USF 2406X

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PALEO-ENVIRONMENTAL INTERPRETATION

of the

TIBBETT GARDENS PROJECT SITE

BRONX, NEW YORK

Final Report

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USF 2406X

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Data from 181 boreholes taken within and just beyond the boundaries of the proposed Tibbett Gardens Project site were examined (Fig. 1). The site is bounded on the north by West 230th Street, on the south by John F. Kennedy High School, on the west by Johnson and Irwin Avenues, and on the east by a roadway which serves as an access to the high school. The area studied (Fig. 1) is approximately 514,000 square feet. The bore-hole spacing and density within the study area allowed a detailed examination and interpretation of geologic and paleo-environmental conditions within the area of the site during the past 6,000 years. Ten of the boreholes were drilled in the Fall of 1986 by the Subsurface Exploration Section of the Bureau of Building Design of New York City's Department of General Services. Samples from these boreholes, although available, were not studied for this report. These sites are shown on Figure 1 and are labeled 5xx. The remaining boreholes taken prior to the construction of John F. Kennedy High School in the late 1960's. Samples from these boreholes are no longer available. The datum used for elevation and depth determinations on the various borehole logs were those of the Boroughs of the Bronx and Manhattan, 2.601 and 2.750 feet, respectively, above mean sea level at Sandy Hook, New Jersey. Since the vast majority of boreholes (171) used the Borough of

Manhattan datum, it was adopted for this report. This report presents the geologic observations and paleo-environmental interpretations of this writer.

The overall stratigraphy indicated on the logs for most of the boreholes is very similar. Although varying in thickness and/or depth, the general stratigraphic sequence displayed in the boreholes consisted of bedrock, overlain by sand of varying texture (grain size), overlain by organic silt and/or peat. In some boreholes the sand, organic silt, and peat layers were often interbedded and repeated. Shells were found primarily in the organic silt, although they were also reported in sand layers lying immediately below the organic silt. Similar stratigraphic sequences are found in the Hudson River valley to the west. The entire sequence was overlain by various types of fill materials.

The bedrock rock reported in the boreholes was either marble (Inwood Marble), gneiss (Fordham Gneiss), or quartzite (Lowery Quartzite). These rock units were, in some instances, misidentified on the borehole logs as limestone, schist, and sandstone, respectively. A brown sand unit lying immediately above the bedrock often contained gravel, boulders, and silt. It is believed to be till, an unstratified glacial deposit laid down during the retreat of ice from the New York City area over 18,000 years ago. In some of the boreholes a gray sand is reported overlying the till. Shells and shell fragments, often

described on the logs as "seashells", are reported from some of these sands as well as the overlying organic silt. These sands may be estuarine (tidal) in origin. It is also quiet possible that they represent fluvial (riverine) conditions. Either condition is possible knowing the recent (pre-fill) history of the Tibbett Gardens site and the surrounding environs. The organic silt deposits are found above most of the sand units indicated in the borehole logs. This material is most likely estuarine in origin and appears to be similar to organic silt currently being deposited in the estuarine portion of the Hudson River as well as the overall sediment that was at the site prior to landfilling. Peat was reported at several of the borehole locations. Although it was not examined, the peat is believed to be of a tidal nature and developed at those locales that were within the tidal range of the shoreline of the estuarine (tidal) portion of Tibbett's Brook or shallow areas (knolls) within the estuary itself. For paleo-environmental purposes, it was assumed that the presence of organic silt, peat, or gray sand containing shells represents former estuarine (tidal) conditions and thusly "wet" areas. The presence of till (brown sand) or bedrock indicates those terranes that would have been above mean high tide and thusly were normally "dry".

The fill, which is the highest stratigraphic unit, is presently found covering the surface at the project site. It is

primarily demolition debris, consisting of brick, concrete and wood, mixed with boulders, sand, and mud. It varies in thickness from 2 feet to 33 feet and is generally thickest in the eastern part of the site. Figure 2 is an isopach map showing the varying thickness of the fill material.

