REPORT NO. 1

BASIC HYDROGEOLOGIC AND REMOTE SENSING DATA FOR SELECTION OF SANITARY LANDFILL SITES, DAYTONA BEACH, FLORIDA

REPORT SUBMITTED TO: Russell Hooper
Director of Public Works
City of Daytona Beach, Florida

April 5, 1977

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ENGINEERING AND INDUSTRIAL EXPERIMENT STATION

College of Engineering

University of Florida

Gainesville

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BASIC HYDROGEOLOGIC AND REMOTE SENSING DATA FOR SELECTION OF SANITARY LANDFILL SITES, DAYTONA BEACH, FLORIDA

INTRODUCTION

Solid waste disposal is one of the most troublesome logistic problems facing our society. Not only has the volume of solid waste increased rapidly in the past few years, but available sites meeting more stringent environmental requirements have been depleted. Marshes and swamps are no longer permitted to be filled. We must not forget that, in the past, waste disposal in marginal wetlands has made it possible for redevelopment of landfill sites to a higher human use (Salvato, Wilke, and Mead, 1971).

At the present time, economics and direct human benefits are not necessarily foremost in current feasibility studies. Such is the case in Volusia County where it is critical that the water supply be protected. Highlands in this County are of limited areal extent and, most significantly, the sand hills and ridges are in areas where recharge of the Floridan aquifer occurs. This study proves that well drained soils meeting the current State requirements are of limited areal extent. These areas should not be utilized as sanitary landfill sites! Rather, we recommend extension of the current Tomoka Farm Road site into the adjacent wetlands. The County site on Rima Ridge recommended by Greenleaf-Telesca as the primary waste burial site in the County should be re-evaluated because of potential danger to the Daytona Beach water supply.

Land and water are our most valuable assets. We must consider the long range liabilities and benefits from waste disposal techniques and methods. In Volusia County no one can benefit in the long run by making the highlands higher and the lowlands relatively lower.

Mr. Russell Hooper, Director of Public Works of Daytona Beach, requested us to make a study utilizing remote sensing techniques to locate and evaluate potential landfill sites in eastern Volusia County. A grant from the Division of University Affairs (Mr. Joseph Vitale, Director) of the National Aeronautics and Space Administration made this research possible. Spectral analysis of Landsat imagery was applied for interpretation and mapping of geotechnical trends in the study area. We were assisted most ably by the staff of General Electric Company, especially Mr. Robert L. Ferguson, who provided technical assistance in spectral analysis utilizing the IMAGE 100 System.

This work proceeded in two parts because of the experimental nature of the satellite image analysis. Standard geological techniques were applied in the initial study. This included compilation of existing data. Available vegetation and soils maps were employed to prepare maps of the distinguishable hydrogeologic units. High and low level aerial photography was the basis upon which ground truths were extended and areal boundaries delineated. Spectral analysis of satellite imagery was employed to develop rapid techniques by which the same basic map types could be produced by the IMAGE 100 System. Our recommendations are based upon this information.

Because of serious concerns for the water supply and the water recharge areas, hydrologic facts have been given foremost concern. We wish to thank Hudson Paper Company for making available pertinent information relating to Rima Ridge, the flatwoods, and swampy areas to the west which the County has attempted to legislate as a "potential recharge area".

This study does not duplicate the study prepared by Greenleaf and Telesca, 1976, "Volusia County Comprehensive Solid Waste Management Study". We do concur that resource recovery and recycling be developed as rapidly as possible. Our hydrological and geotechnical data suggest an extension of the Tomoka Farm site as being better than the Rima Ridge site recommended in the County report. Not only does eastern Volusia County generate 74% of the solid waste, but most significantly:

1. There is less danger of pollution of the Floridan aquifer with chemical and biological leachates.
2. The water quality in the shallow and deep aquifer in this area is presently of relatively poor quality.
3. The site and surrounding land is owned by a single company, the Rotalar Corporation. It is in a remote area and at the present time there is minimum cultural development.
4. The site is at the divide of the Tomoka River and Spruce Creek and upgraded leachate surface discharge would be further purified by flowing through the headwater swamps (Center for Wetlands, 1976).

For background data on the County problem, the proposed waste disposal sites and pre-existing concepts, please refer to the report of Greenleaf-Telesca.

GROUND TRUTHS

<u>Surficial Deposits and Topography</u>

The most conspicuous geological feature in Volusia County displayed on high level color infrared (CIR) photographs and unenhanced satellite imagery is a multiple series of progradational beach plains eastward of the Deland-Crescent City sand hill ridge. Because of minor differences in elevation of the low ridges and swales, these areas of flatwoods and cypress strands have been misinterpreted in most previous geological studies (Cook, 1945; Knochenmus and Beard, 1971). It is the fabric of the depositional lineaments (Appendix B, color composite) as well as the sedimentology and stratigraphy of the associated deposits that led Brooks (1968) and White (1970) to the conclusion that the "flatwoods" are not erosional or depositional sea floor plains in the sense that "marine terraces" had previously been construed.

