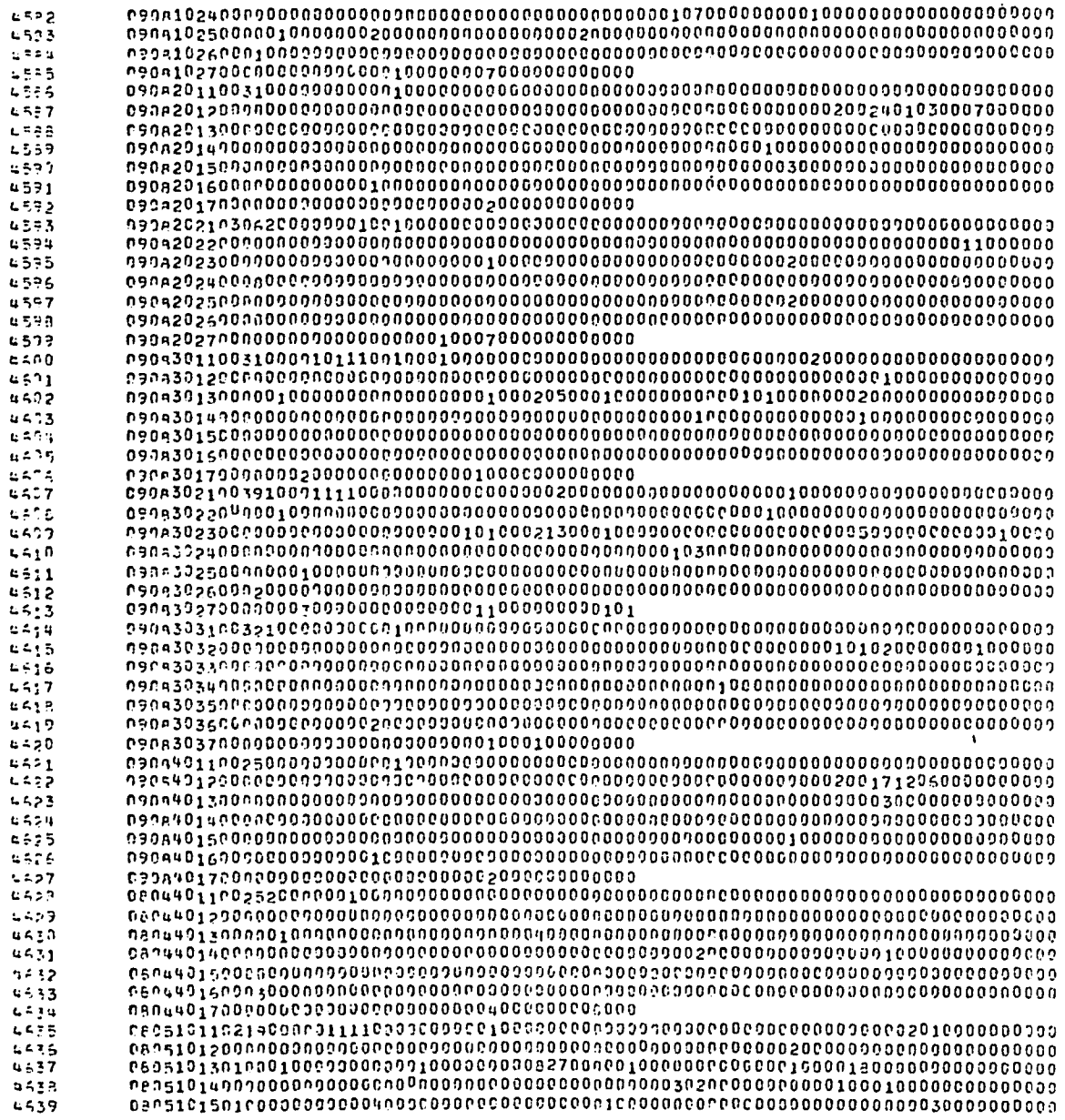

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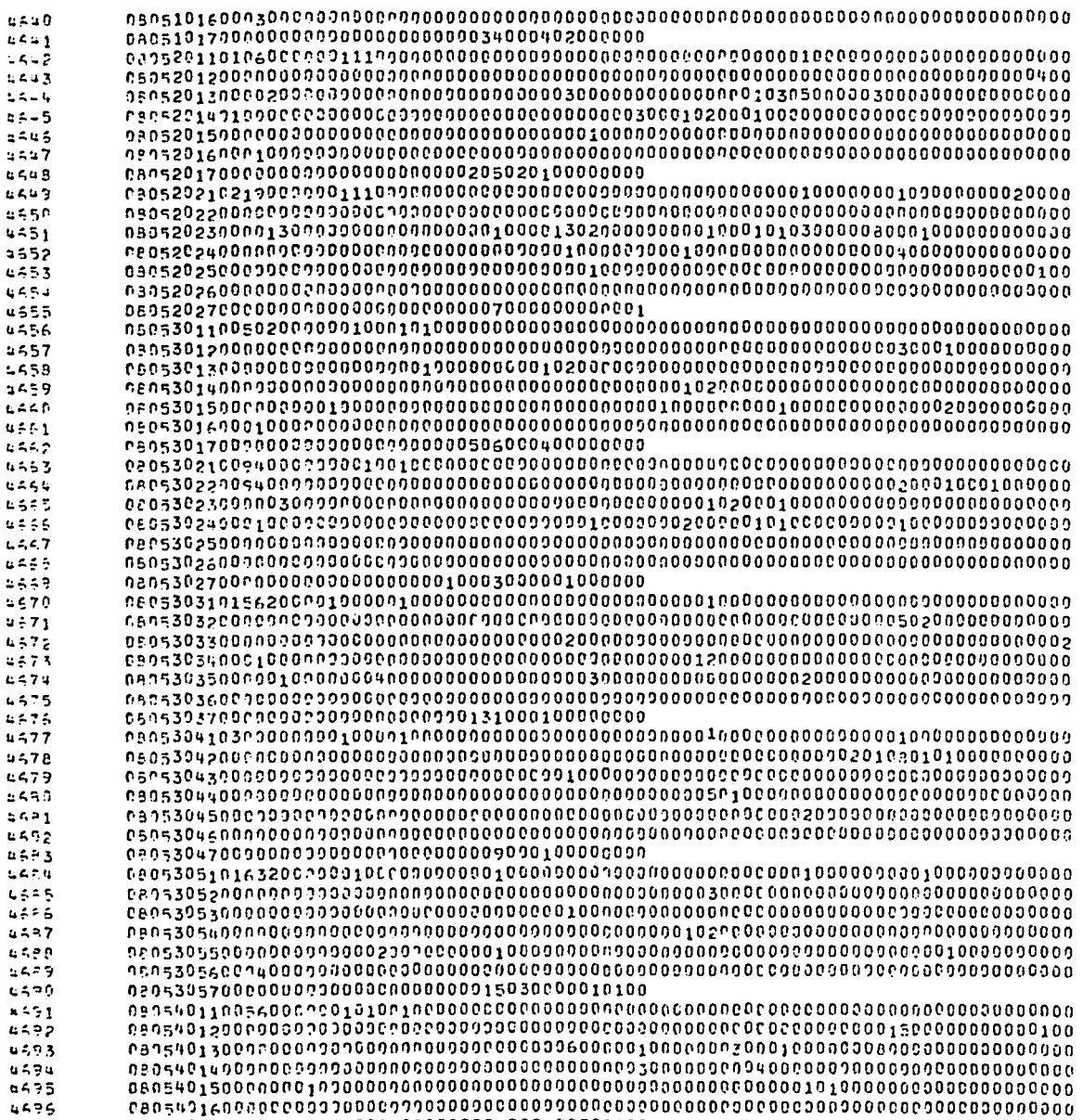

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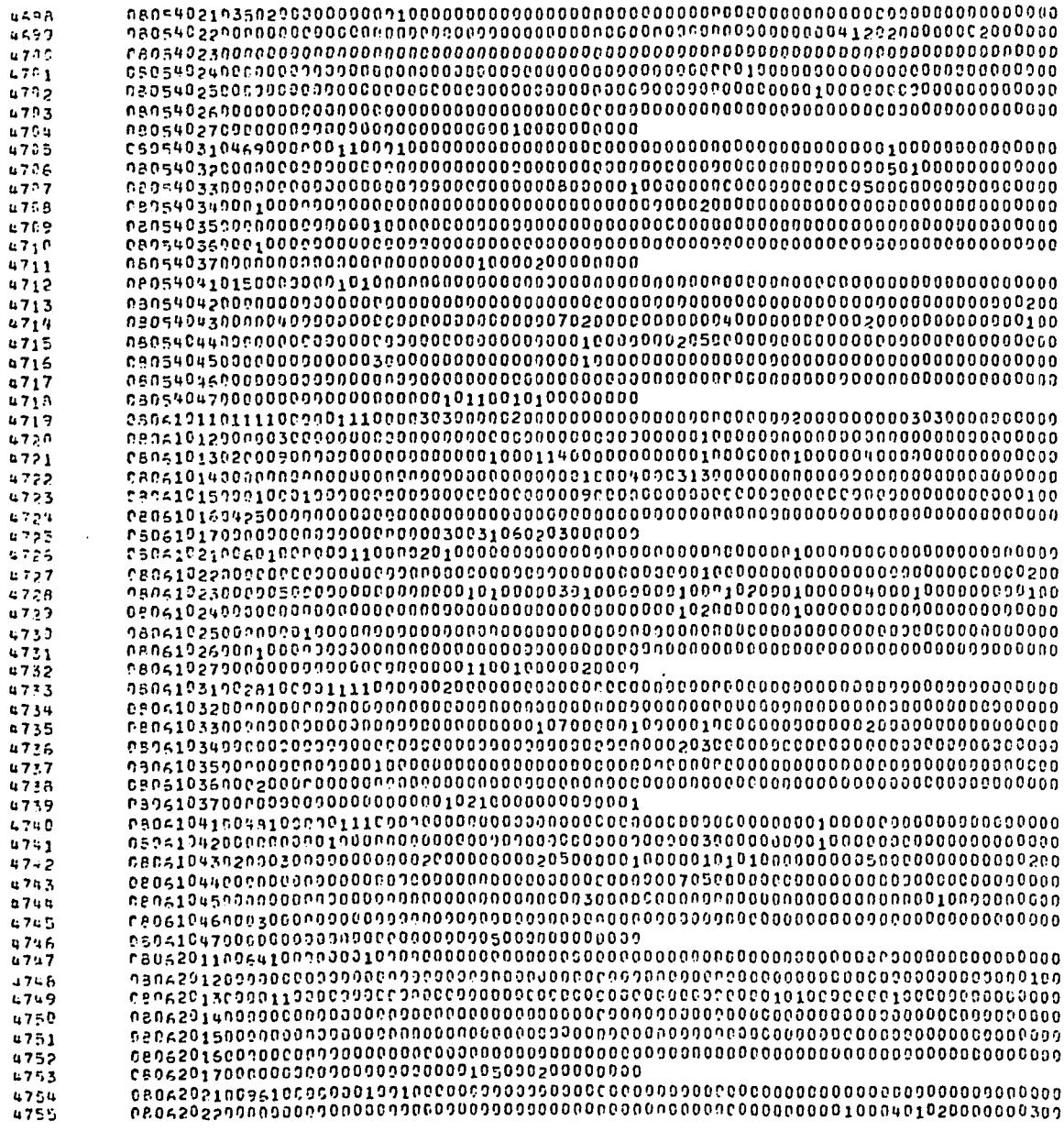

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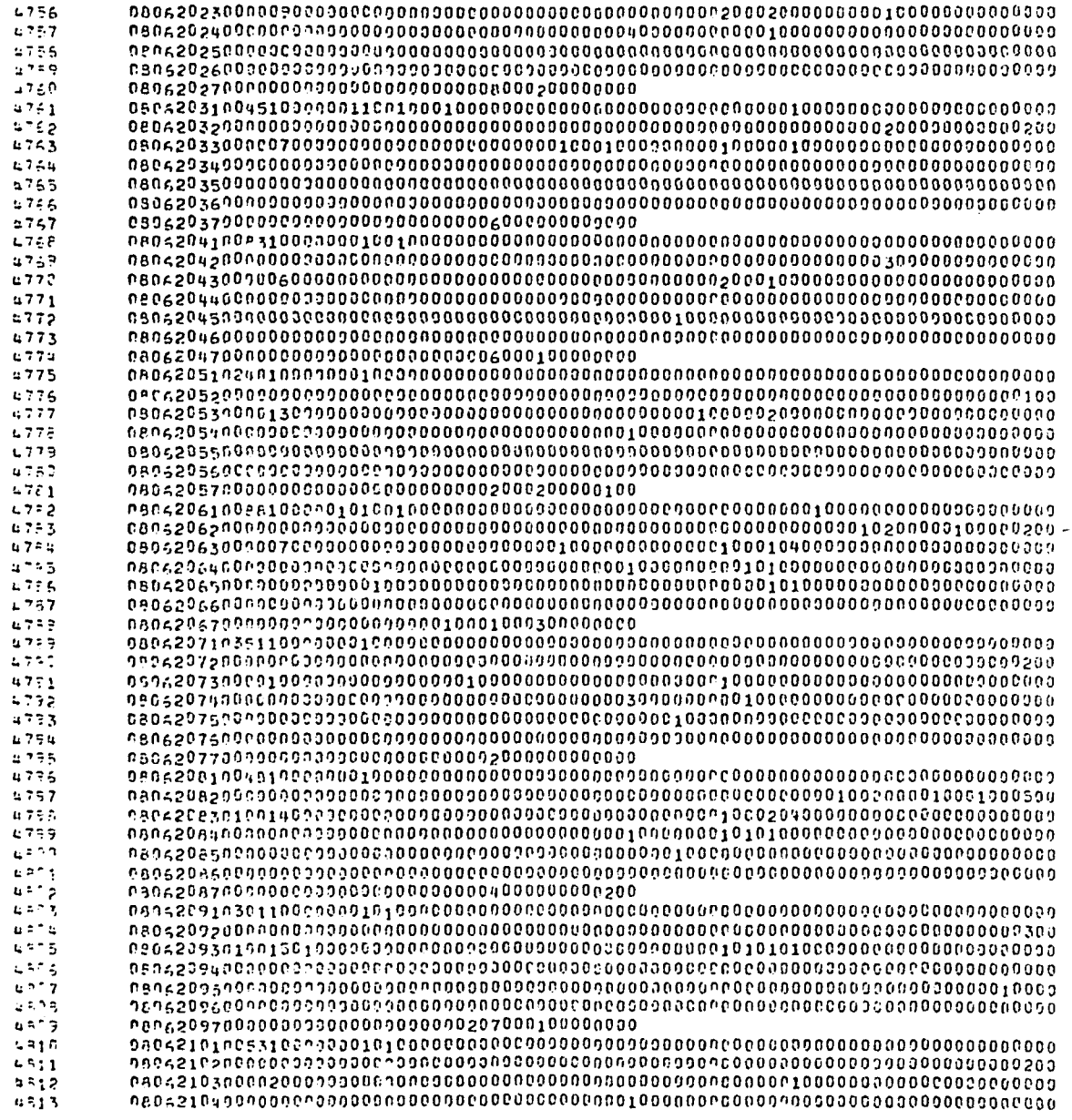

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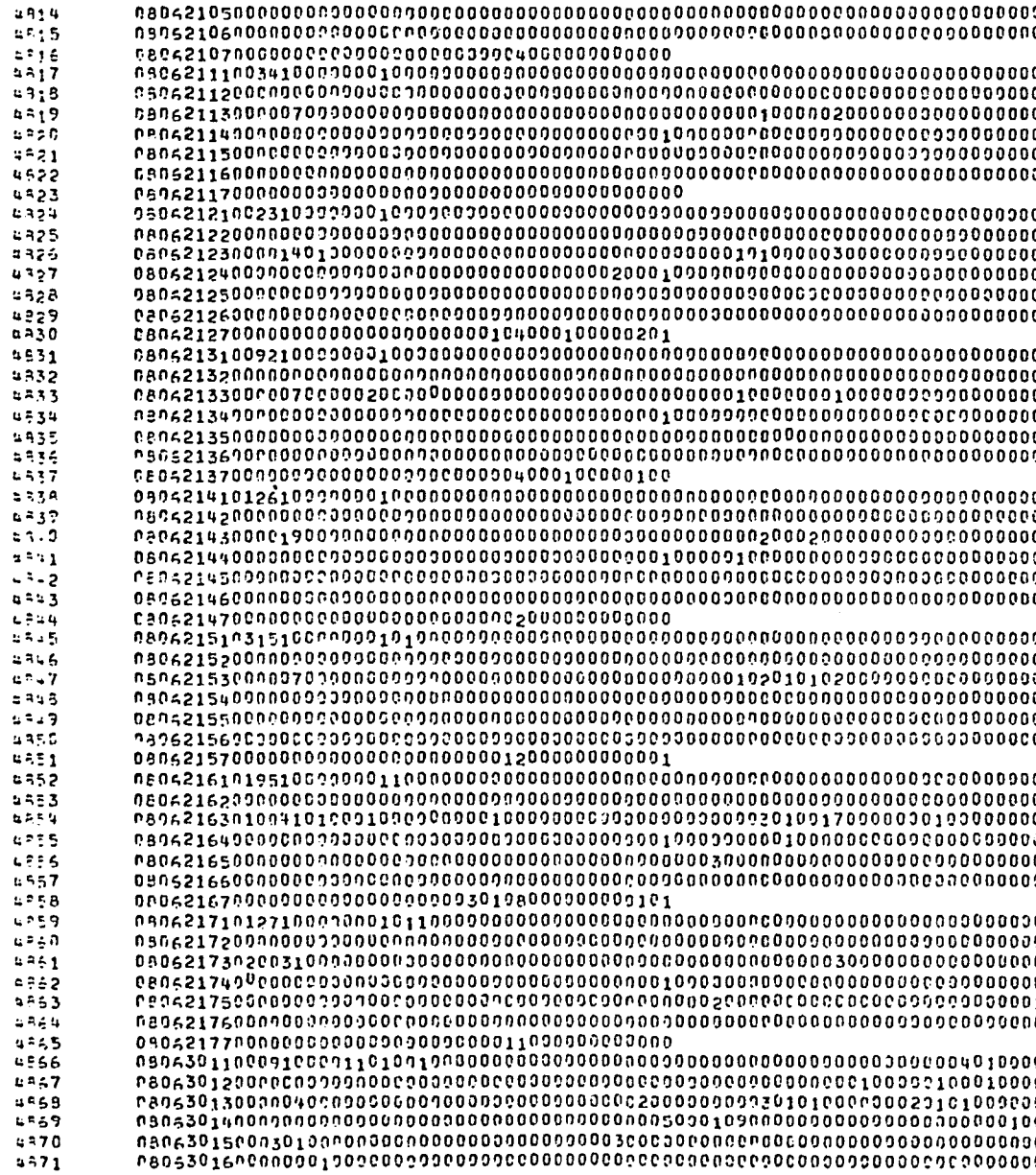

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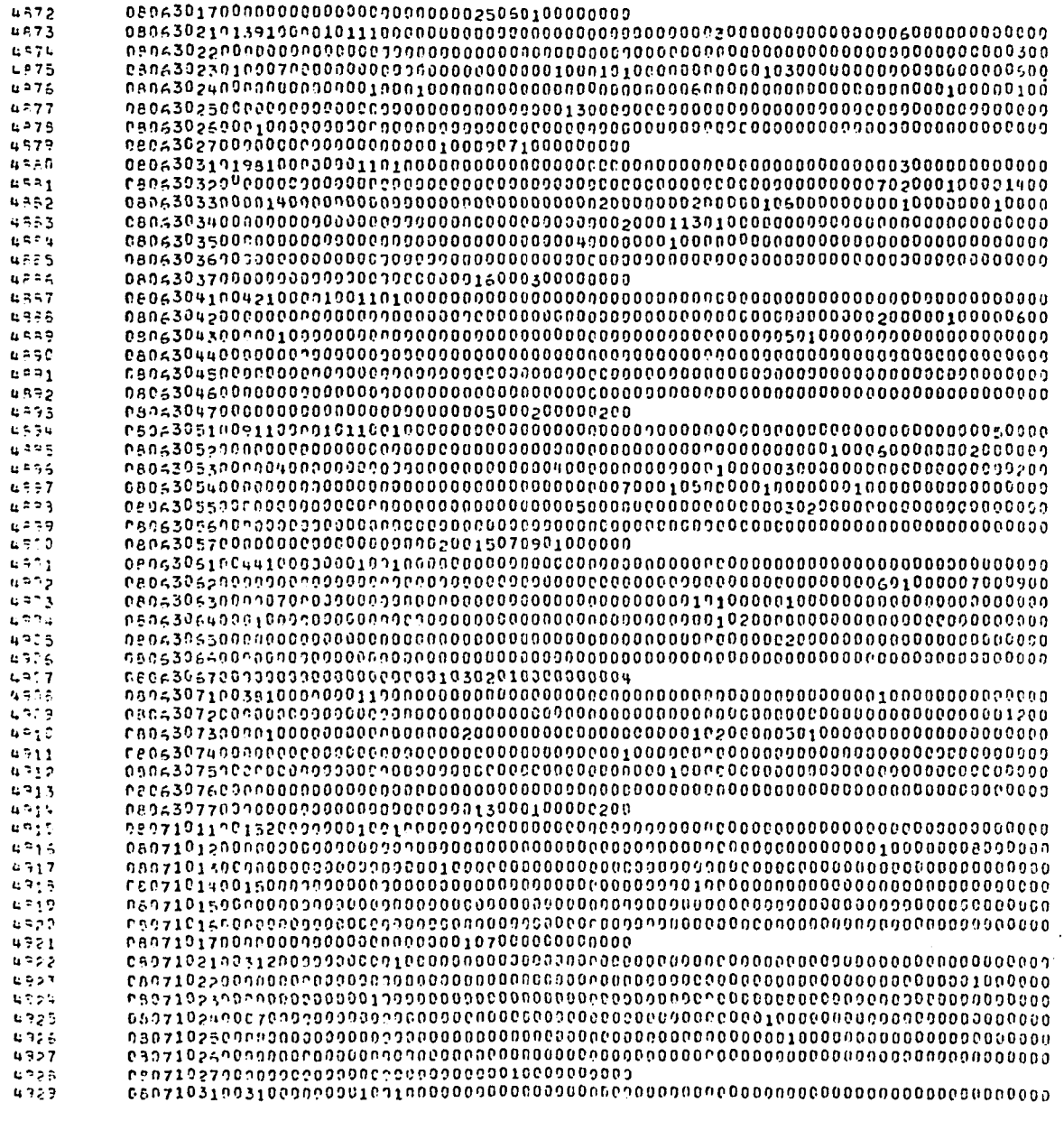