In order to interpret the paleo-environmental conditions that existed at the site several "paleo-geologic" maps were constructed for the project site at various depths or positions below the present surface. The first, Figure 3, displays the distribution of the geologic units immediately below the fill. It is a geologic map of the study area, based on the borehole data, with the fill stripped away. The map correlates very closely to pre-fill maps of the site and in a general fashion, indicates where the dry or land areas, and wet or tidal/estuarine areas were located. Figures 4, 5, and 6 are maps drawn at -10, -20, and -30 feet, respectively, below the datum. These levels were chosen because they correspond very closely to sea level (mean tide) positions at 2000 years B.P. (Before Present), 4000 years B.P., and 6000 years B.P. The depths to these levels and their respective ages are well established for the New York City area (Figure 7). These depth "slices" are basically horizontal cross-sections and do not display water depth or the topographic surface above the mean high tide level. The "maps" are to be used to determine the location of sites above mean tide level that may have been

occupied or used and thusly could be considered archaeologically sensitive.

In sequentially viewing figures 3 to 6, one is observing the project site at four distinct time periods. It is quite obvious that the amount of area covered by estuarine conditions diminishes with time. The continued spread (transgression) of estuarine conditions over the 6000 year period illustrated on the maps corresponds with the flooding of the coastal regions of New York City following the world-wide melting of glacial ice. Thusly, the estuarine area becomes smaller and more restricted with time. At the -10 feet or 2000 years B.P. level (Fig. 4), those areas displaying sand or bedrock should be considered as being possible archaeologically sensitive locations. These would include the northwest, southwest, and southeast corners of the site. At the -20 feet or 4000 years B.P. horizon (Fig. 5), the estuarine area becomes restricted and the presence of a narrow sandy beach or shore extending along the western side of the ancient tidal inlet is observable. In addition, a wide beach area was present in the southwestern portion of the site. Again the sandy/bedrock areas should be considered potentially sensitive locales. Finally, at the -30 feet or 6000 year B.P. elevation (Fig. 6), estuarine or tidal conditons are very restricted. This small embayment was most likely surrounded by sandy beach, bedrock, or tidal swamp environments. It is very important to note that Figures 4, 5 and 6 represent horizontal

slices through the project site. Thusly where bedrock is illustrated on the maps, sand (till) was probably present at the surface for the time period of each map. The till is at least 18000 years old and would have been exposed at those sites where it is reported in the borehole logs lying above the bedrock. Therefore the extent of any sandy shore or beach areas was probably greater than displayed on these figures.

On the basis of this report, it appears that the western and southeastern portions of the Tibbett Gardens project site could have provided hospitable locations to Indian inhabitants of the area. The sandy beaches, along the banks of the estuarine or tidal inlet that pre-dated Tibbett's Brook, were sheltered by the tall bedrock exposures to the east and west of the site (Marble Hill and Riverdale, respectively). Access to the Hudson River, to the west, and Long Island Sound, to the east, would have been easy to accomplish via the estuarine water body that existed in the project site area.

FIGURES

Figure 1. Map showing the location of boreholes within the Tibbett Garden project site.

Figure 2. Isopach map of the fill material at the Tibbett Garden Project site. Contour interval equals 5 feet.

Figure 3. Paleo-geologic map of the lithogic and sedimentary units immediately below the fill material.

Figure 4. Paleo-geologic map (horizontal cross-section) at the -10 feet or 2000 year B.P. level. Sediments immediately below the fill are also shown.

Figure 5. Paleo-geologic map (horizontal cross-section) at the -20 feet or 4000 year B.P. level. Sediments immediately below the fill are also shown.

Figure 6. Paleo-geologic map (horizontal cross-section) at the -30 feet or 6000 year B.P. level.

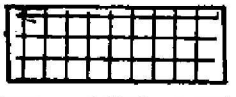
Figure 7. Sea-level curve for the New York Metropolitan area.

LEGEND

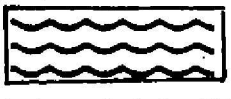
Datum: Borough of Manhattan. 2.750 feet above mean sea level at Sandy Hook, New Jersey.