In many places the regressional beach plains have been complicated by subsequent erosion and there are areas of scour at the sites of old inlets and tidal channels; more distracting is the fact that subsequent stands of sea level reflooded the lower areas of pre-existing beach plains, resulting in deposition of younger lagoonal silt and clay. In most cases these are the large swamps.

Low ridge and swale lineaments are displayed clearly in the imagery with flatwood areas located predominately in the beach plains that represent regressional stages from high to lower stages of sea level. The depositional fabric is discordantly truncated seaward by prominent sand (and shell) ridges; the Talbot Plain by Rima Ridge, the Pamlico Plain by the Atlantic Coastal Ridge, and the Princess Ann Plain by the Silver Bluff Ridge. Seaward of the Silver Bluff Ridge is the present lagoon (Halifax River and Mosquito Lagoon) and barrier island (Figure 1). The beach plains have the following elevations:

Talbot Beach Plain "Talbot Terrace" 40-45 ft. m.s.l.**

Pamlico Beach Plain "Pamlico Terrace" 25-35 ft. m.s.l.

Princess Ann Beach Plain "Silver Bluff Terrace" 6-15 ft. m.s.l.

** mean sea level

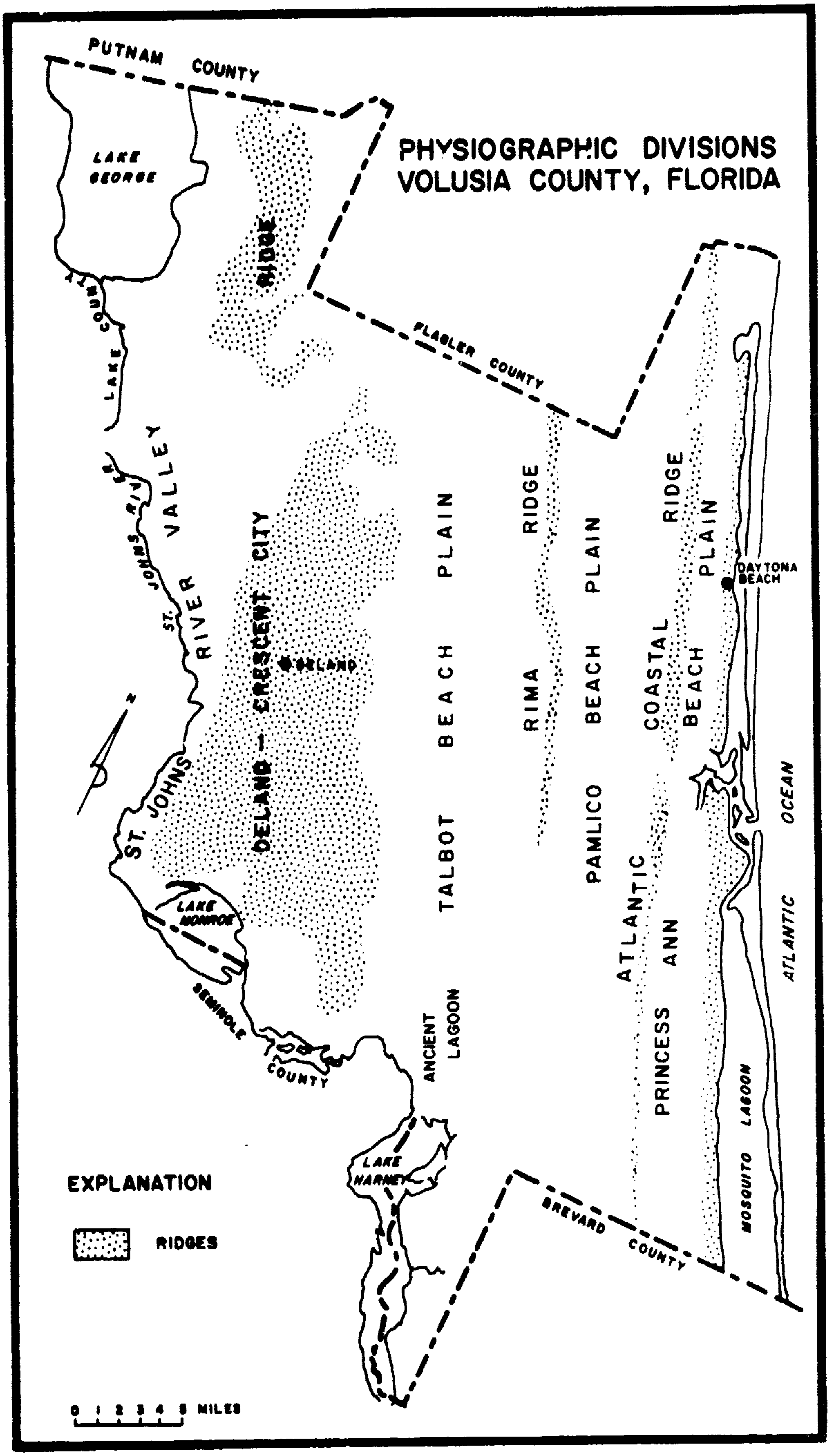

PHYSIOGRAPHIC DIVISIONS
VOLUSIA COUNTY, FLORIDA
PUTNAM COUNTY
LAKE GEORGE
LAKE COUNTY
FLAGLER COUNTY
RIDGE
ST. JOHNS RIVER VALLEY
ST. JOHNS RIVER
DELAND — CRESCENT CITY
DELAND
TALBOT BEACH PLAIN
RIMA RIDGE
PAMLICO BEACH PLAIN
ATLANTIC COASTAL RIDGE
PRINCESS ANN BEACH PLAIN
DAYTONA BEACH
ATLANTIC OCEAN
MOSQUITO LAGOON
ANCIENT LAGOON
LAKE MONROE
SEMINOLE COUNTY
LAKE HARNEY
BREVARD COUNTY
N
EXPLANATION
RIDGES
0 1 2 3 4 5 MILES

FIGURE 1

From recent experience, we know that a rising sea level results in erosion. It would appear that the well-sorted sand (and shell) ridges (i.e. Rima Ridge, the Atlantic Coastal Ridge, and Silver Bluff Ridge) represent the maximum beach energy conditions at the highest sea level which preceeded each regressional beach plain. Rima Ridge represents dunes and beach deposits formed at the maximum Pamlico sea flooding and not the barrier island seaward of the Talbot "lagoon".

Though abstract as this geological interpretation (made possible by remote sensing) may be, it is extremely valuable in mapping the hydrologic and geotechnical properties of the surficial earth materials in Volusia County. For example, in the area of the Tomoka Farm disposal site, there is clearly no genetic difference between the flatwoods and the adjoining cypress strands; the difference is clearly a matter of drainage. Both are underlain by fine sand grading downward into silty sand and clayey silt, just as in the Recent progradational sequence underlying Sanibel Island, Lee County, Florida. The upper sand represents sorting in the surf zone, on the beach and dunes; whereas the underlying dirty sand, silt, and clay were deposited seaward of the breaker bar. Such is also the case in the artificially restored beach at Cape Canaveral (Brooks, 1976).