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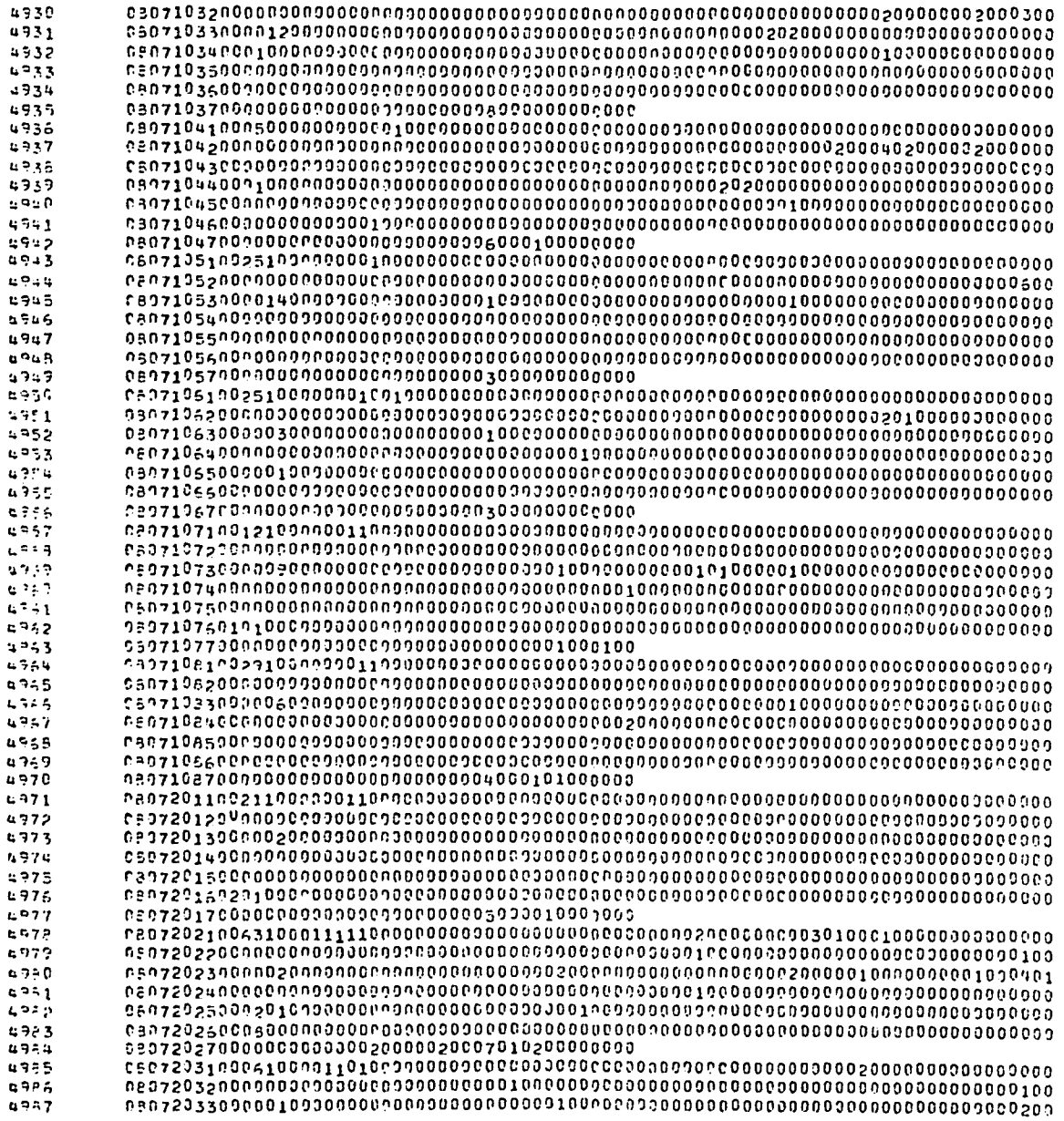

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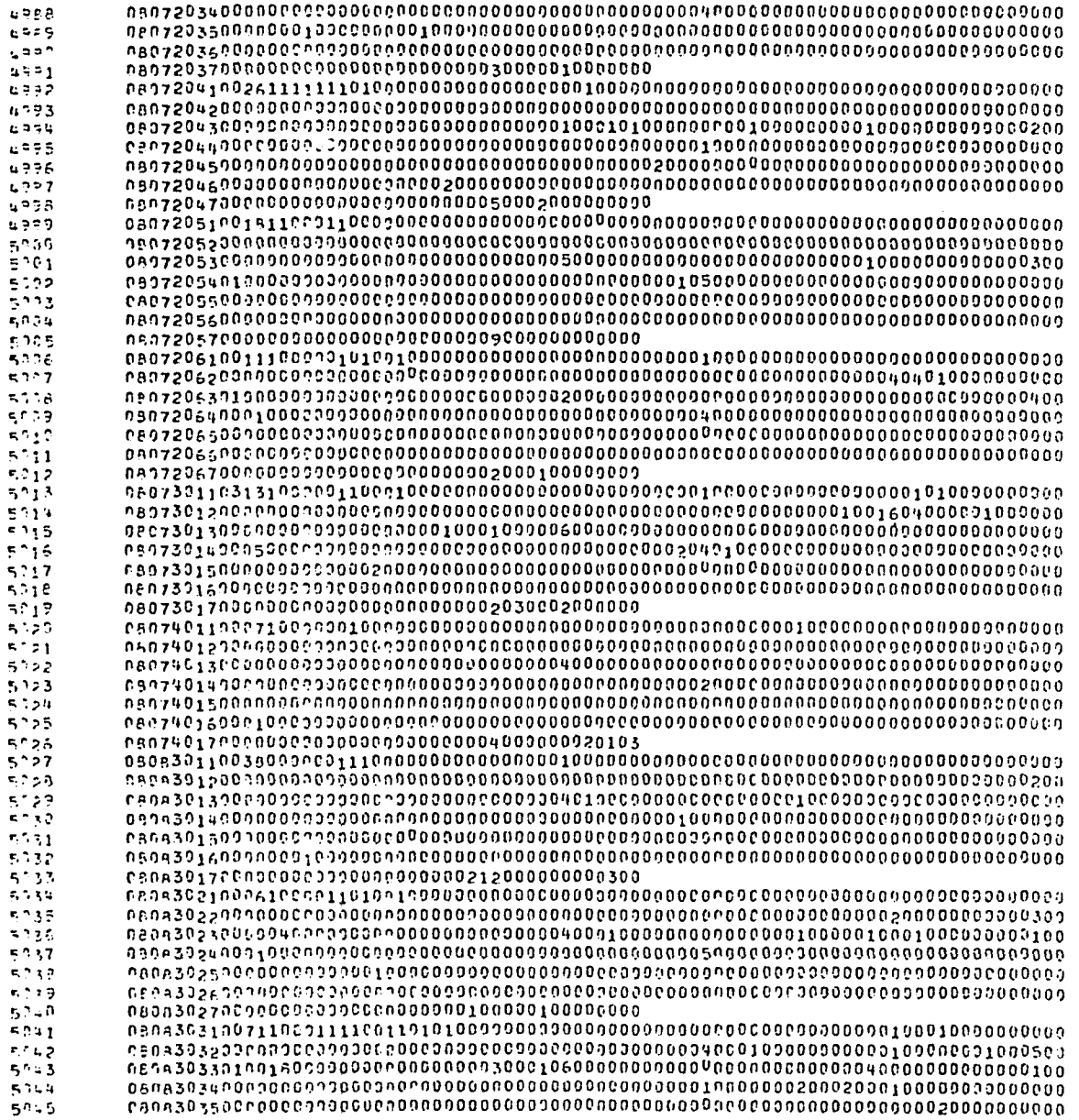

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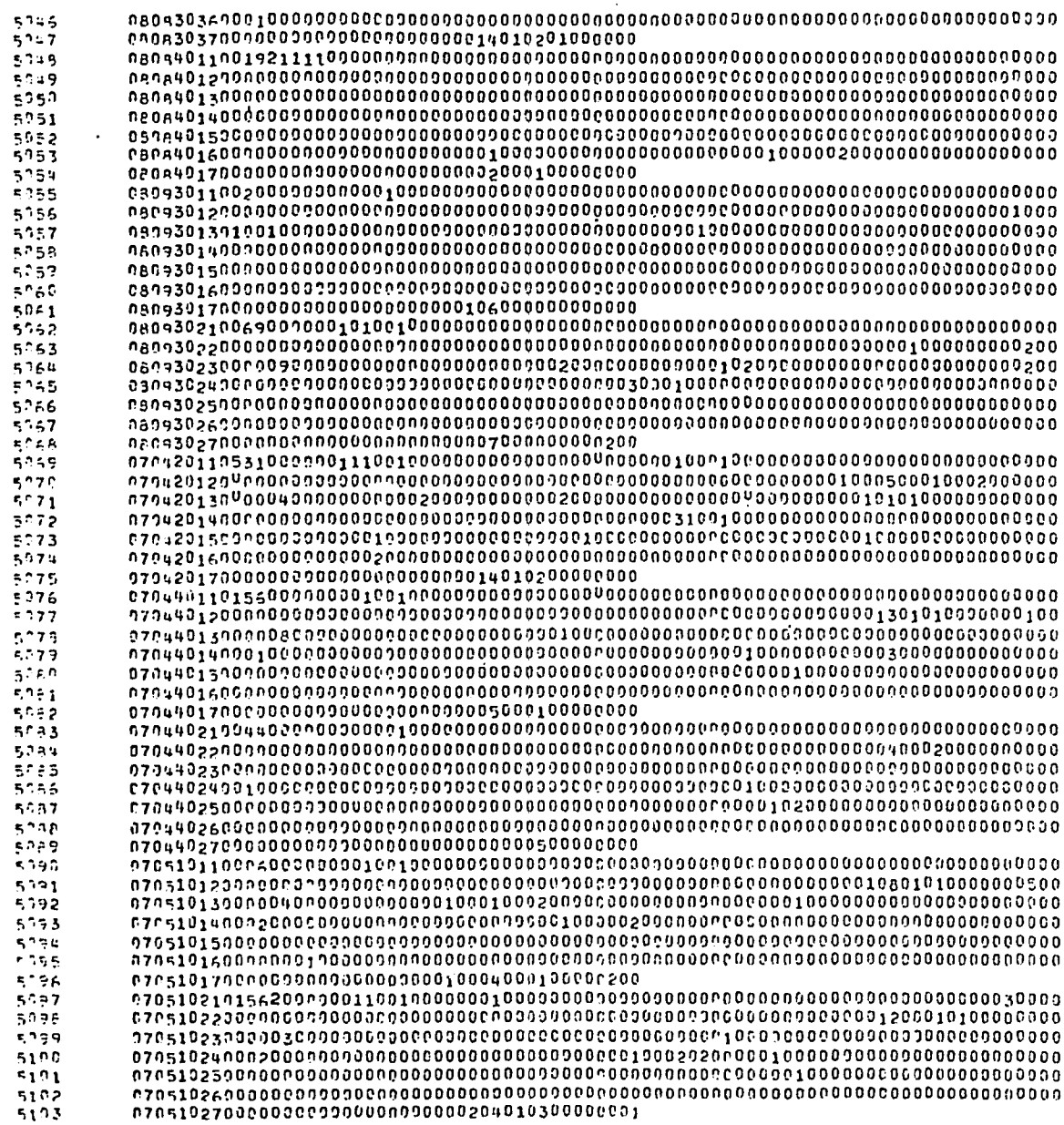

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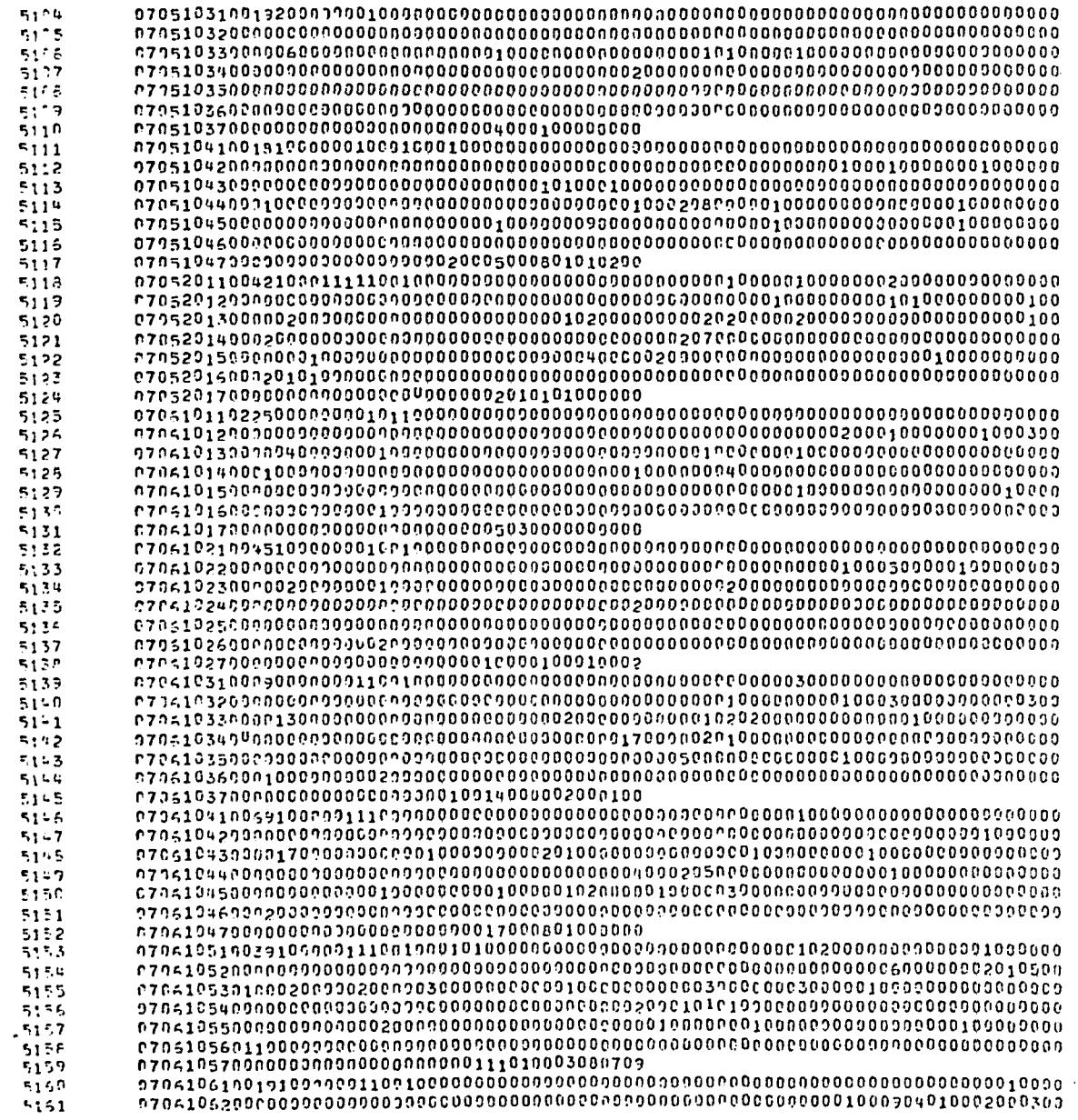

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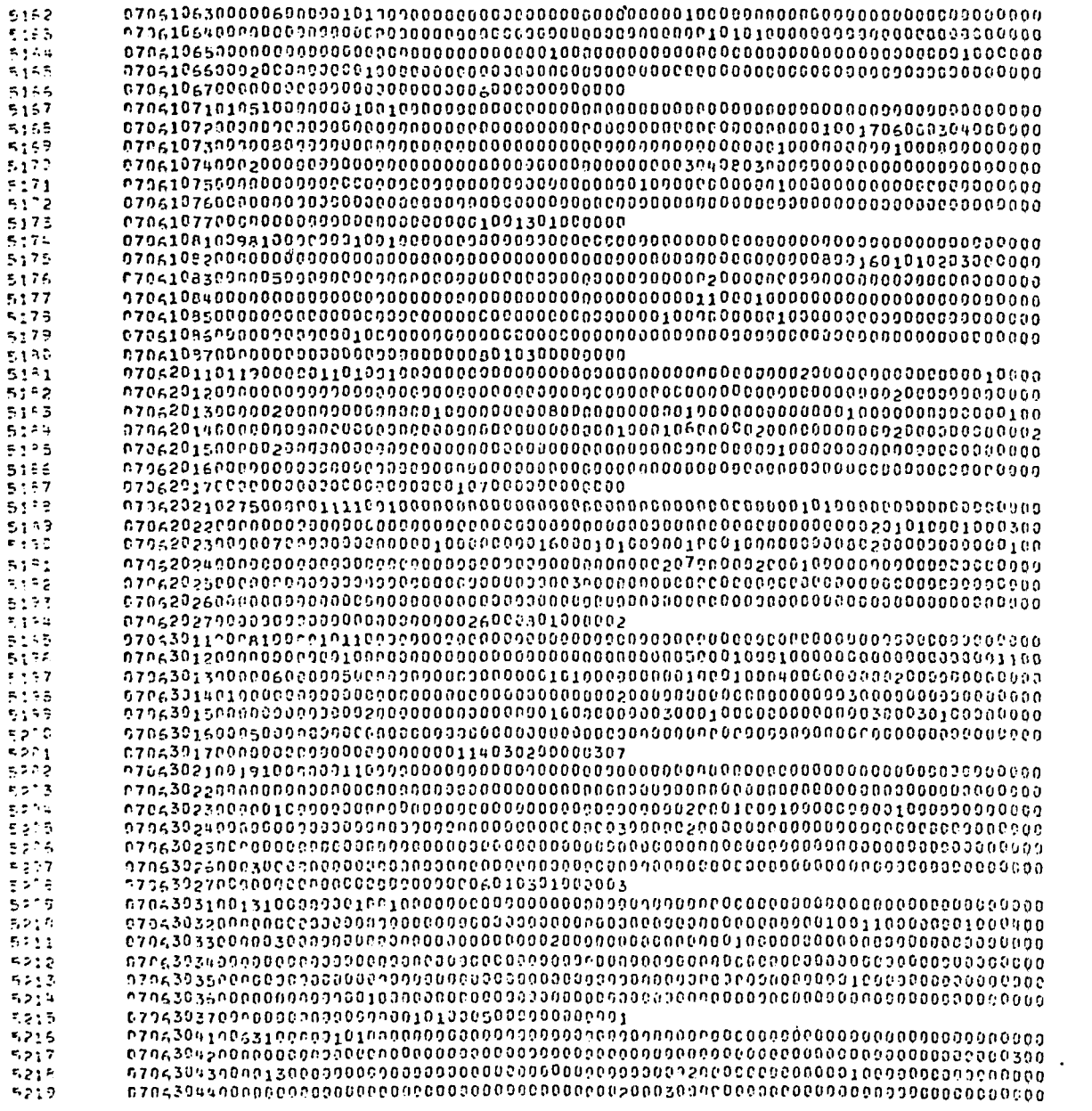