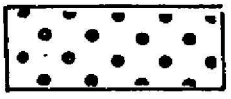
Scale: 1 inch = 60 feet

Lithologic symbols


Fill


Peat


Organic silt or gray sand with shells


Till or brown sand


Bedrock

FIGURE 1

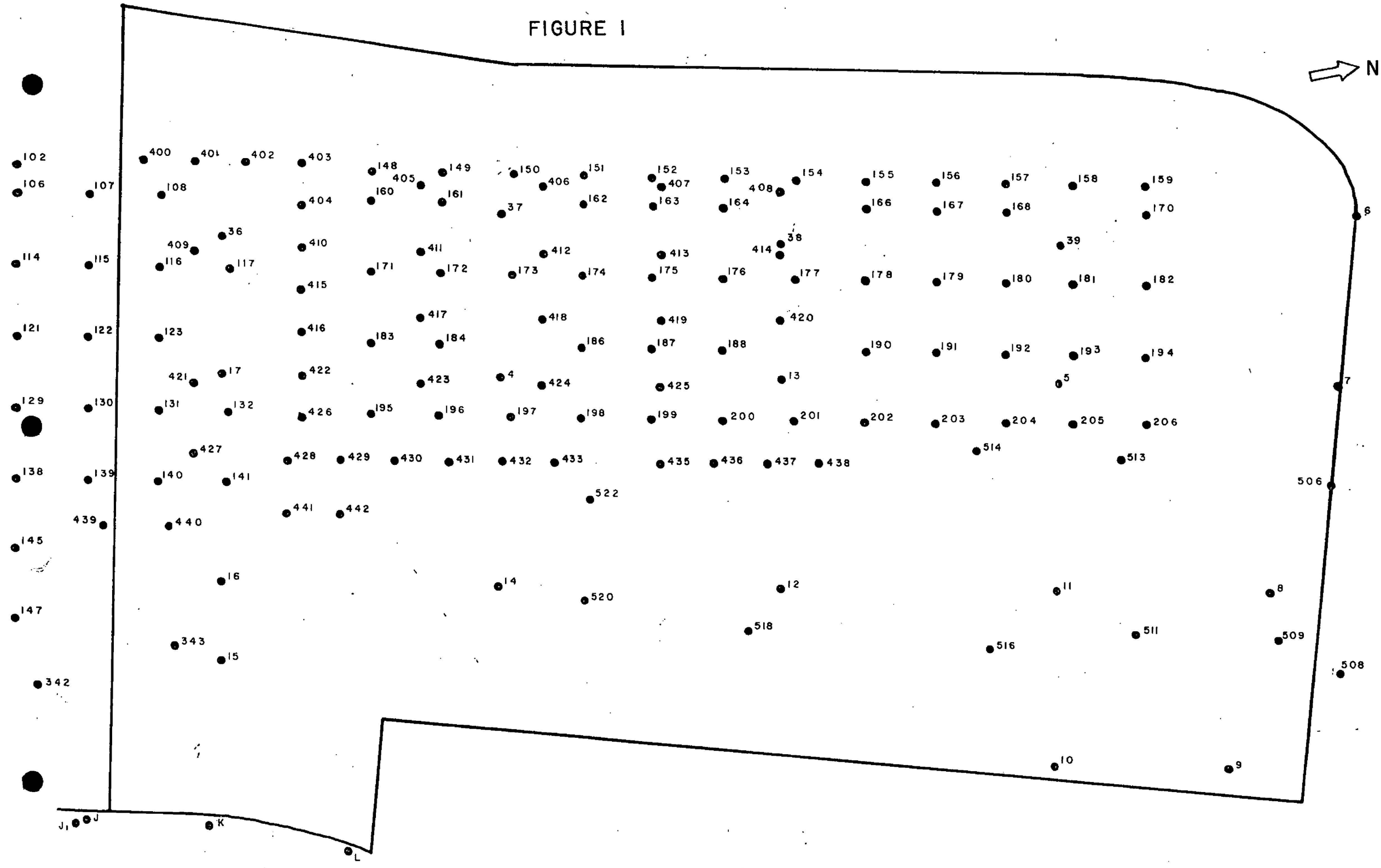

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FIGURE 2

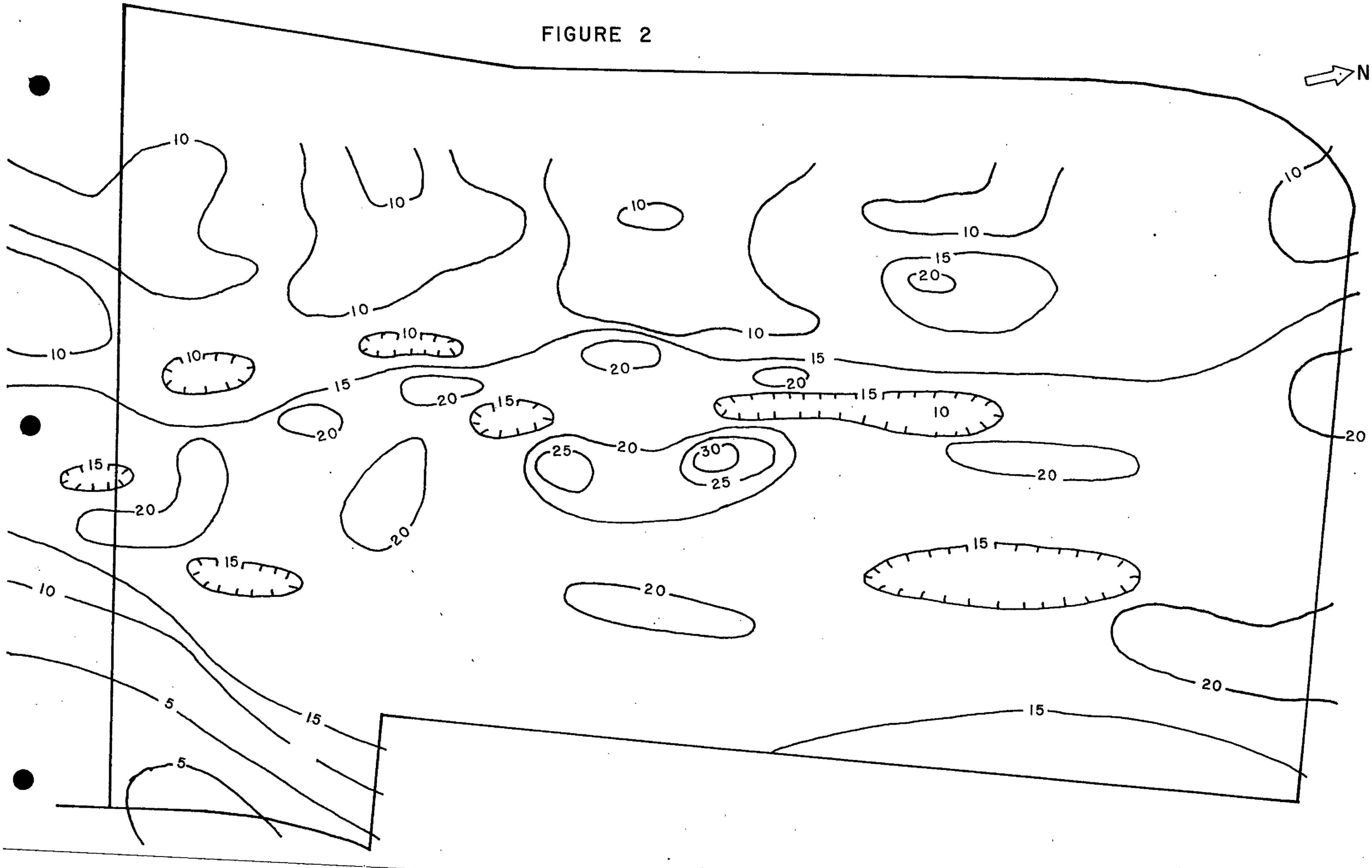
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FIGURE 3

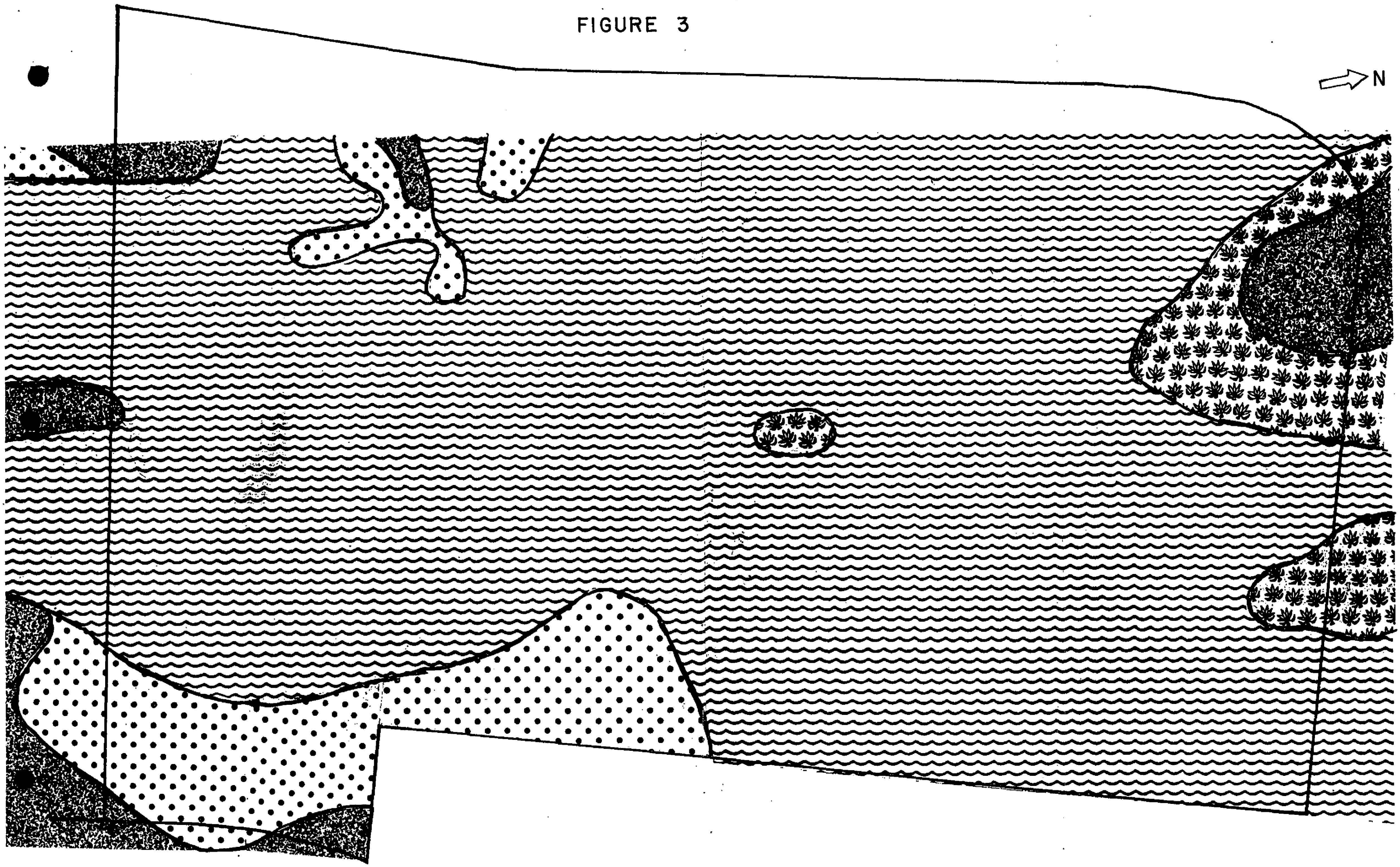


FIGURE 4