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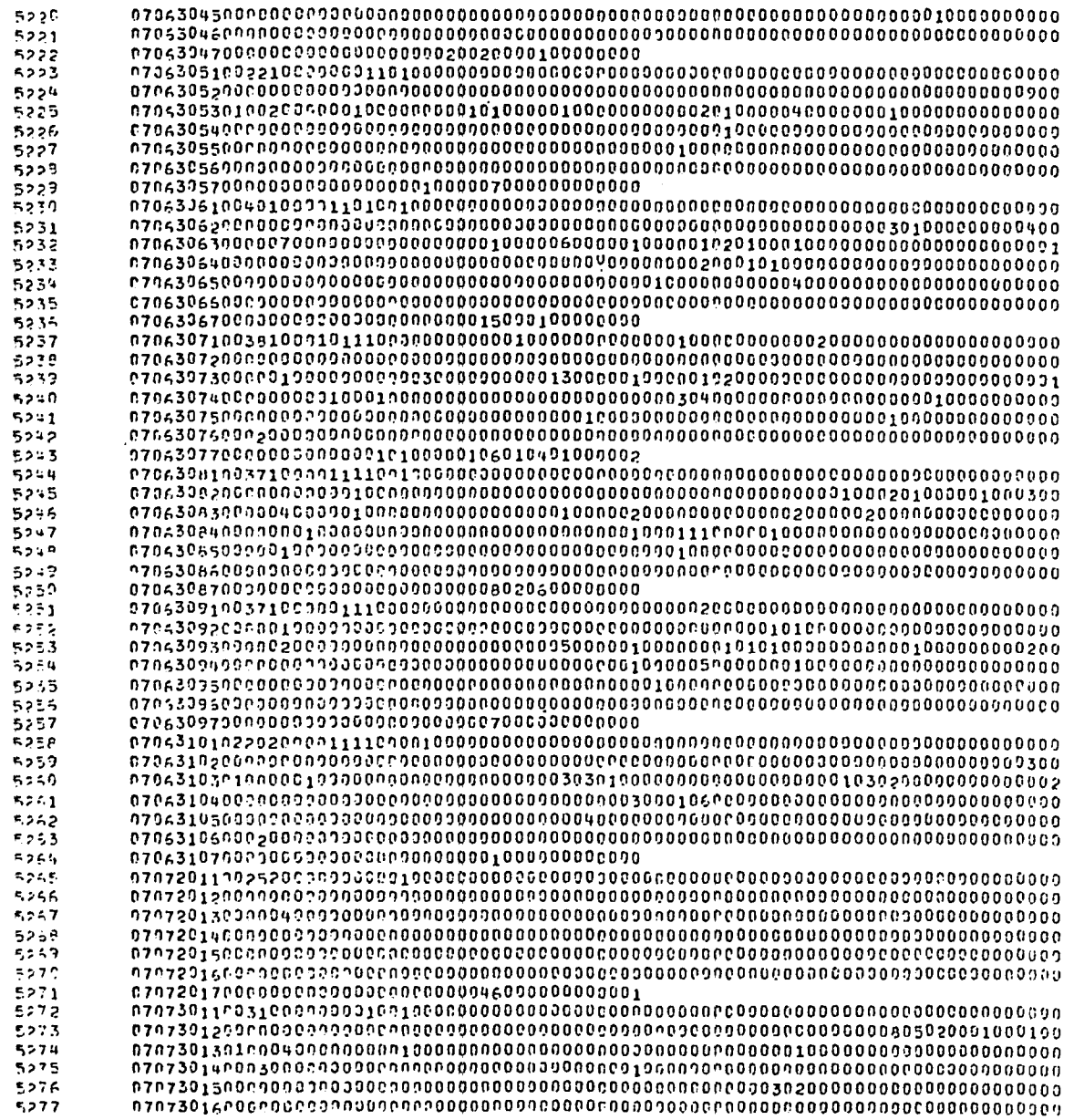

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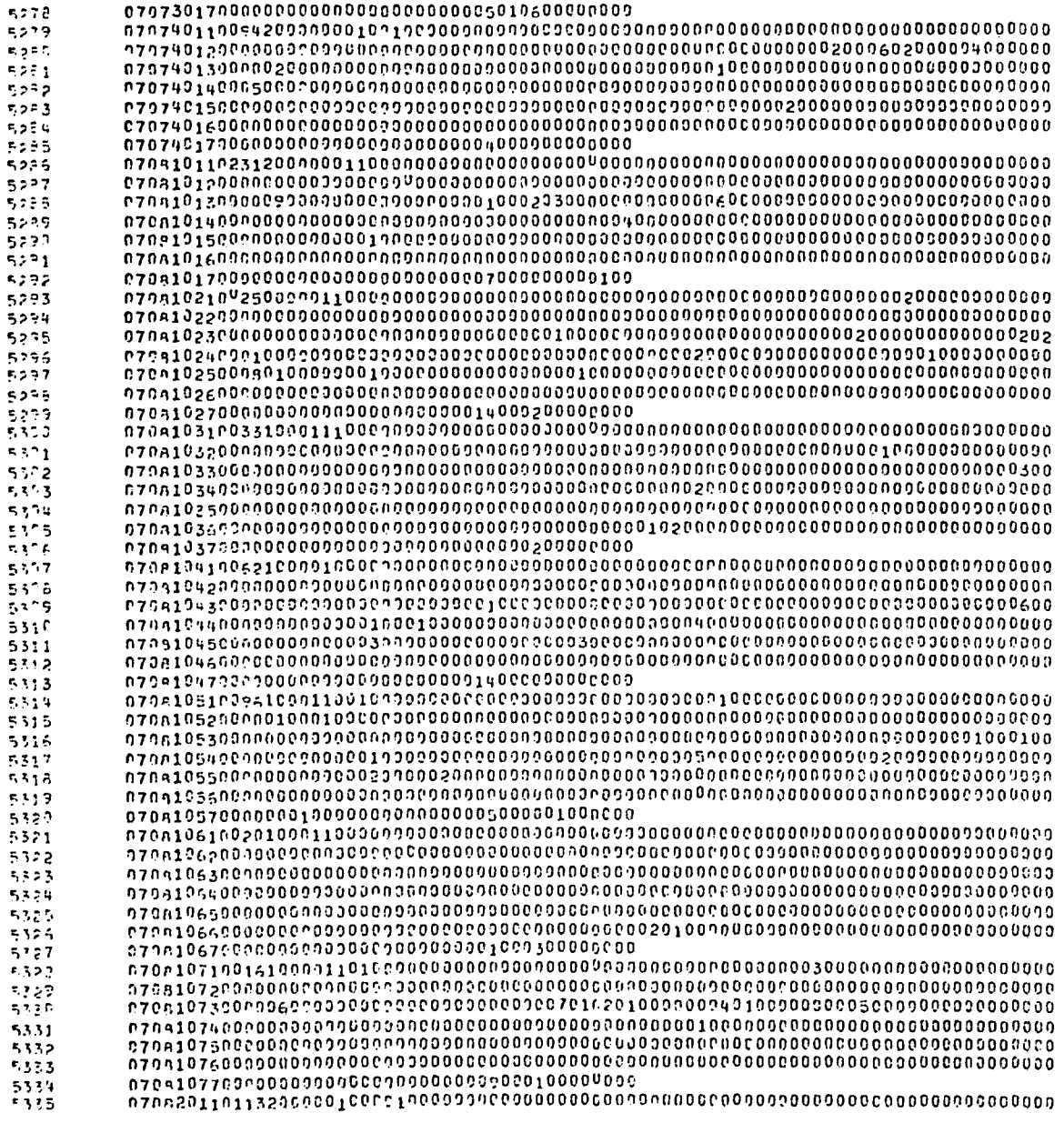

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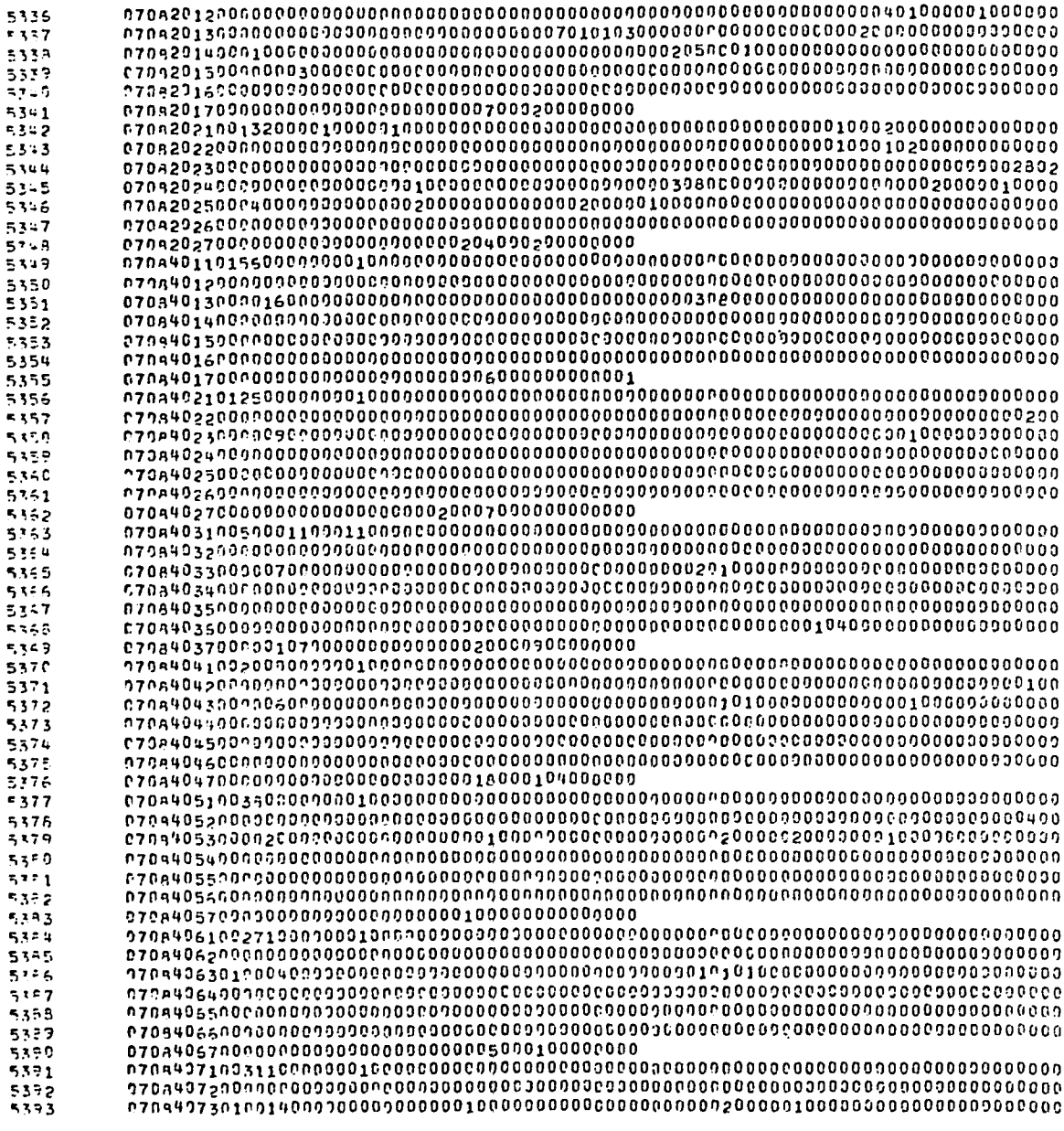

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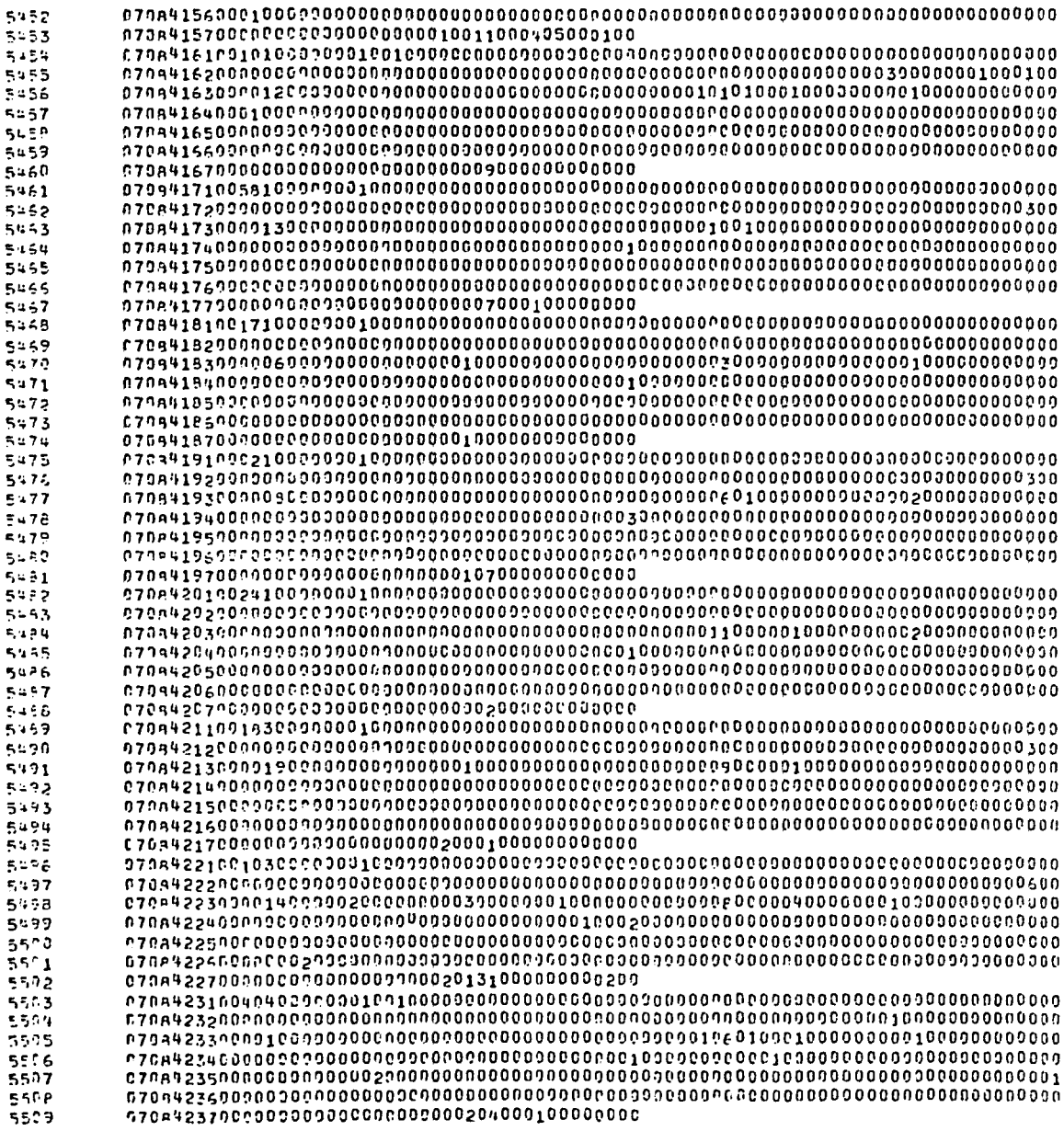

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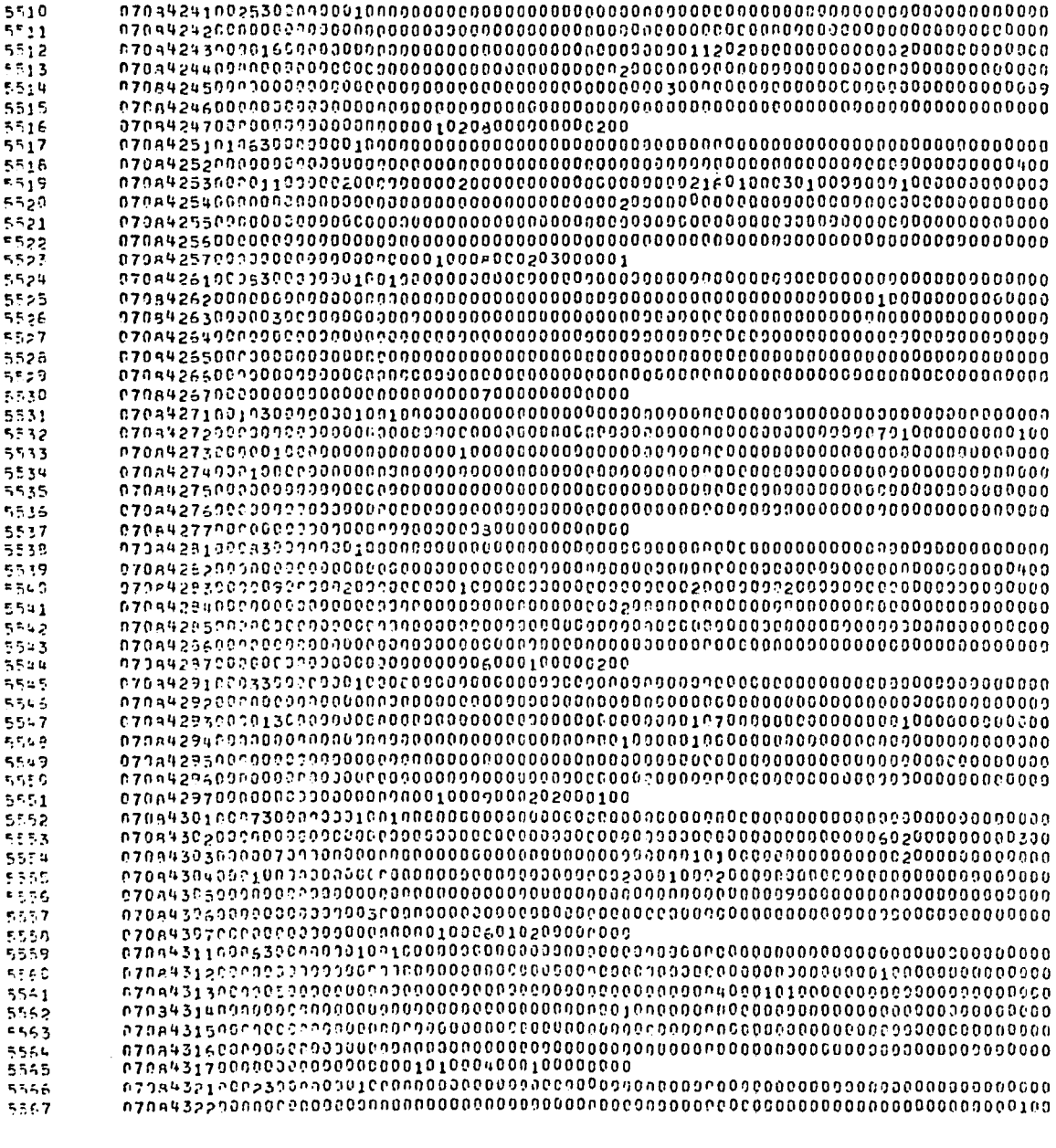

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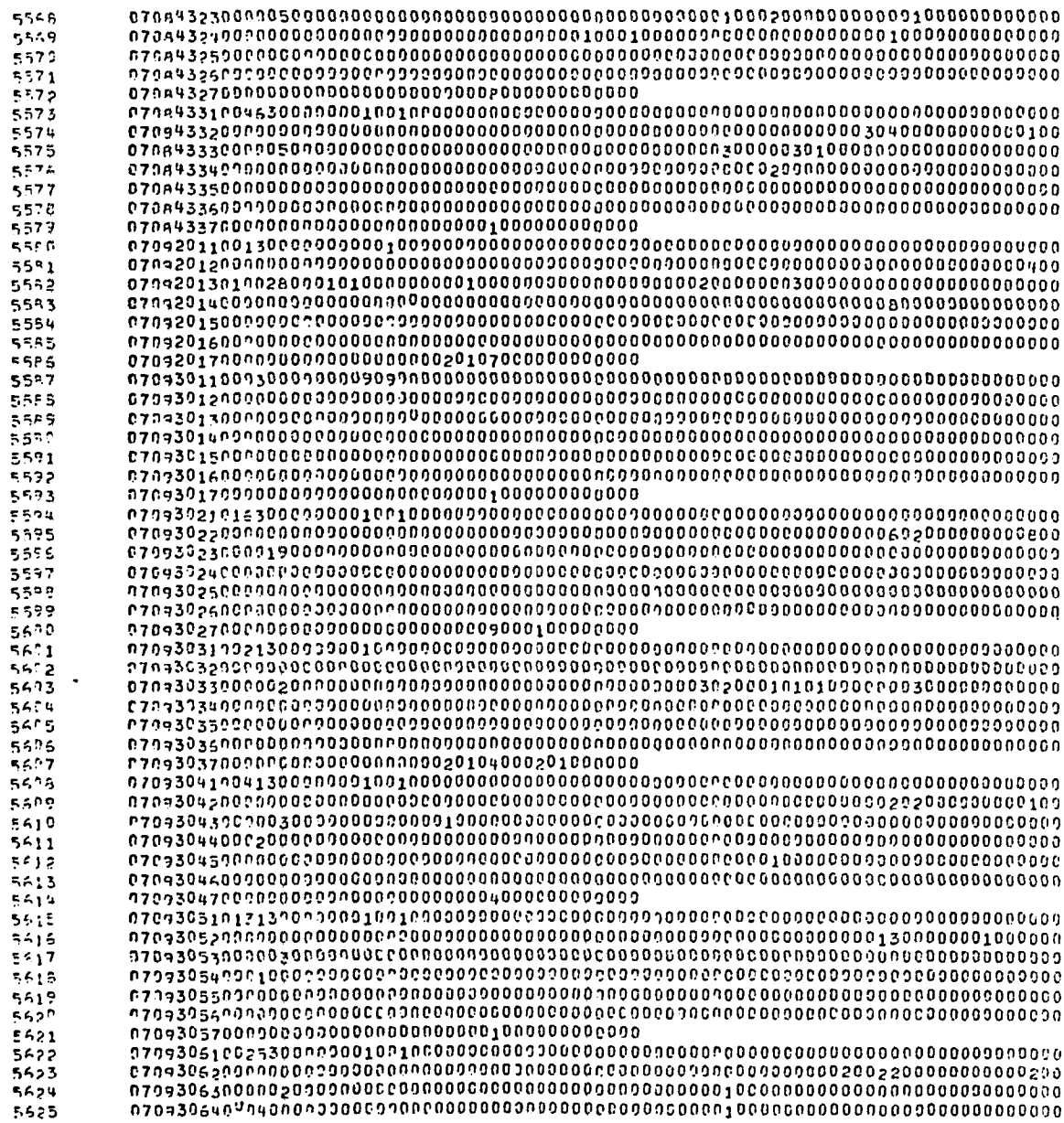

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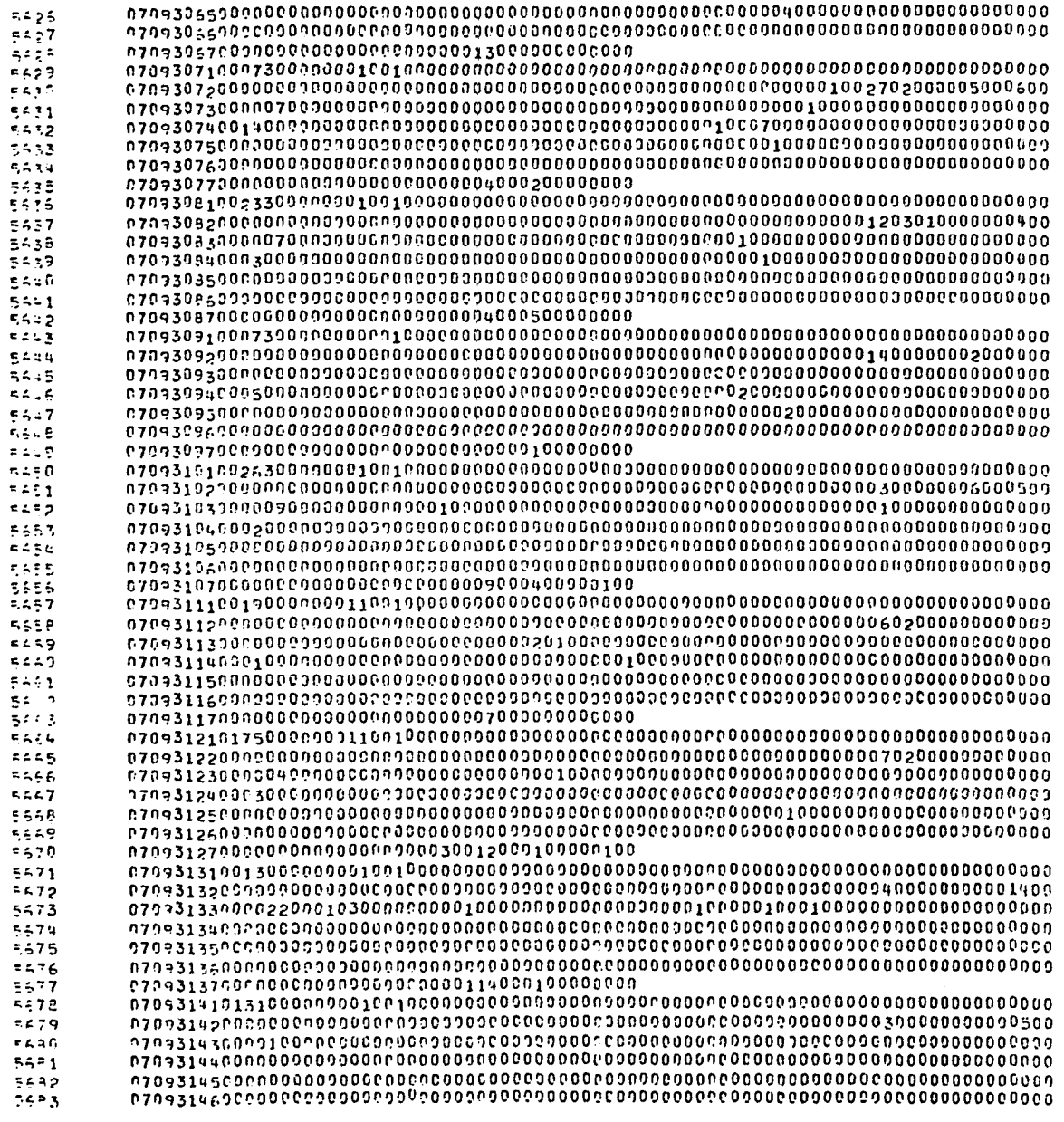

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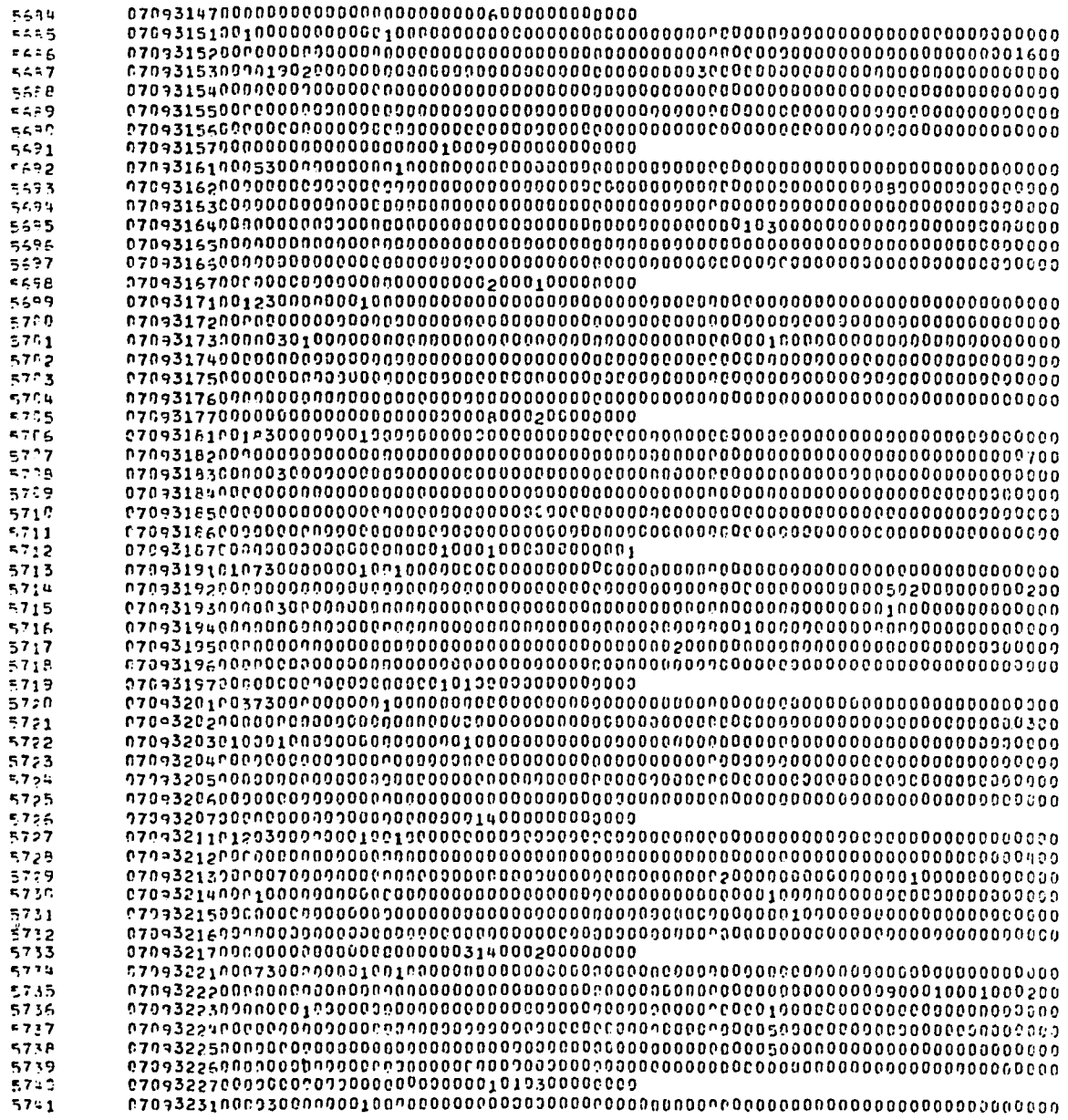

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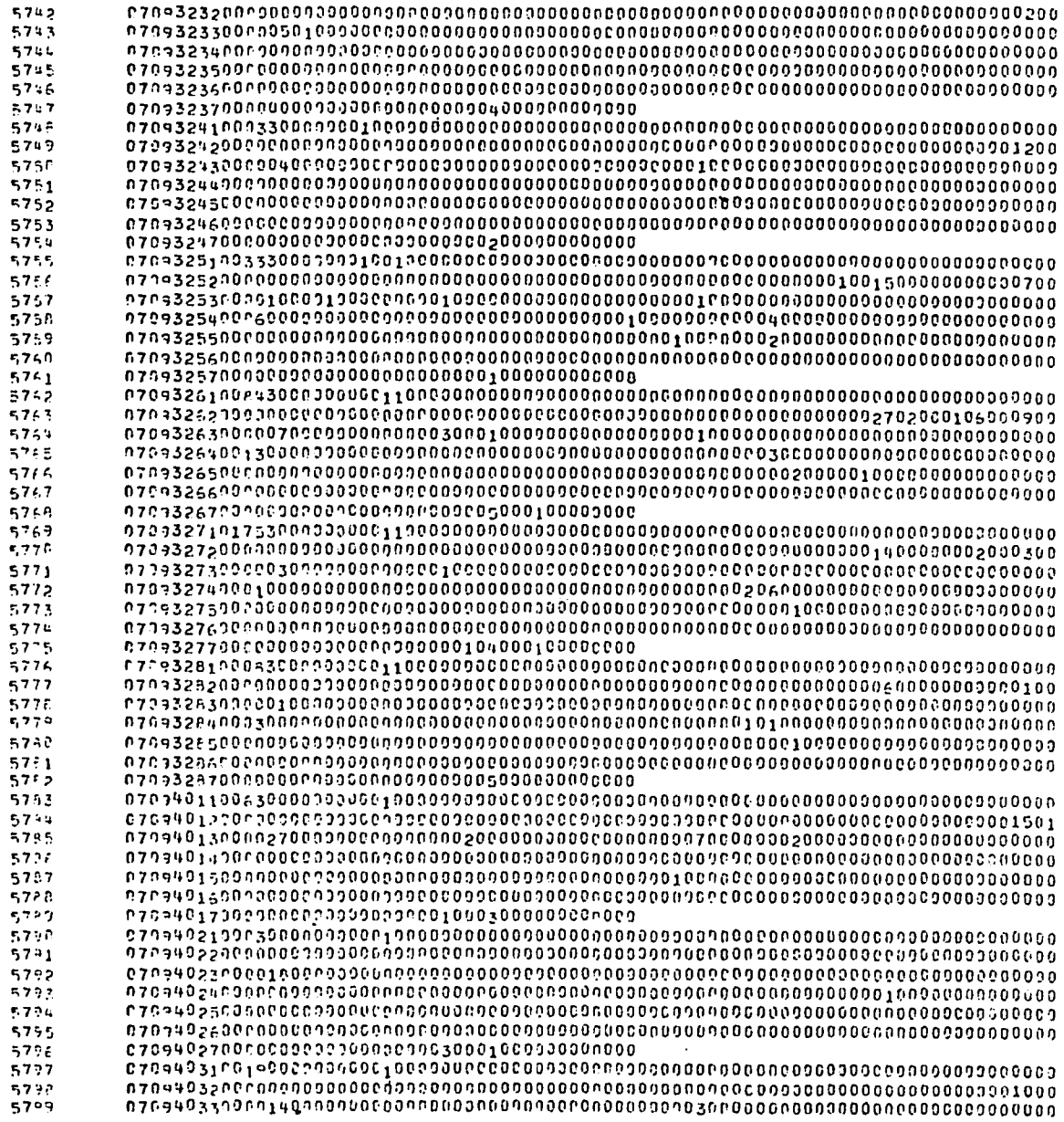

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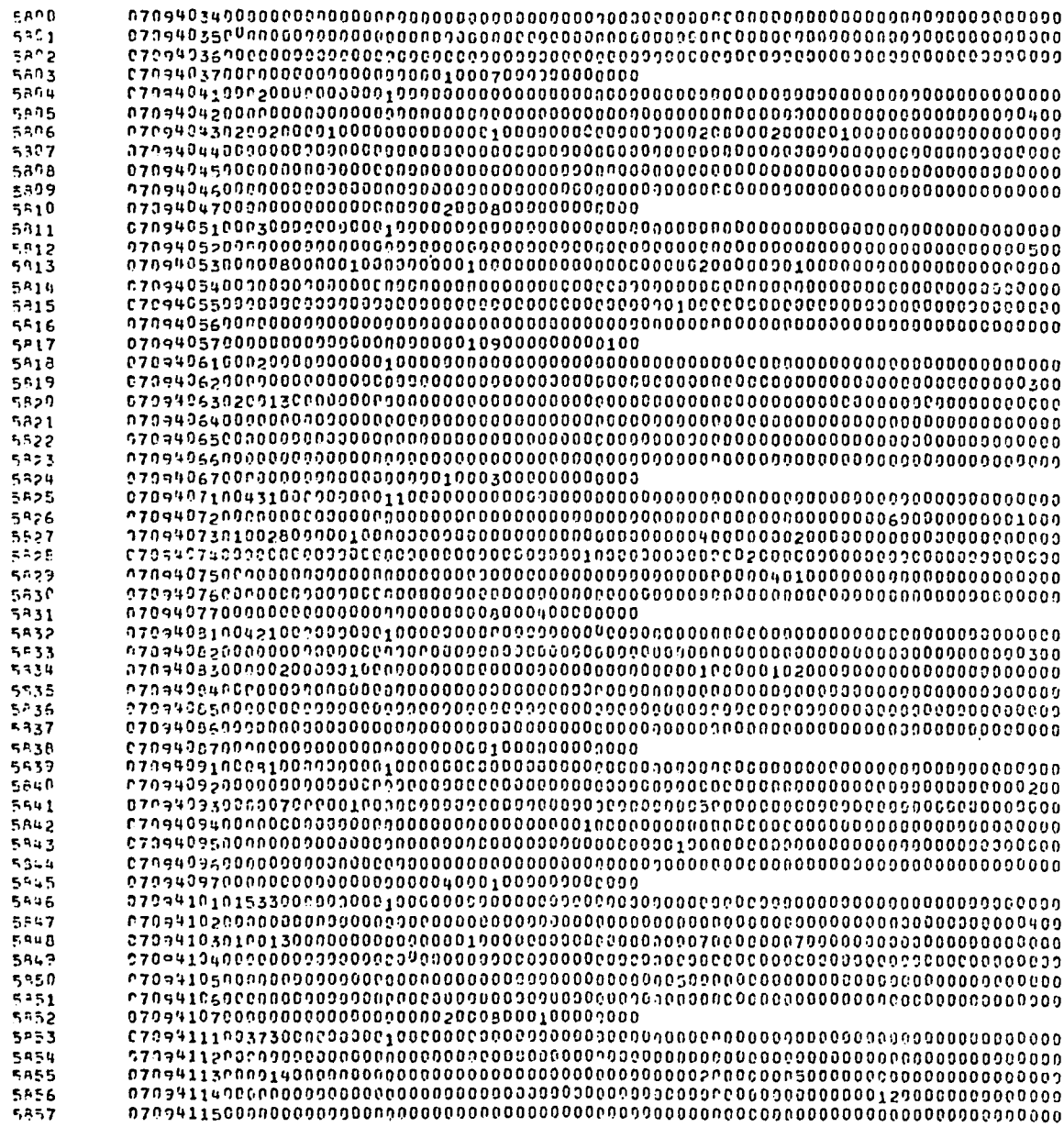

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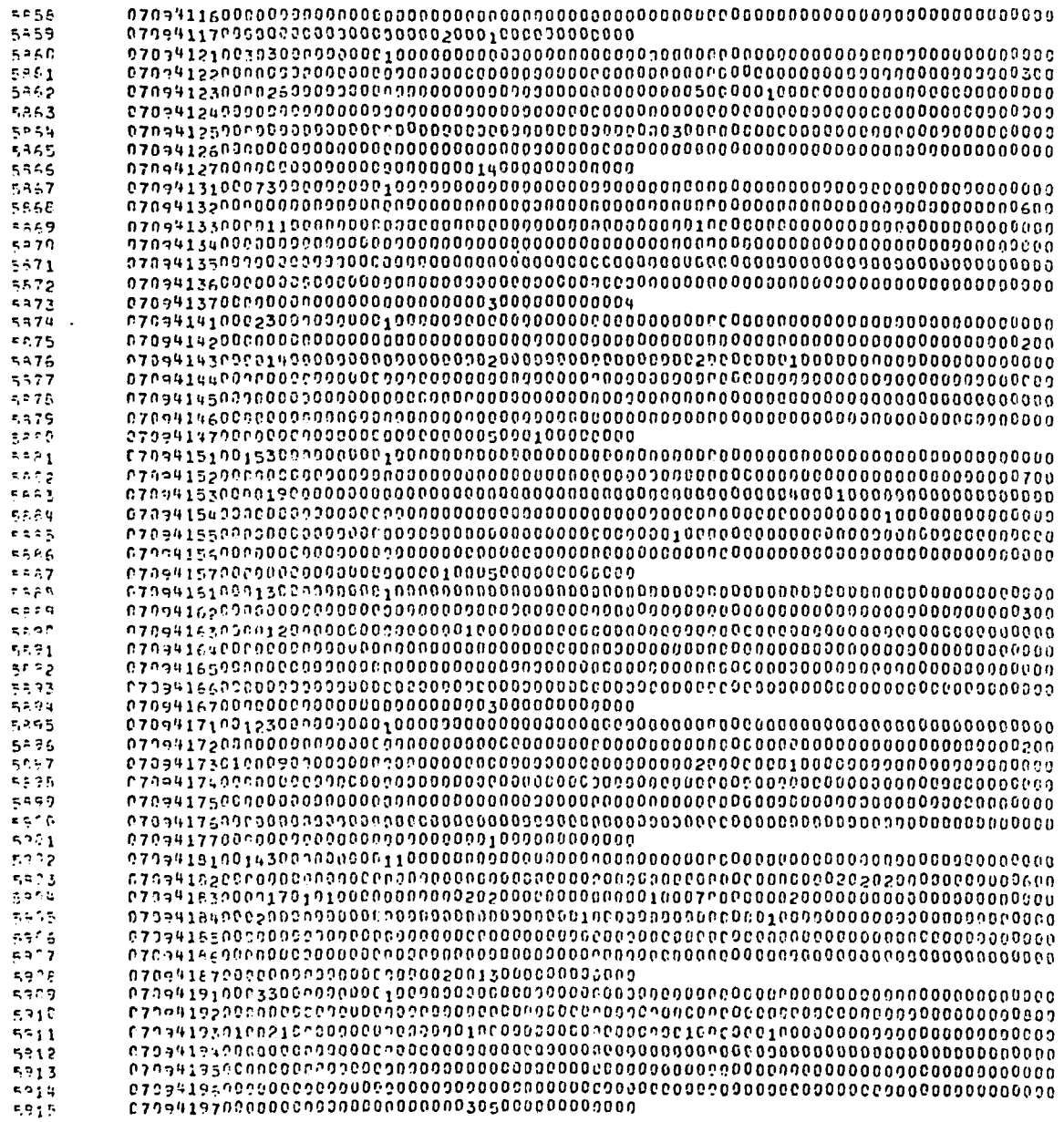