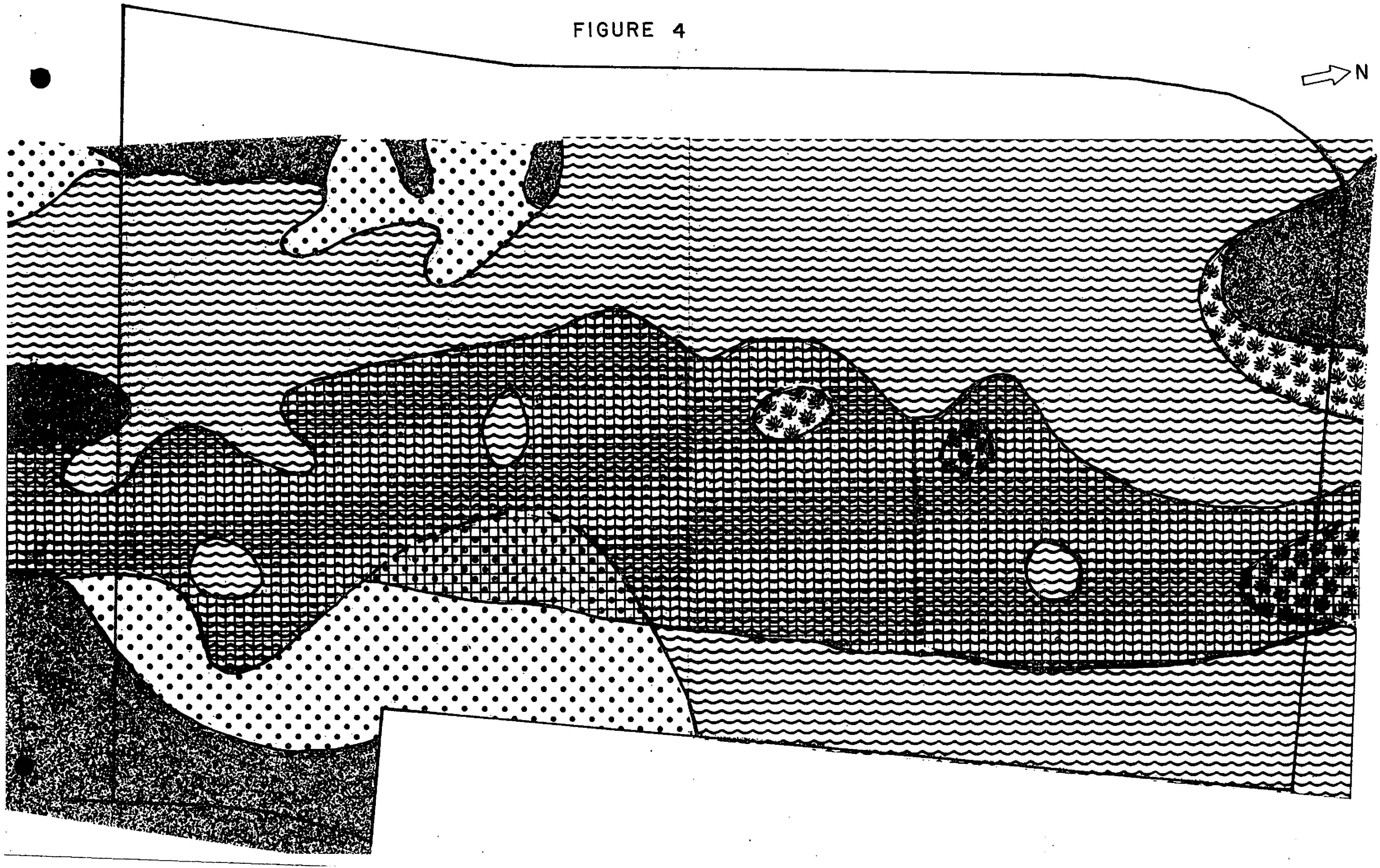


FIGURE 5

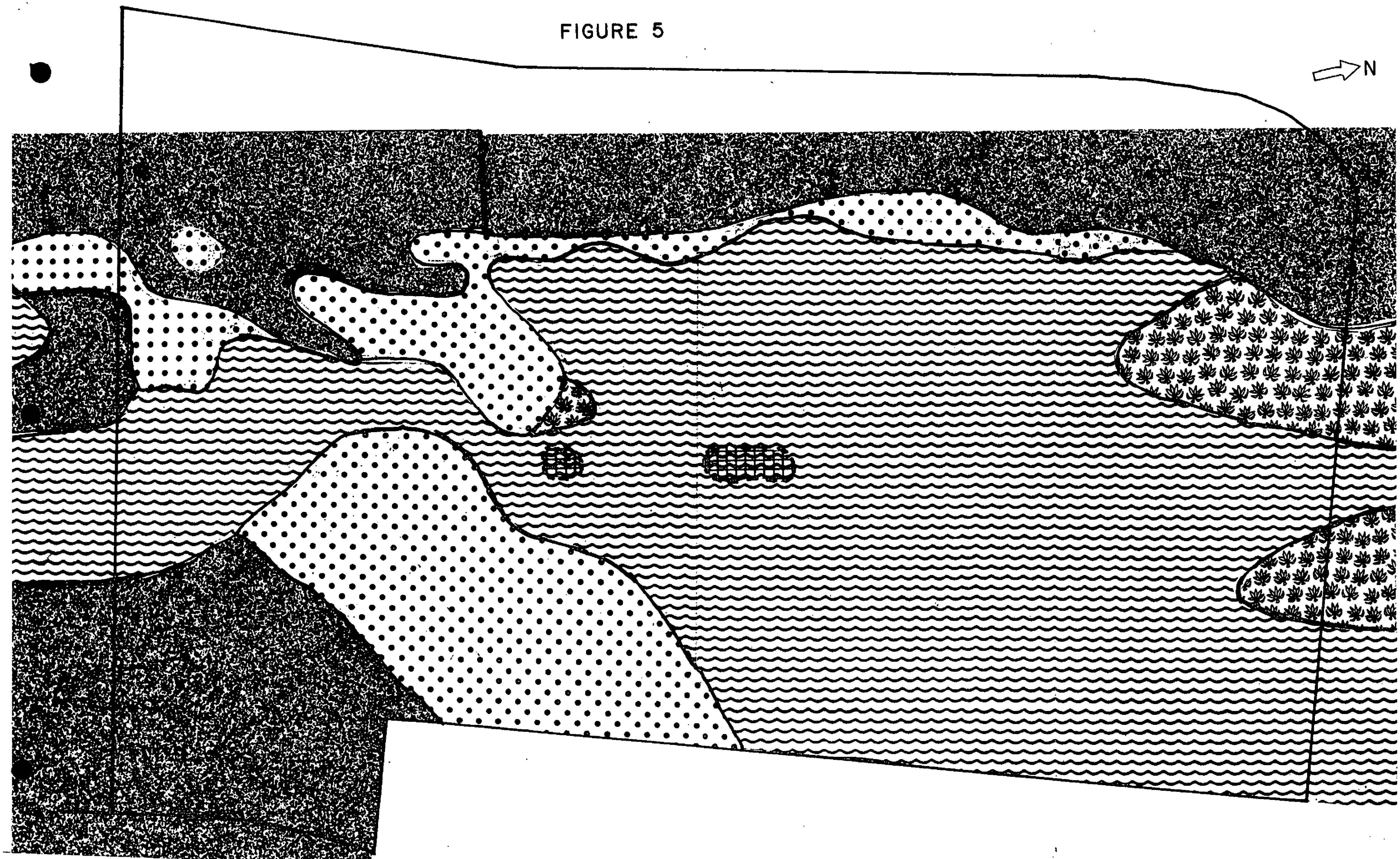