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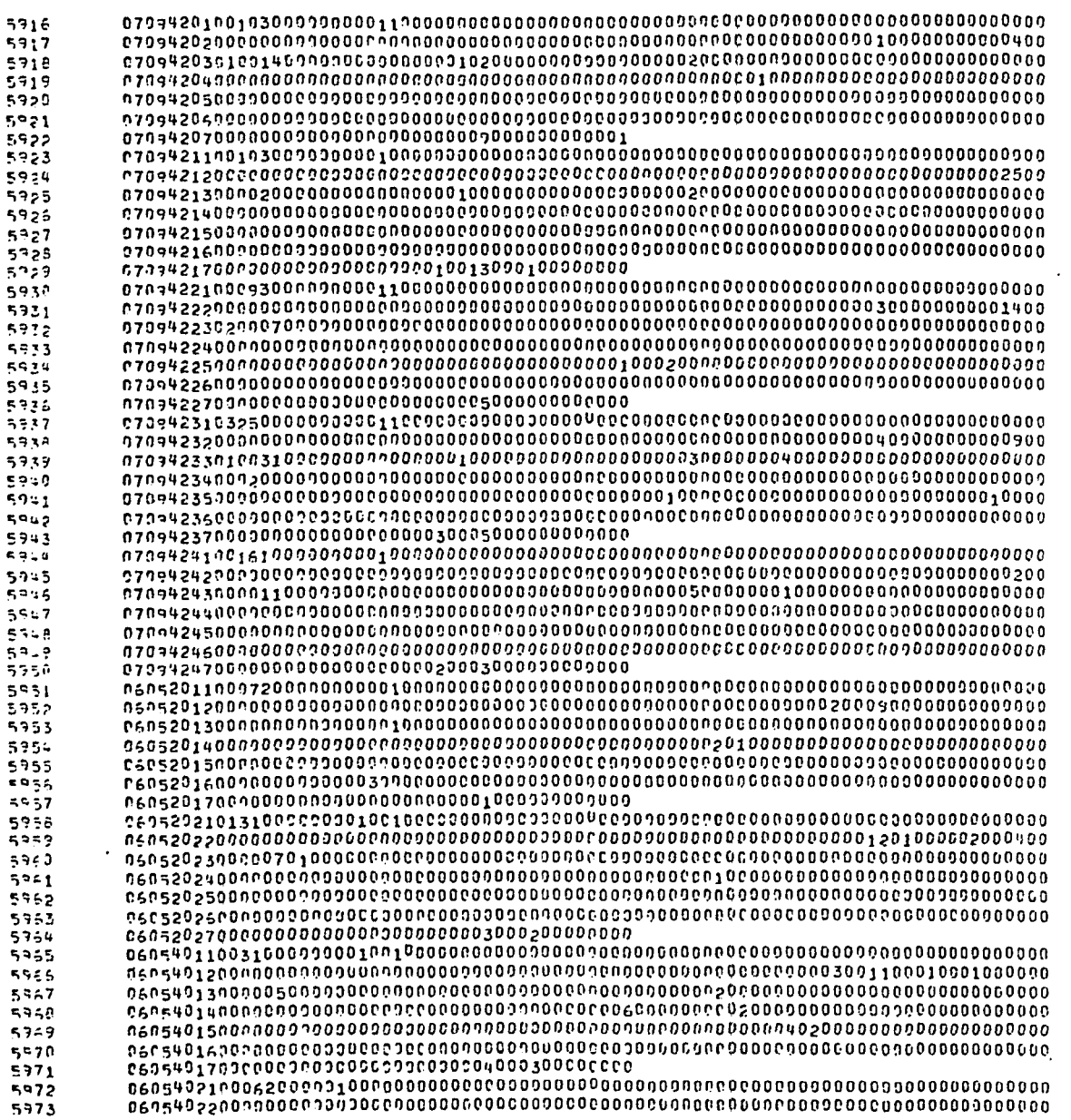

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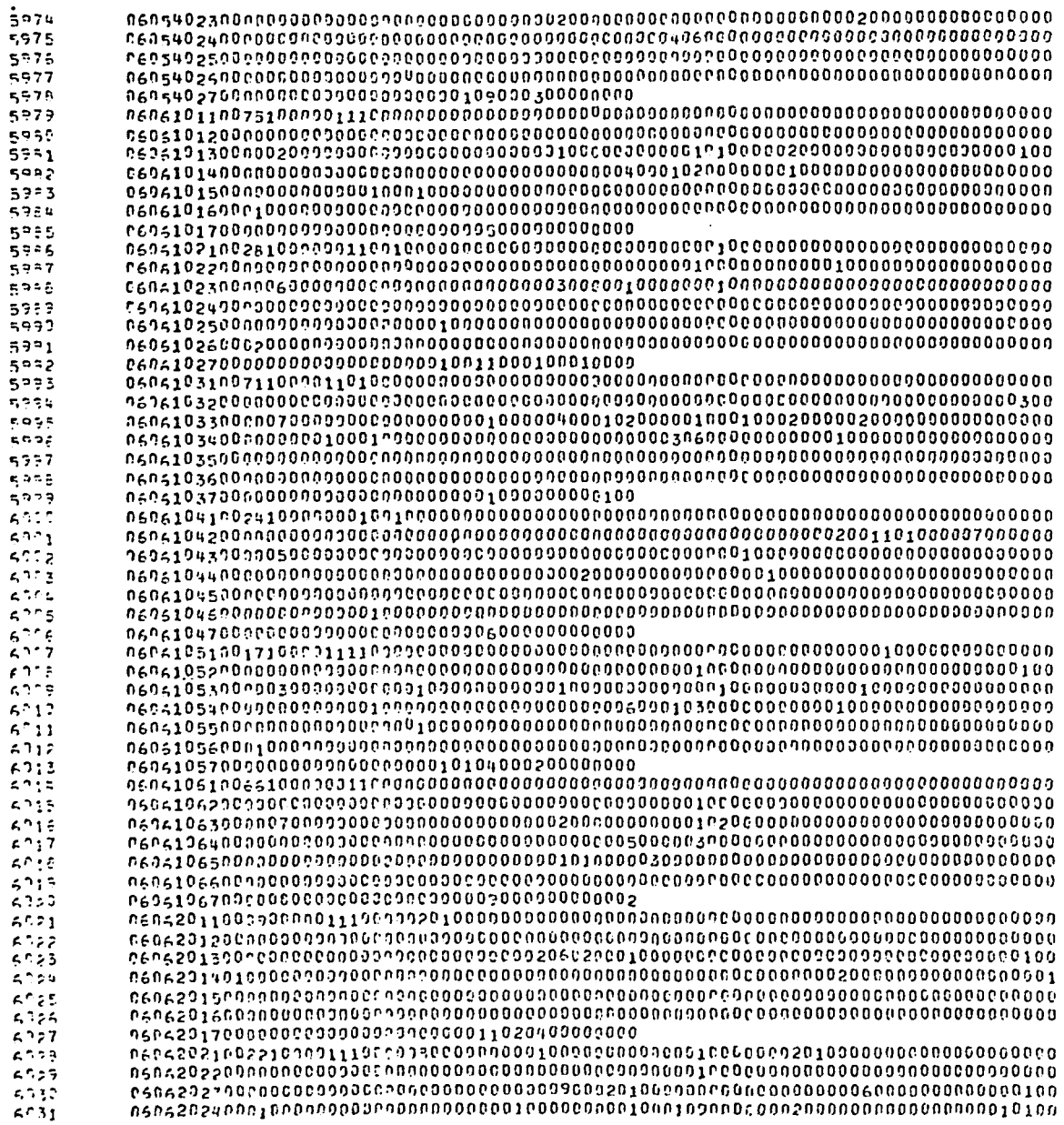

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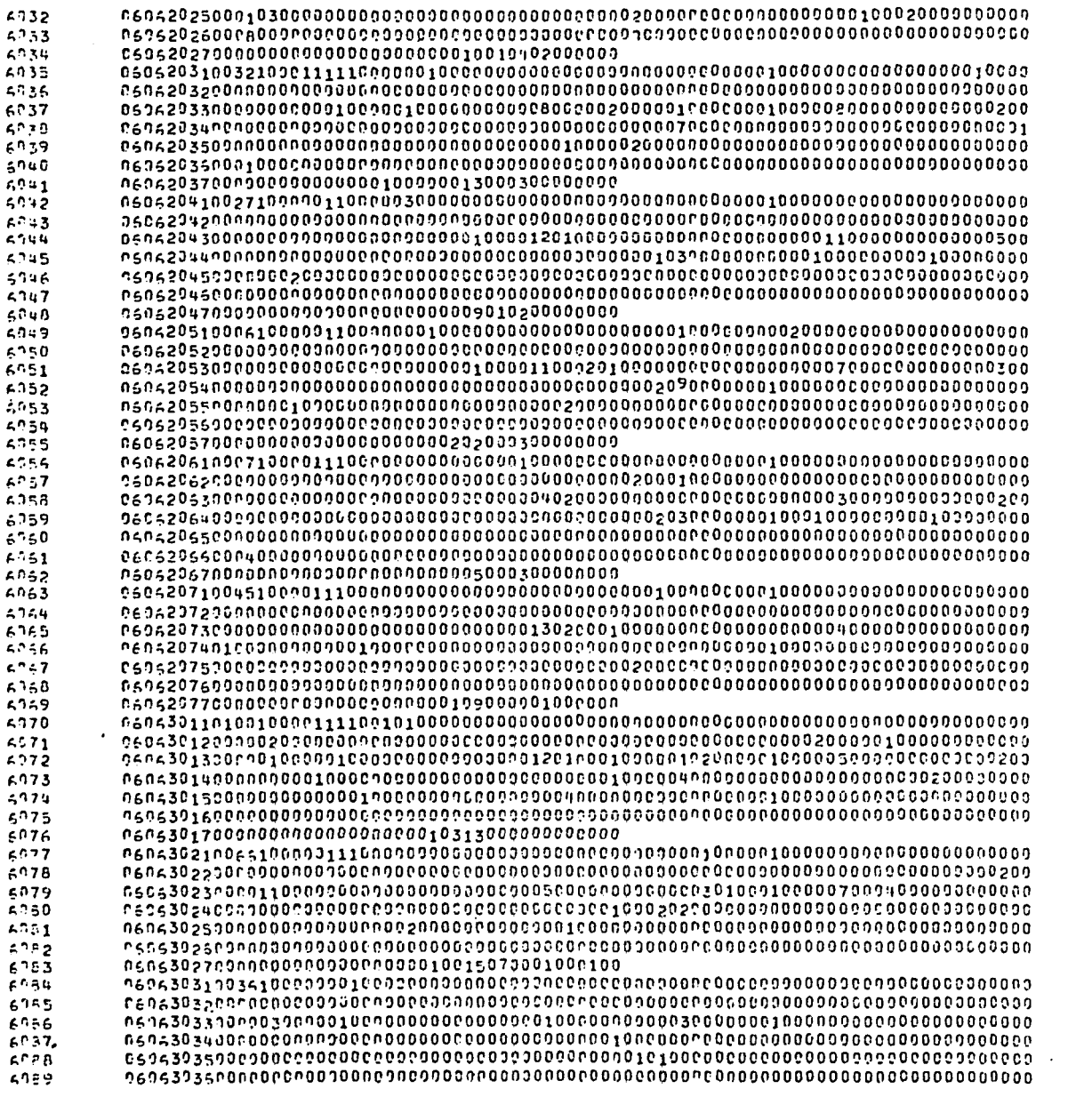

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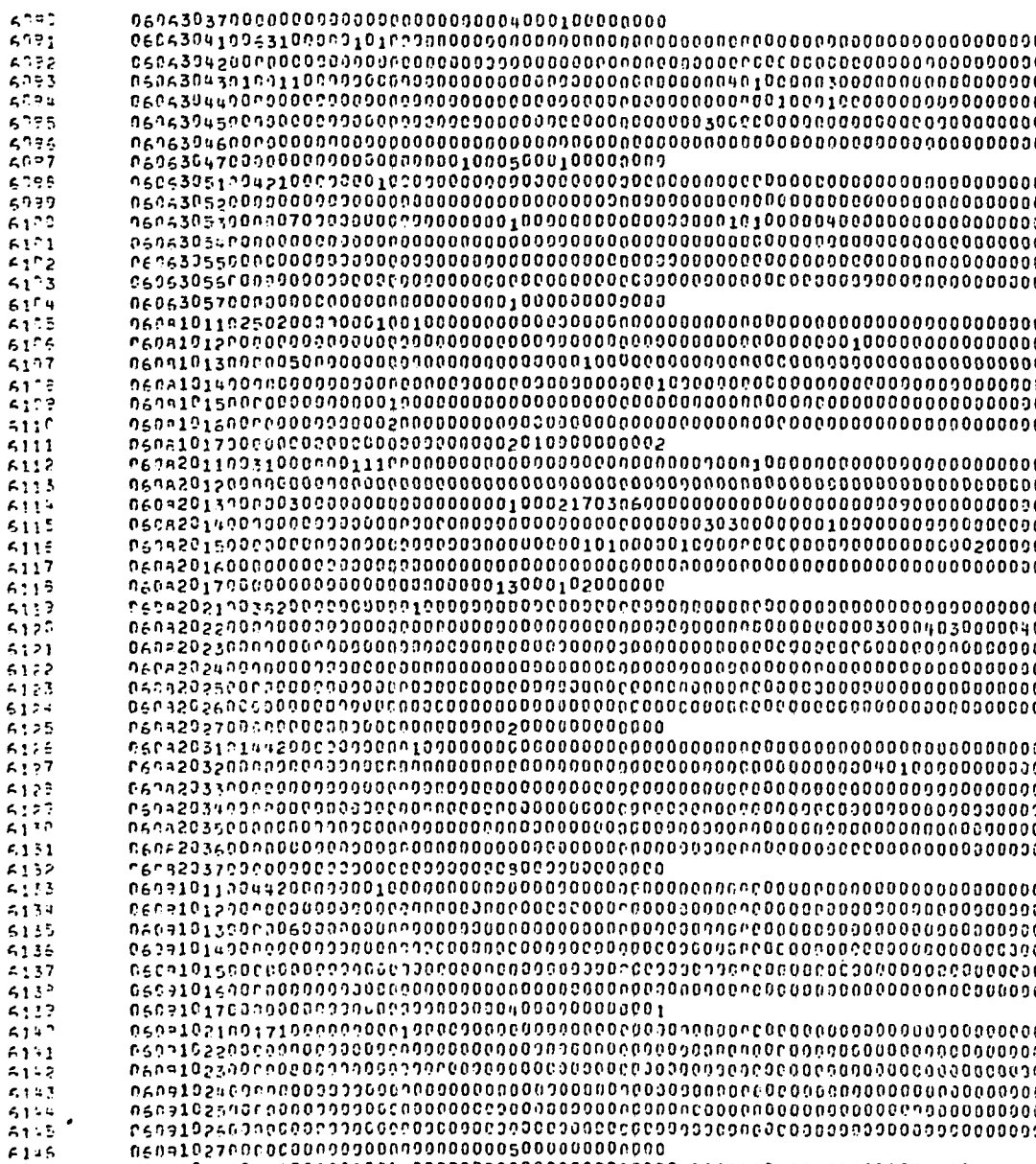

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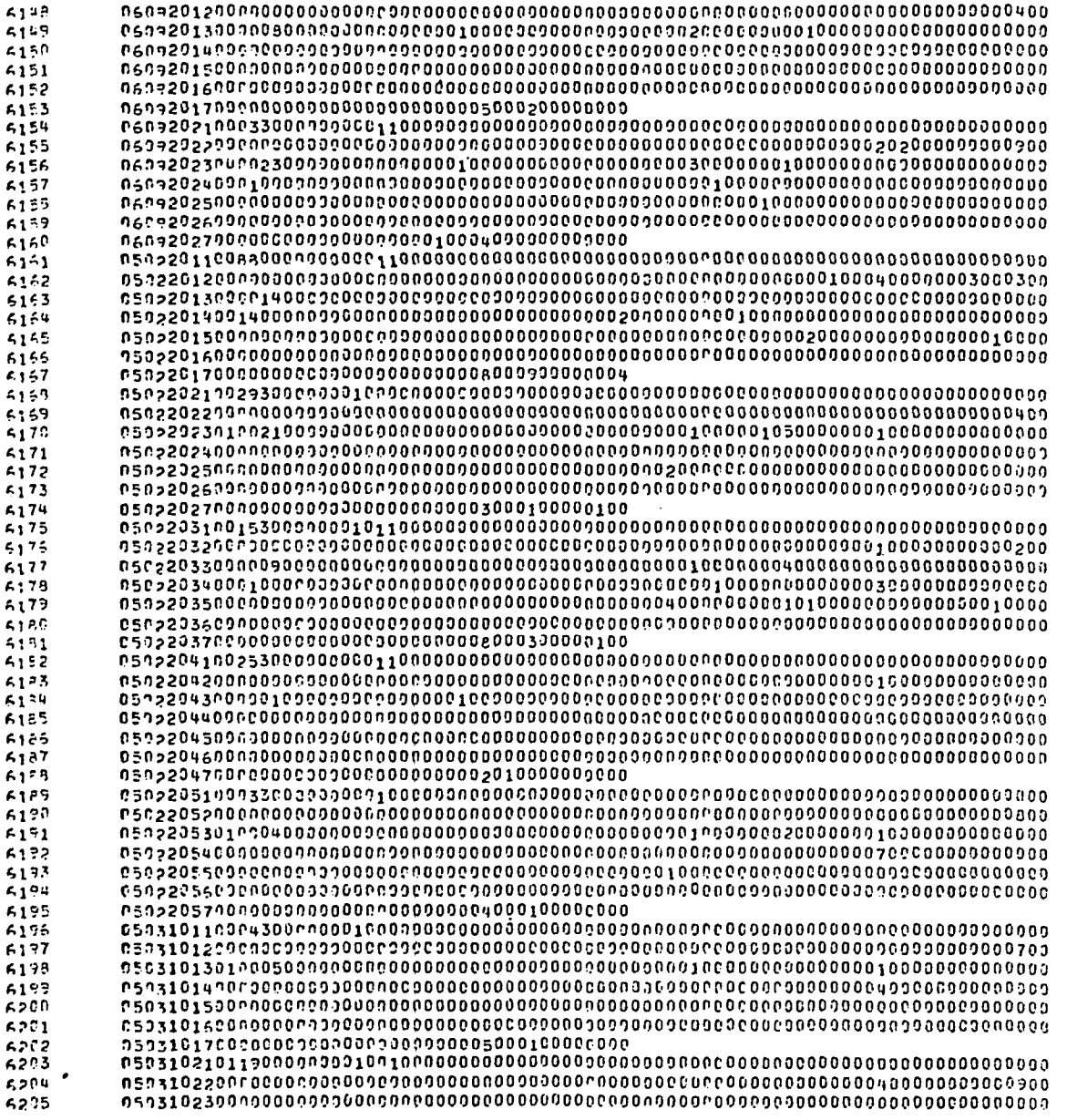

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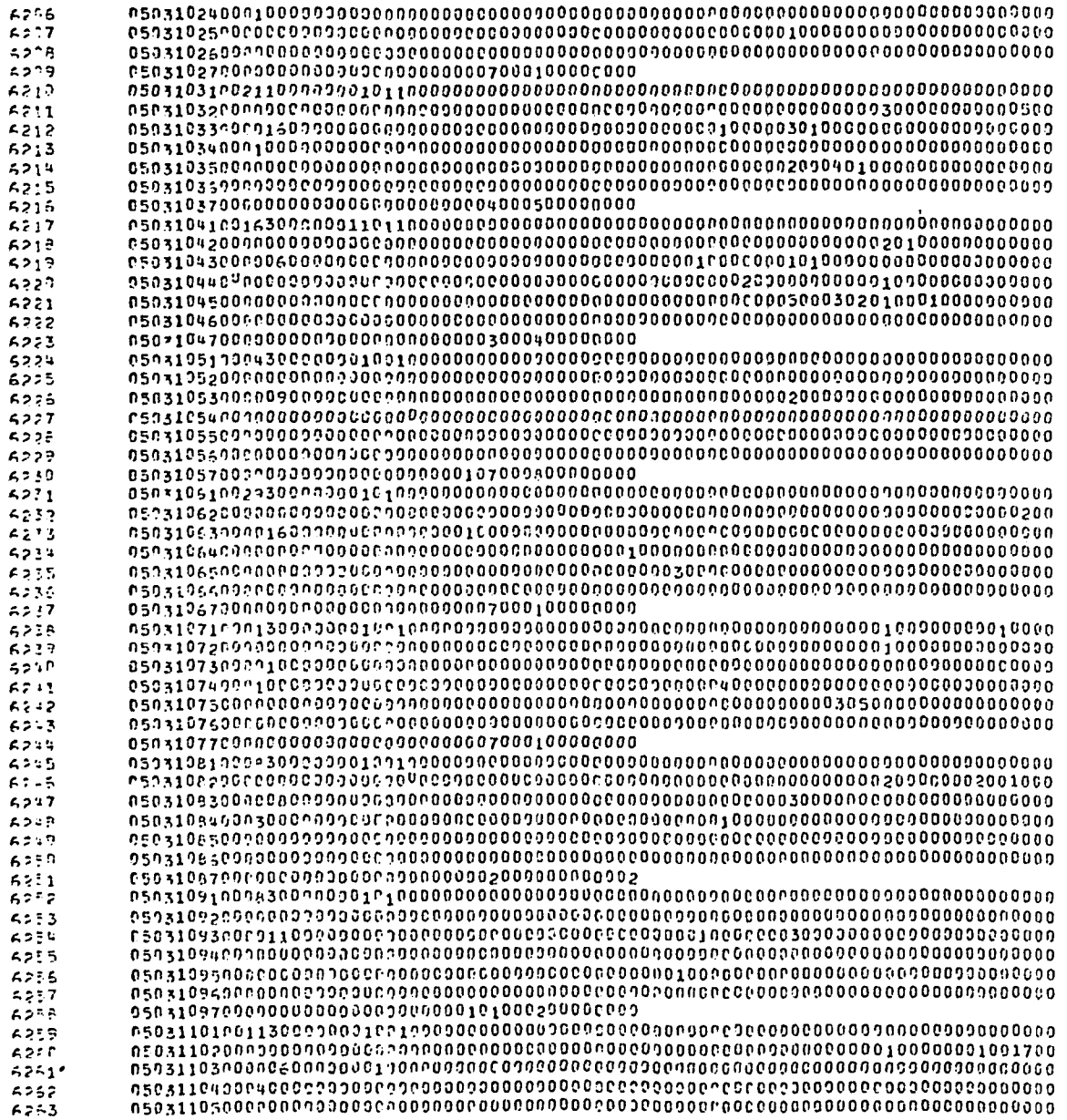

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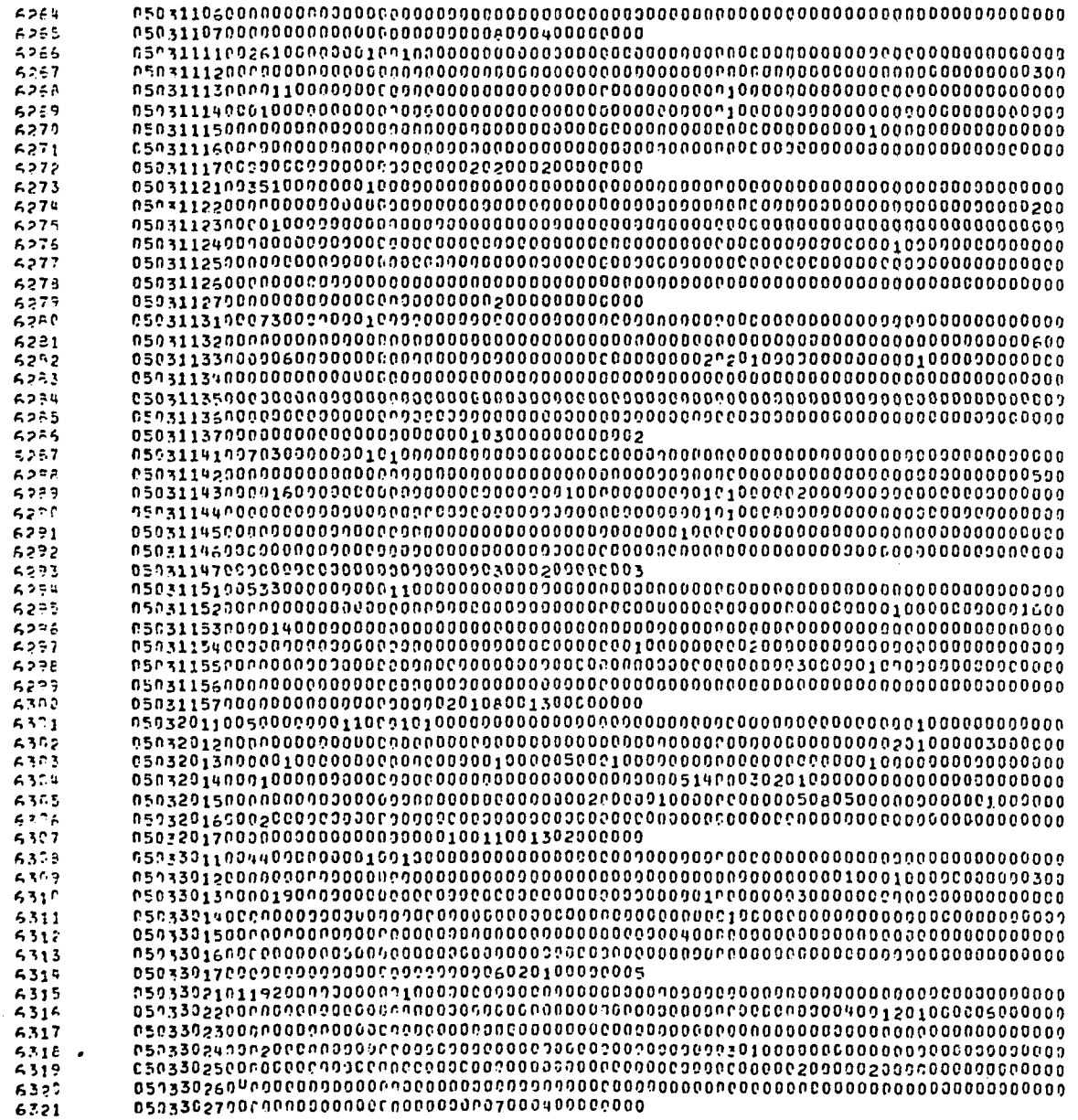

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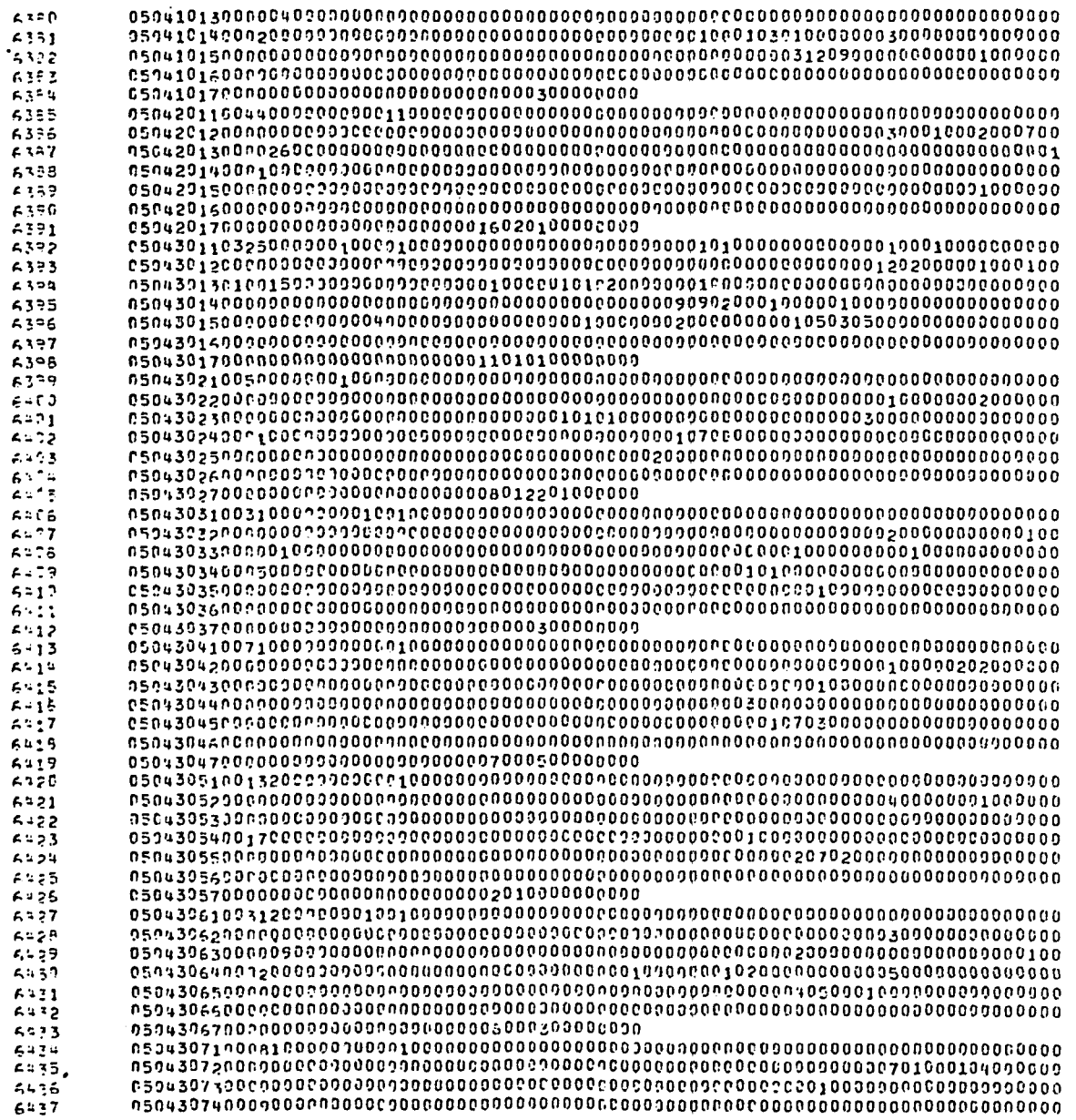

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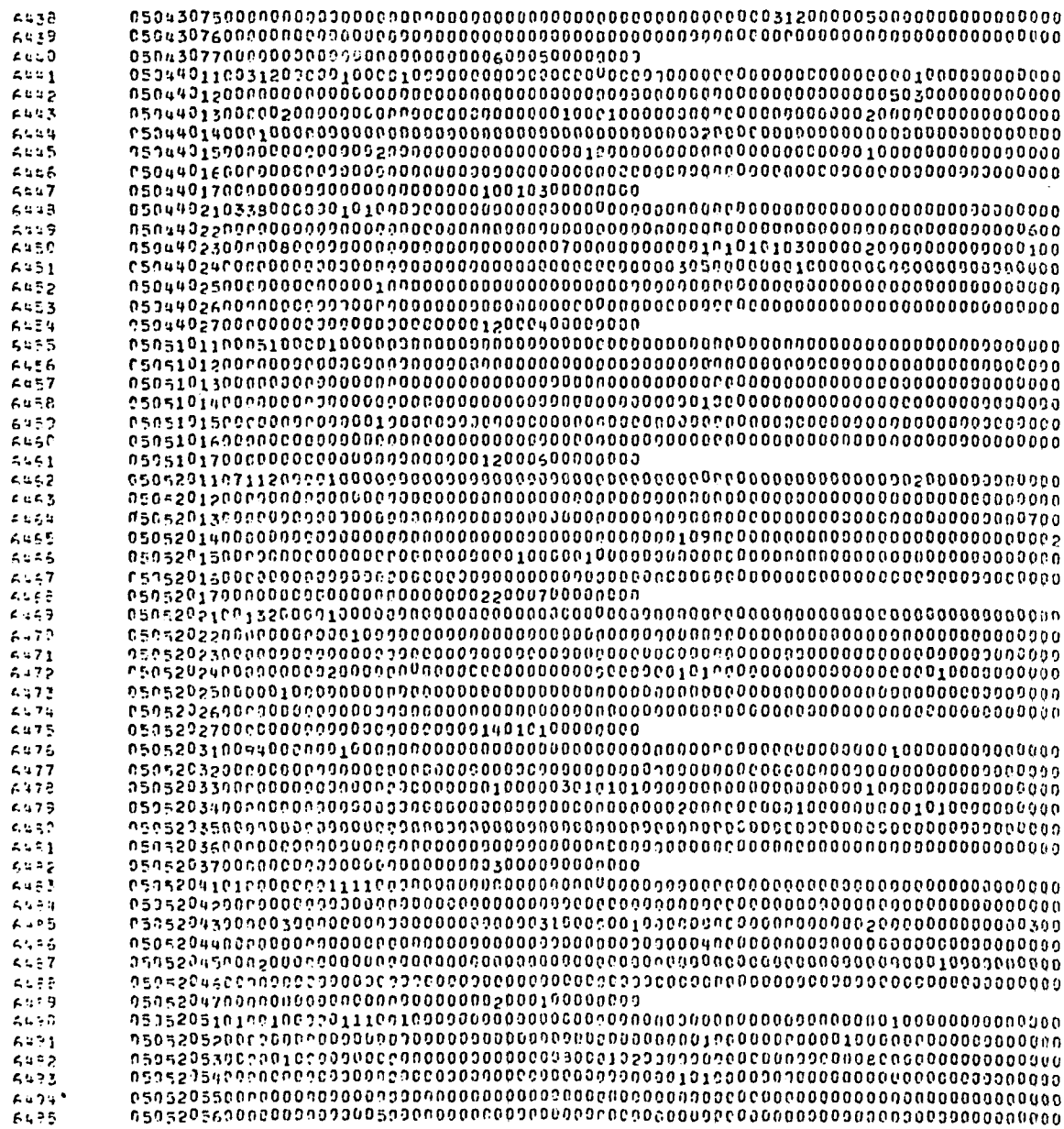

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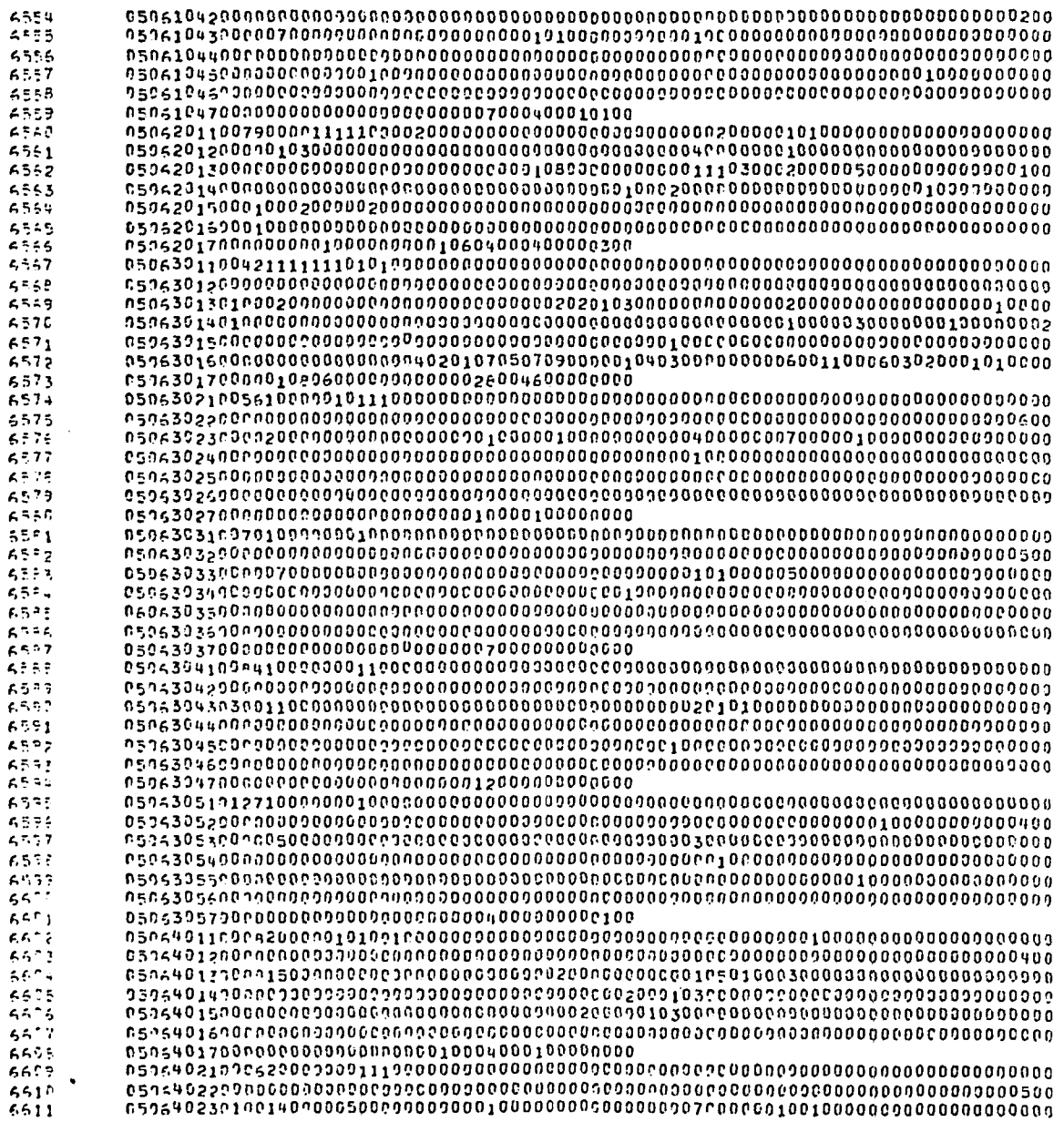

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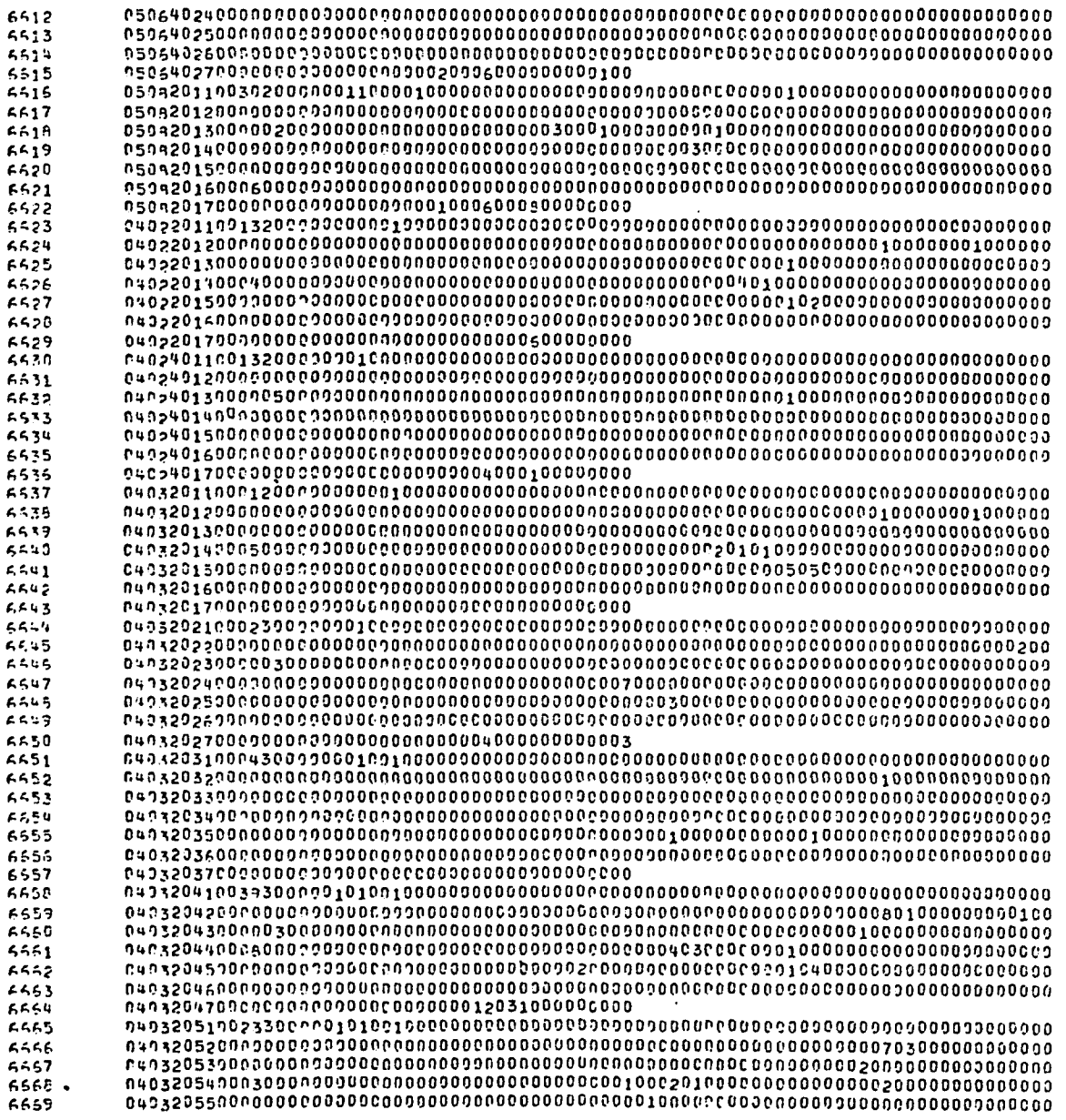

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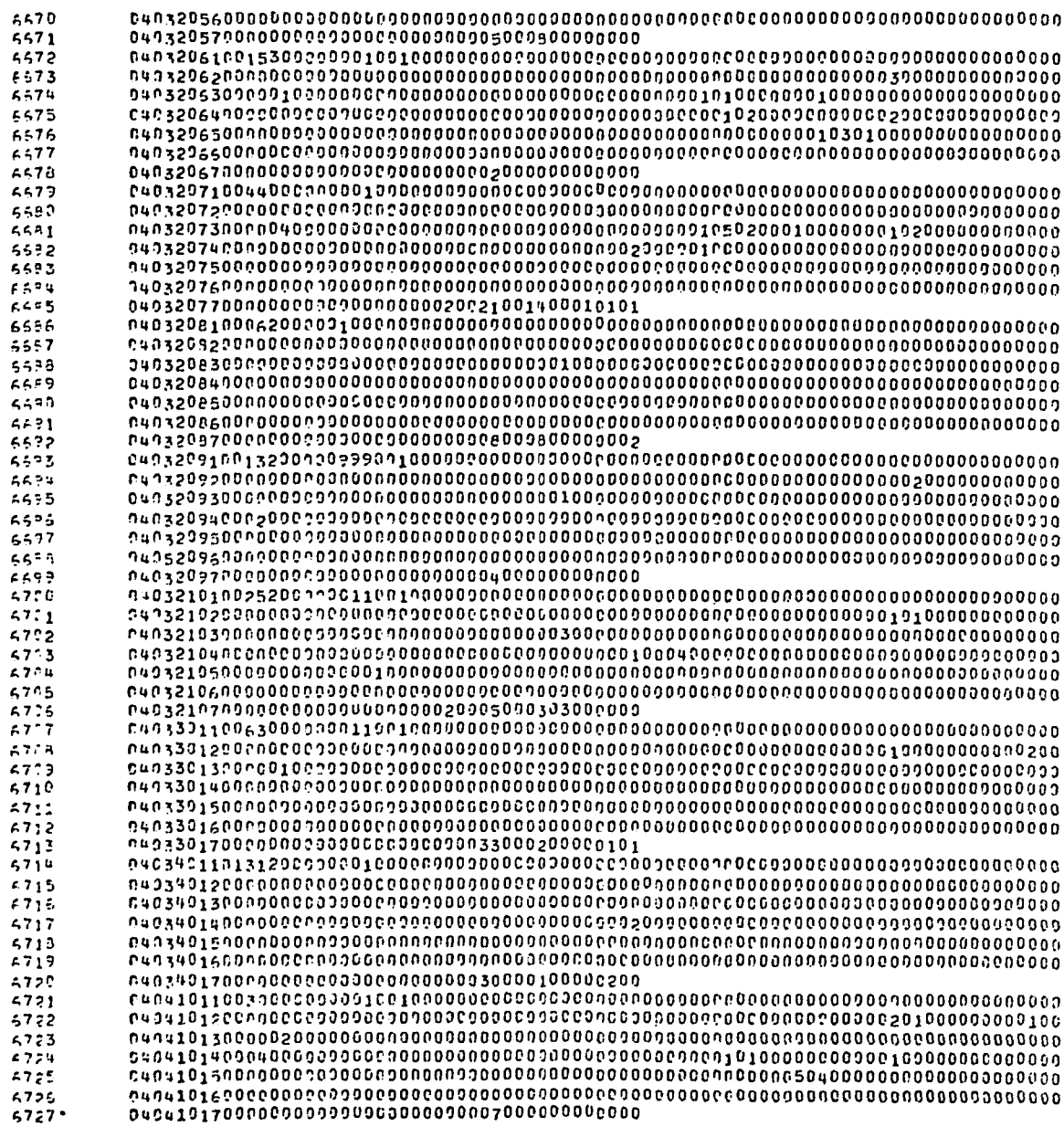