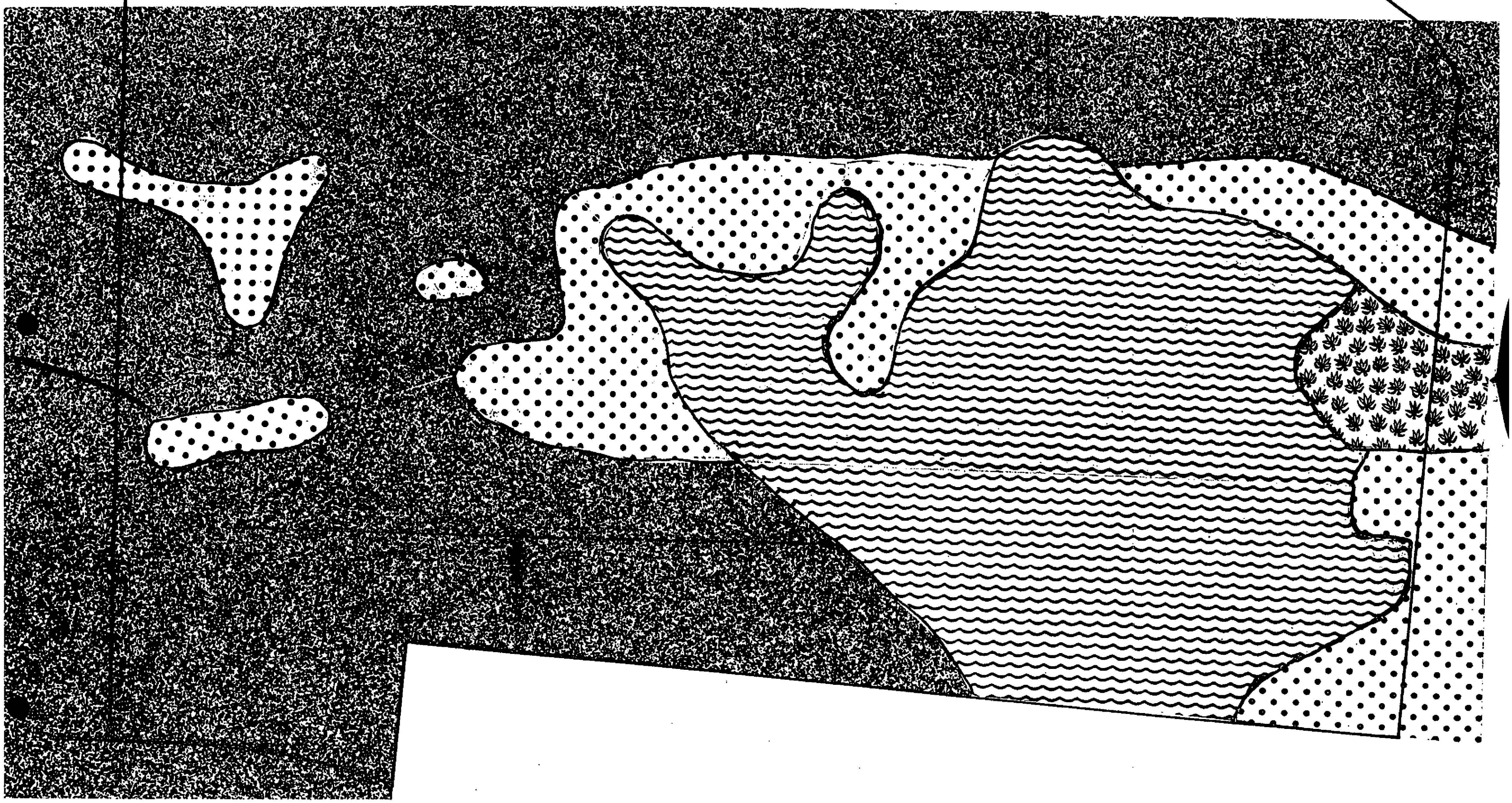