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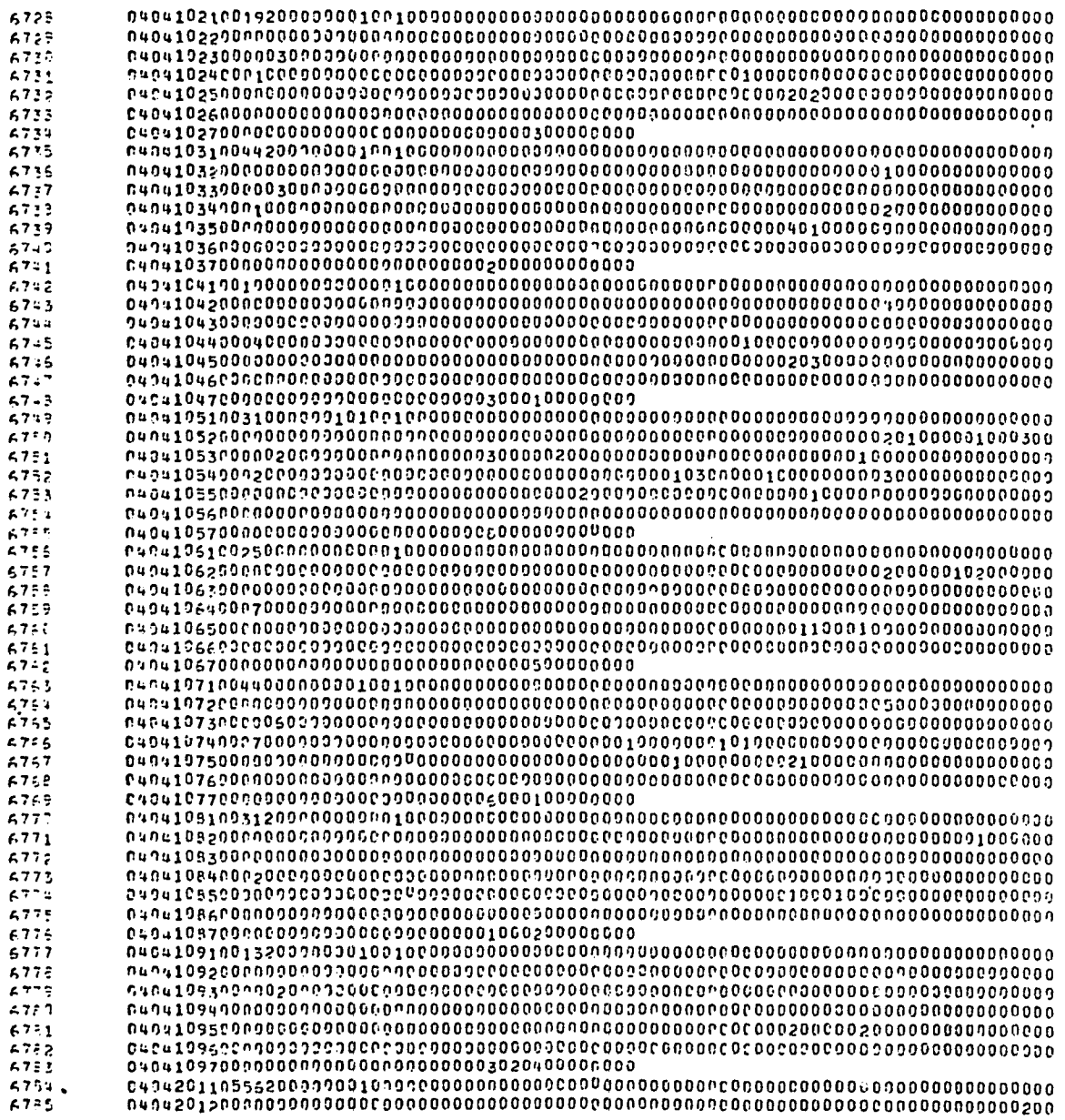

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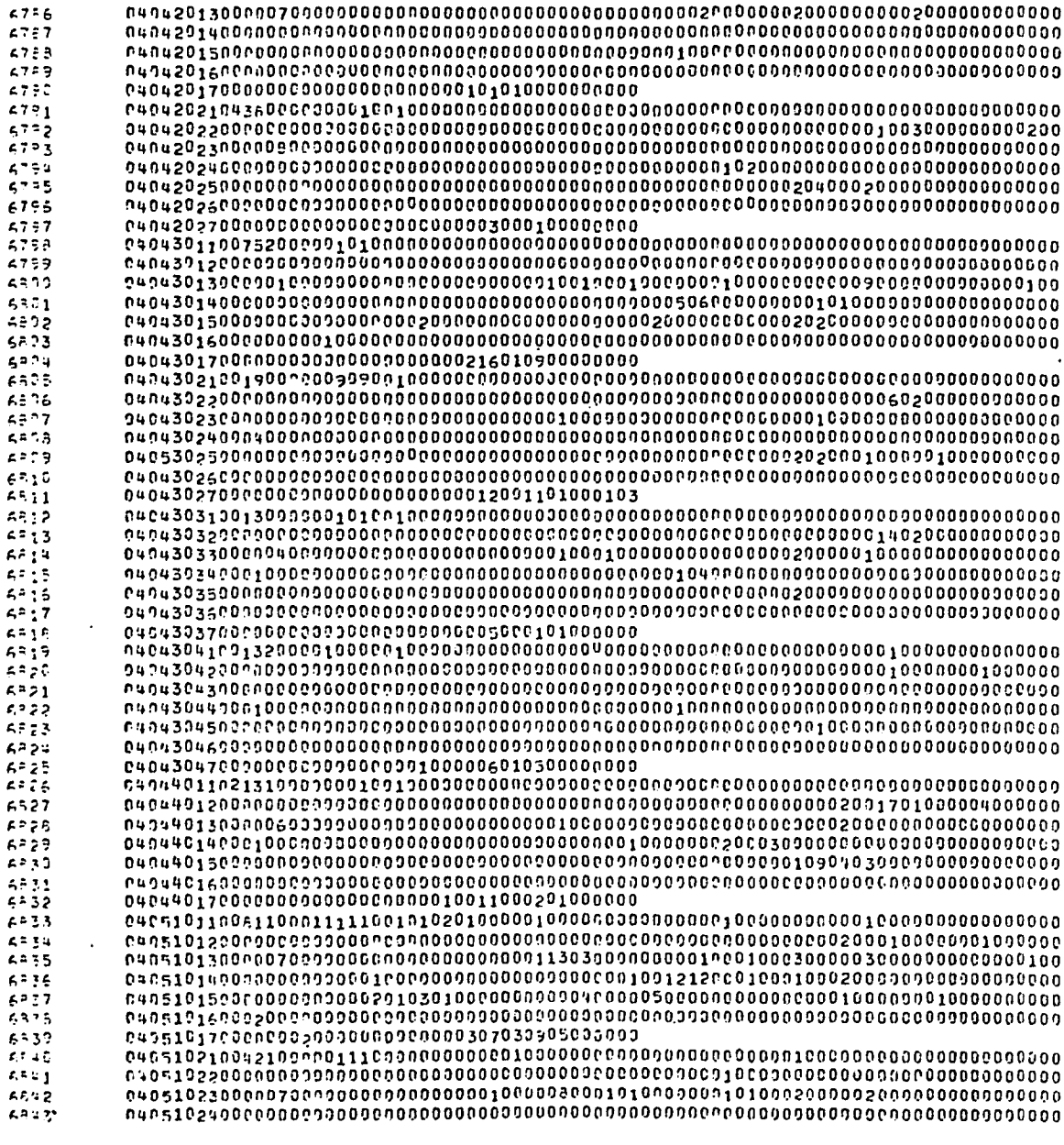

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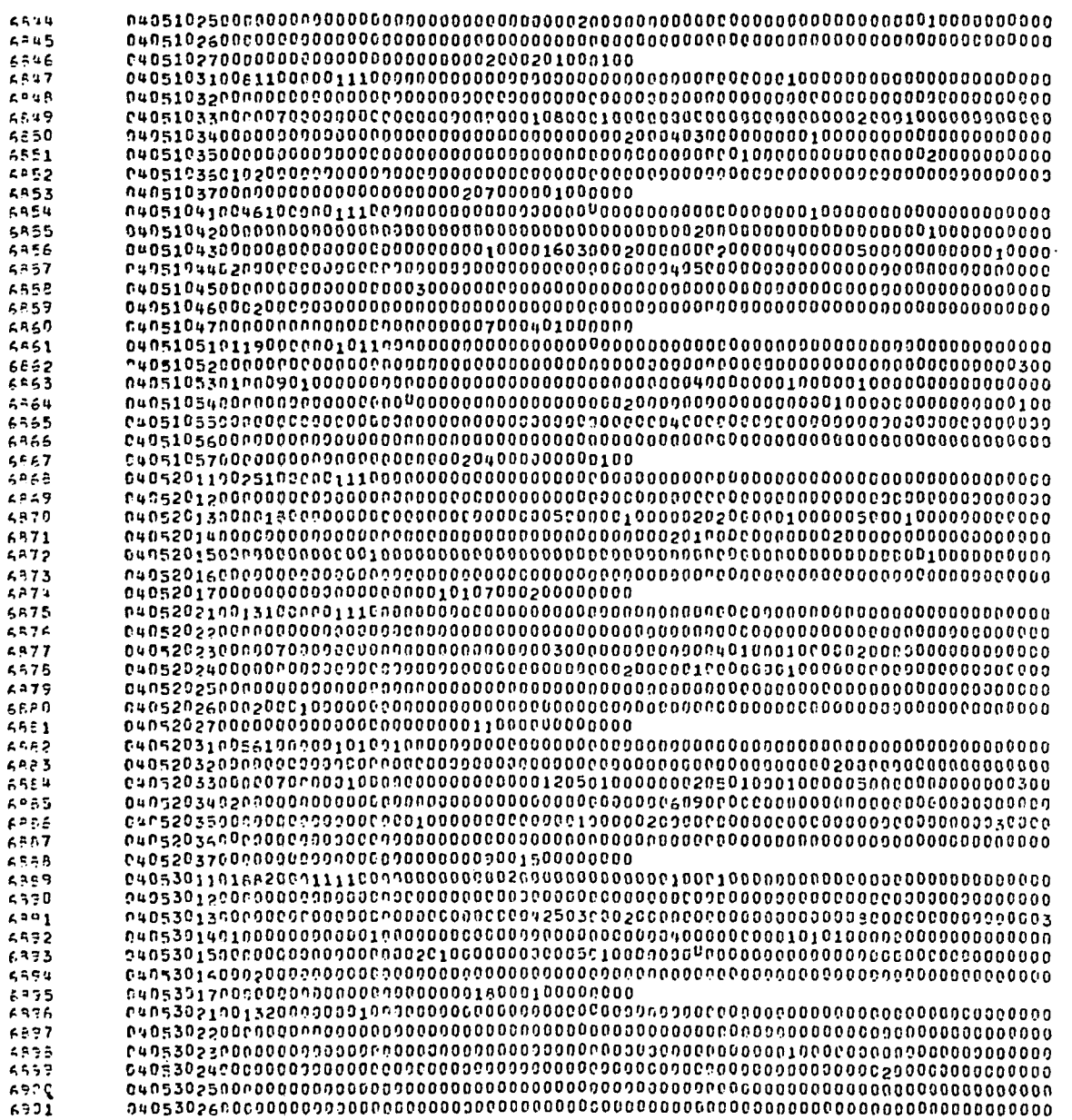

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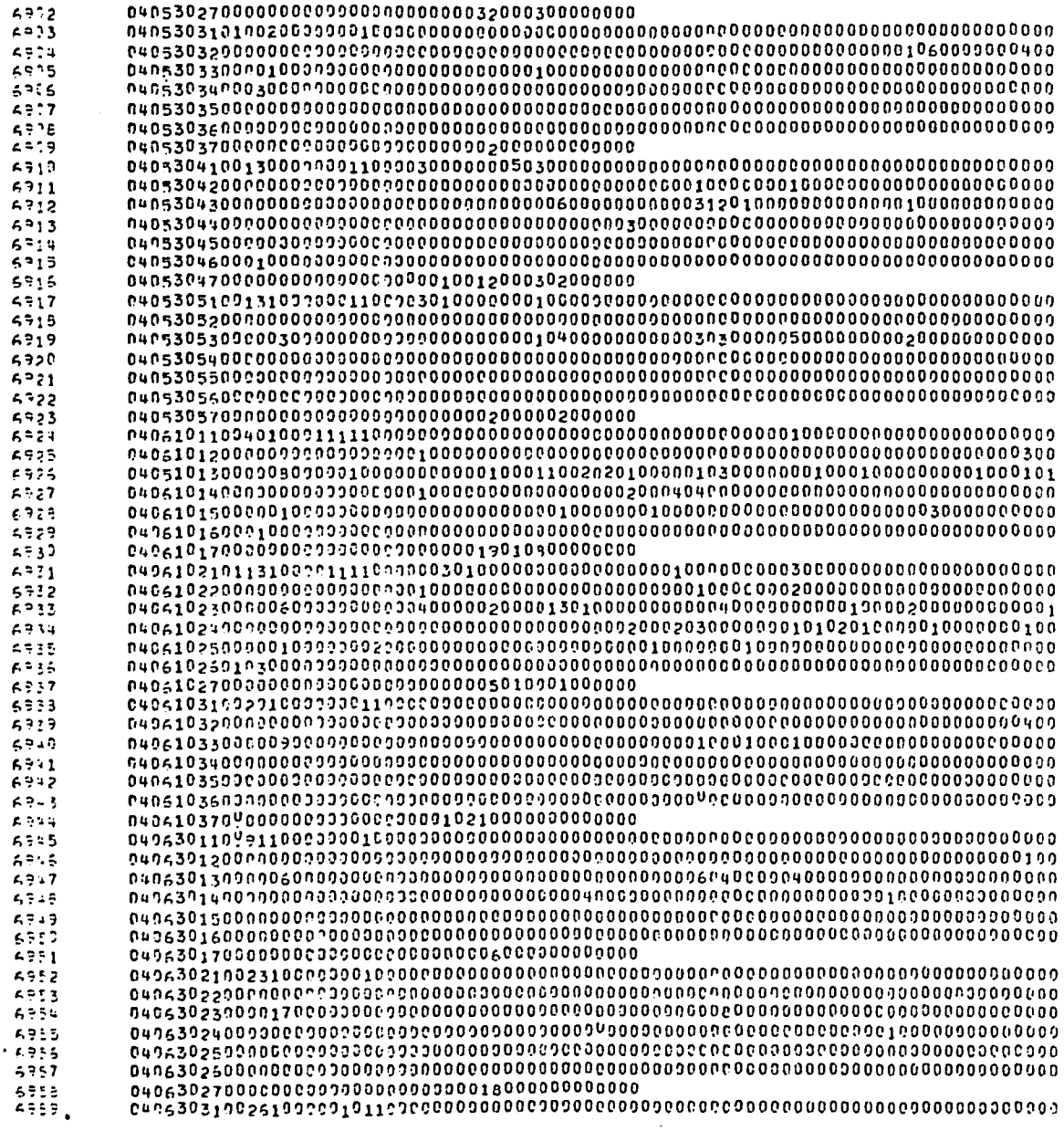

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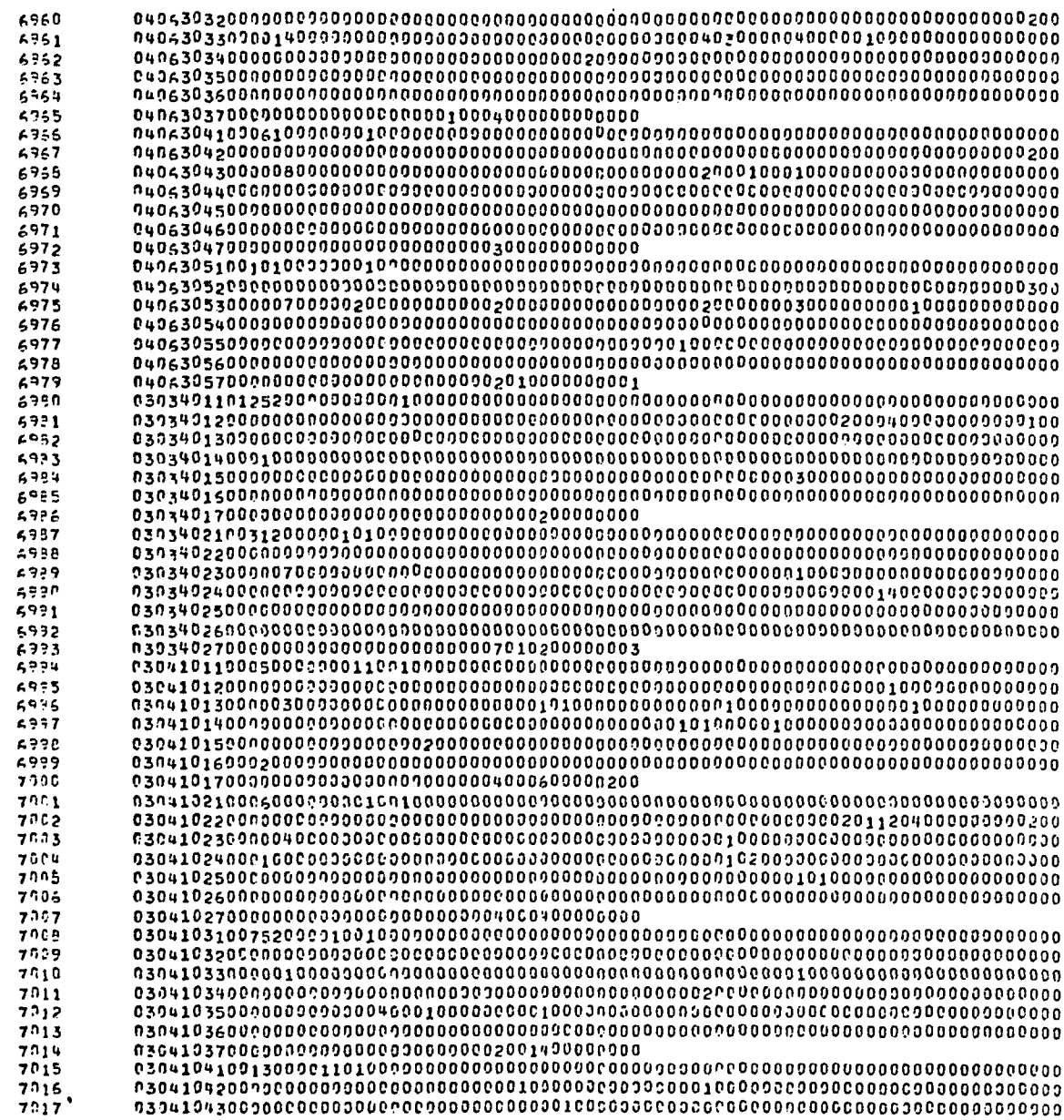

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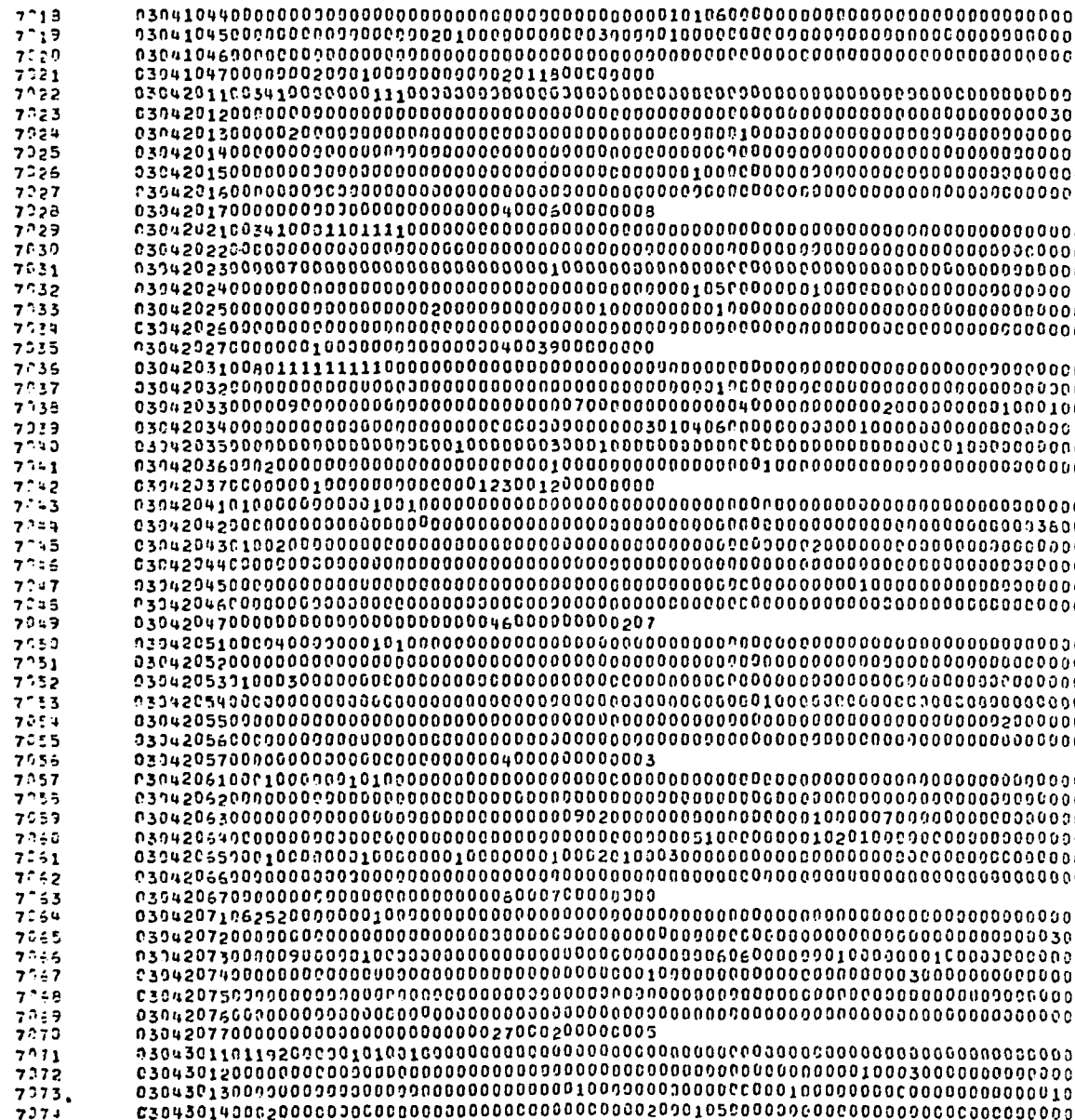

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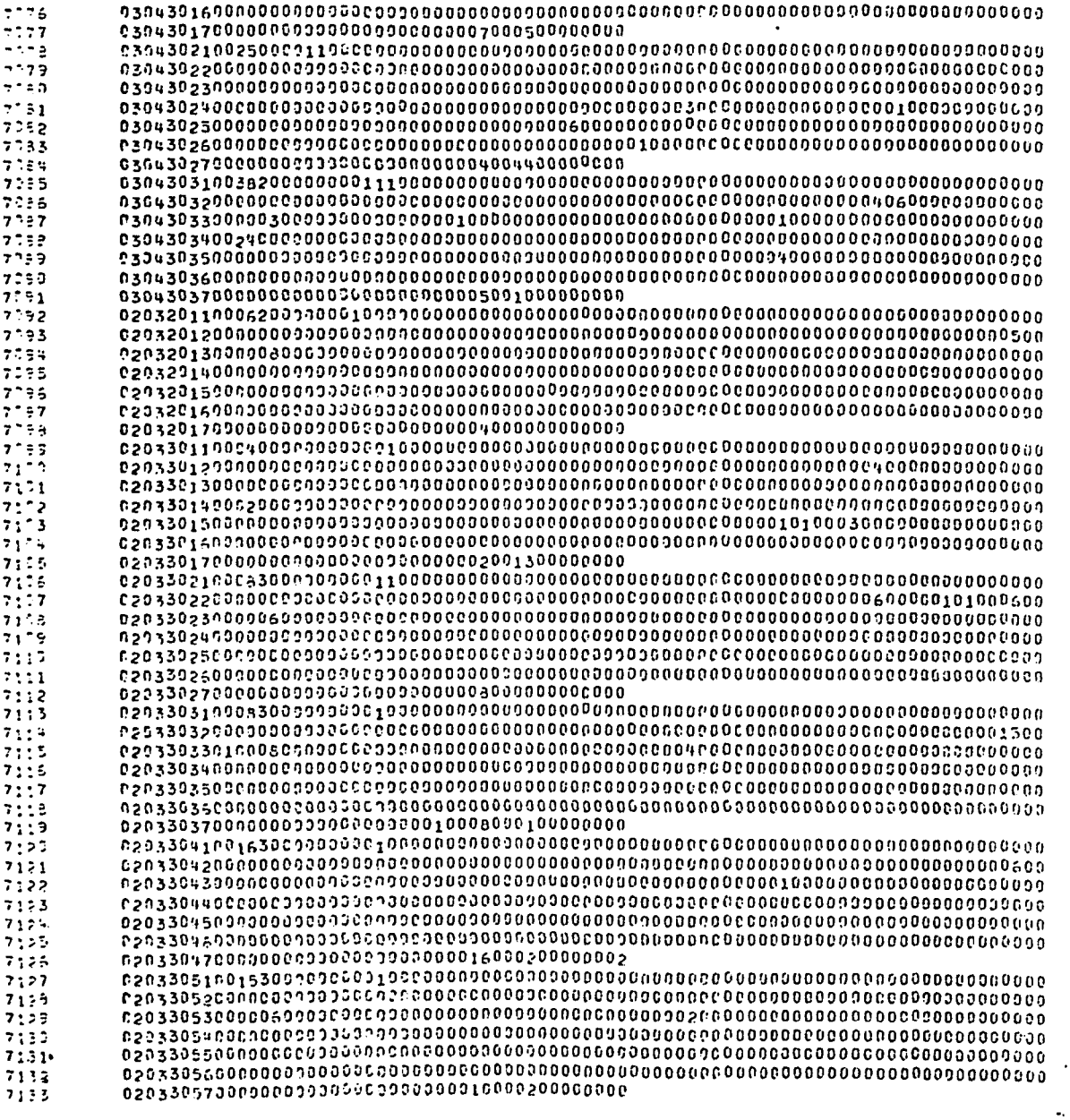

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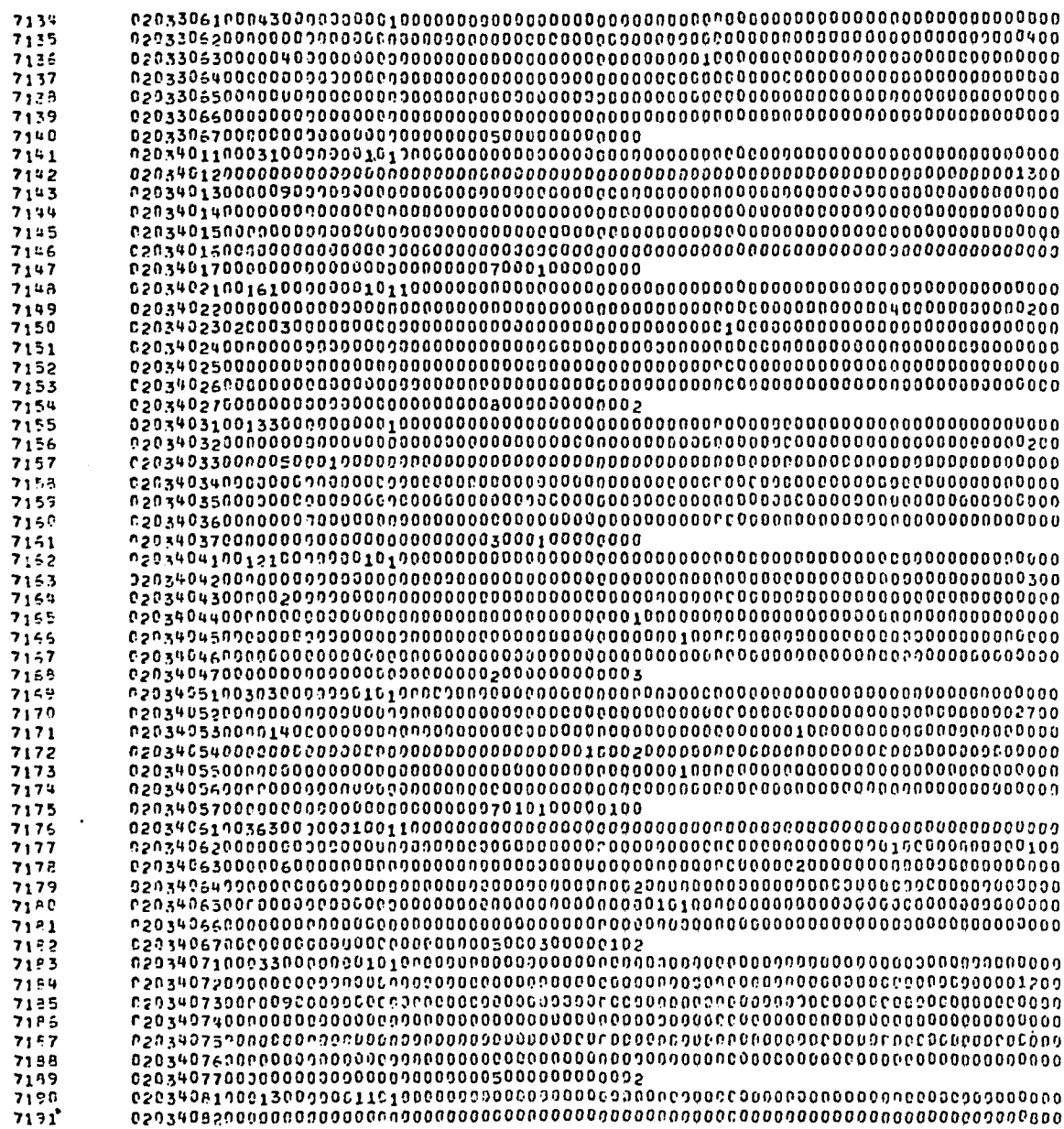

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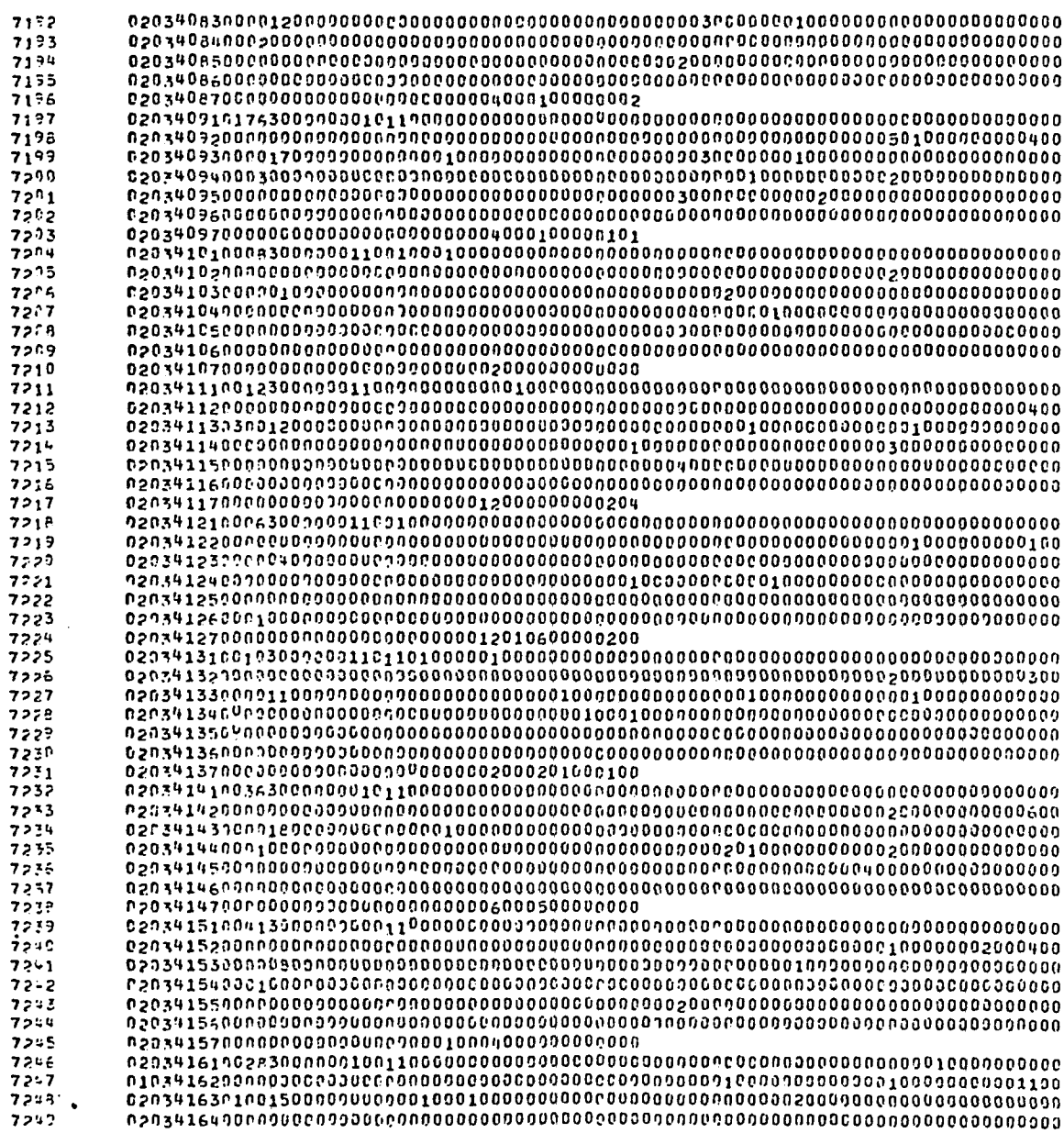

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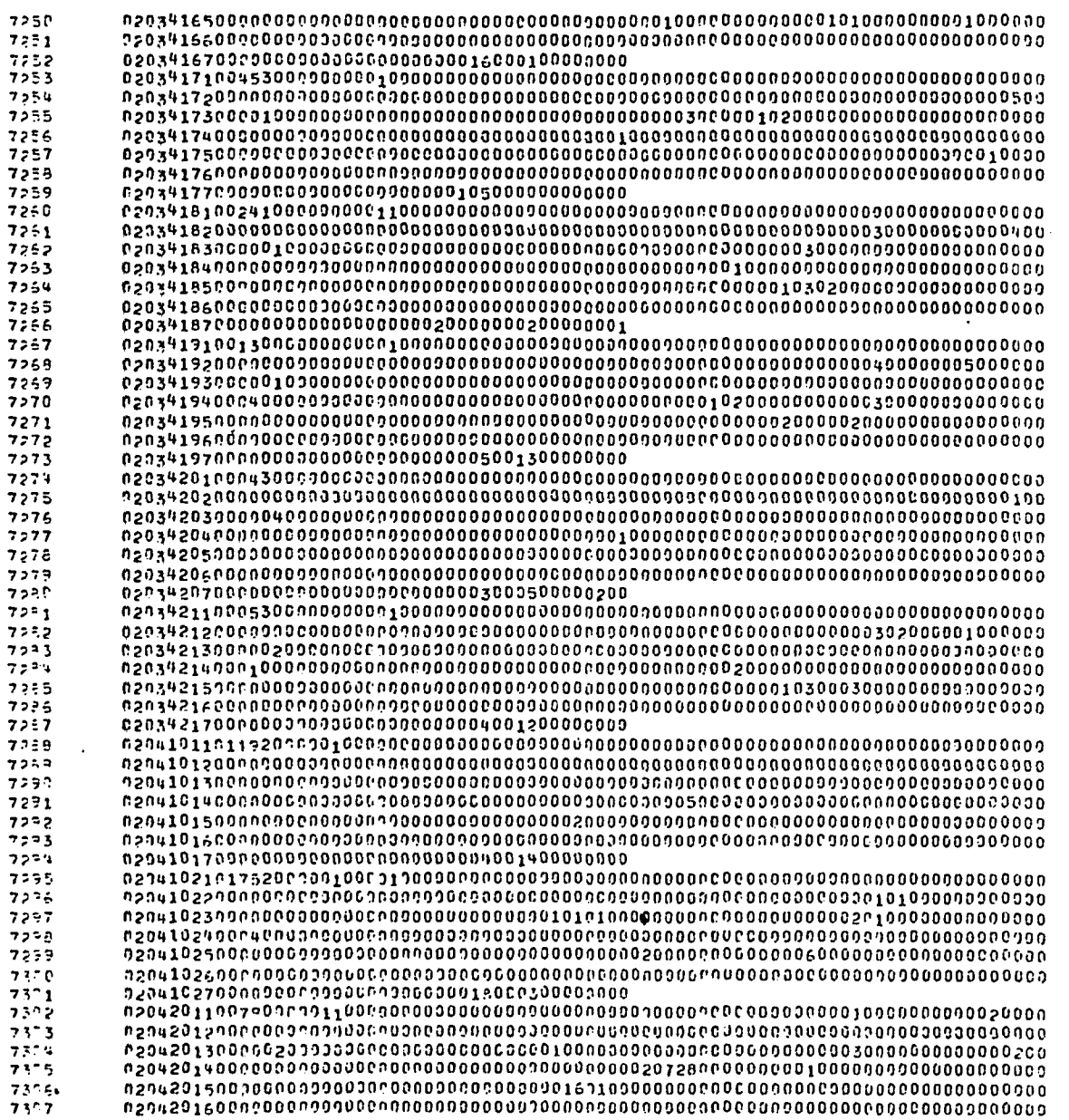

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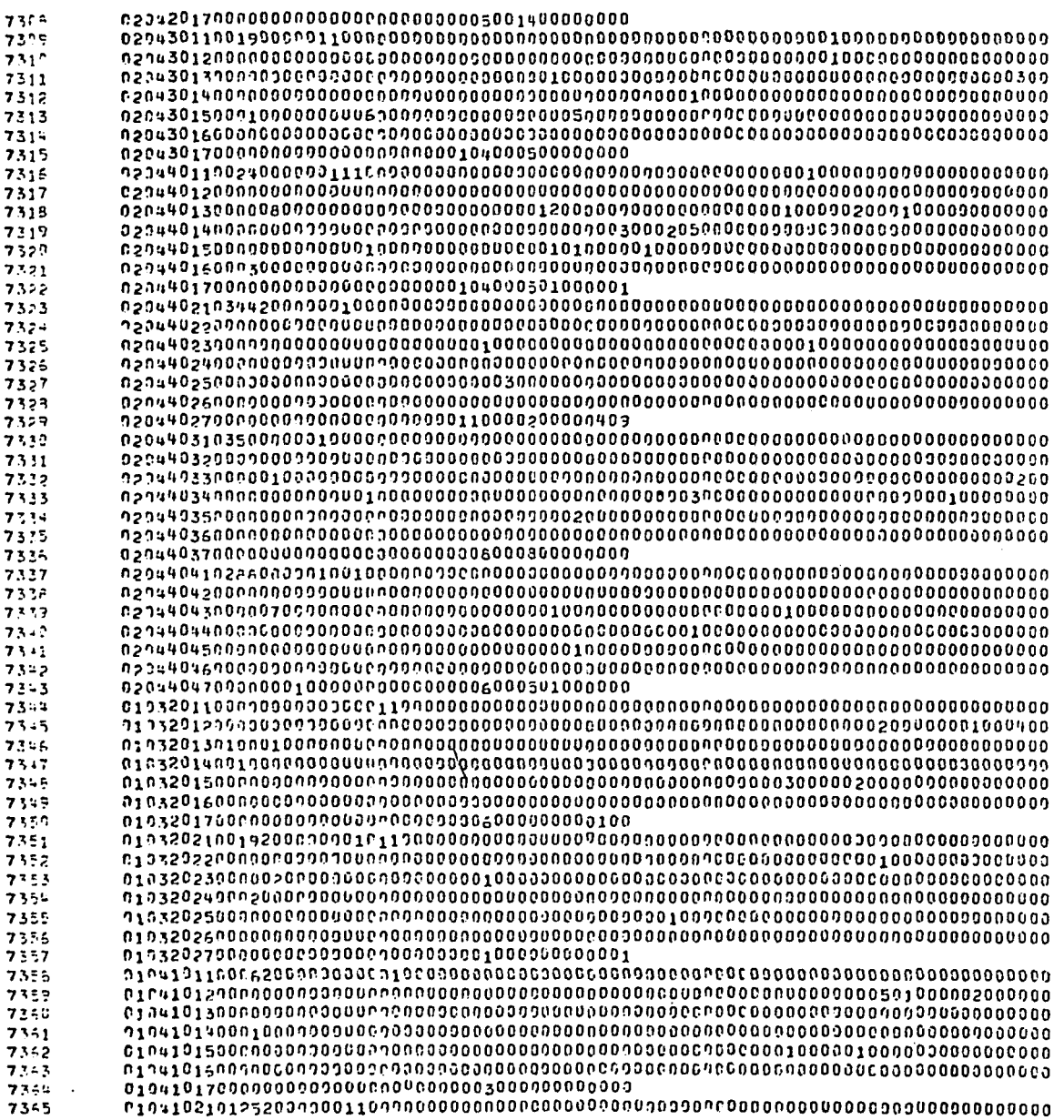

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