FIGURE 6



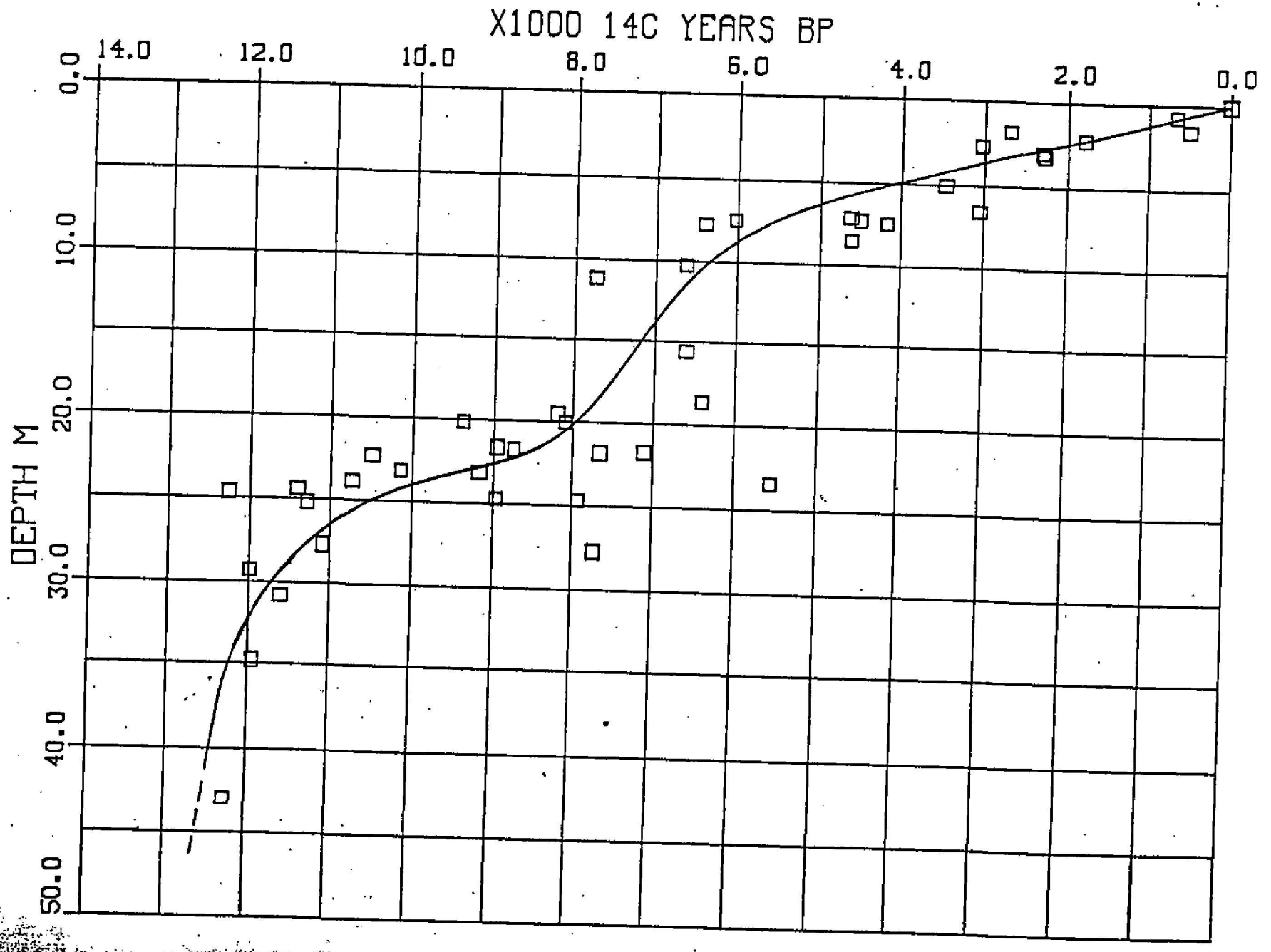

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FIGURE 7