An obvious example of the role that drainage has played is in the well drained sandy soils adjacent to Tomoka River and Spruce Creek (mapped by the Soil Conservation Service, 1975). The surface slope and consequent drainage are the only differences between the xeric sand ridges and adjacent flatwoods and cypress strands. All are genetically relic beach ridge deposits.

The Deland-Crescent City Ridge is not comparable to the three prominent topographic ridges named above. This is an area of sand hills and lake basins resulting from extensive surface and ground water erosion. The porous, permeable materials in this ridge are directly underlain by limestone at a depth of 60 to 100 feet. This area of internal drainage, karst topography, and residual sand hills is believed to have existed from Early Pleistocene to Pliocene time as has the St. Johns River offset forming the western margin of the County (Pirkle, 1971).

Three categories of swamps exist: (1) those that are located in swales between beach ridges; (2) the depressions in which silt and clay have accumulated to form extensive swamps; and (3) those conforming to the geological fracture pattern of underlying limestone. The swales between beach ridges are genetically and texturally related to those of the adjoining flatwoods except there is less paleodune sand.

The more extensive swamps and lake basins which are underlain by silt and clay occur in shallow depressions that have been formed by either erosion by streams and then backfilled, original low places due to ancient tidal scour and backfilled, or impondment behind a ridge formed during a subsequent depositional cycle.

The river swamps of the Tomoka River and Spruce Creek are in river valleys eroded at a time of lower sea level which were subsequently backfilled with mud, marl, and peat during the Recent rise of sea level. The extensive swampland just eastward of the Deland Ridge, the Deep Creek Swamp, is probably an example of an erosional river valley backfilled at some previous time with clay and other fine sediment.

The position of an ancient tidal inlet southward of Rima Ridge is obvious on the Lake Ashby topographic quadrangle map. Lake Ashby is located at a position of former tidal current scour. The Cresent Lake basin is also due to current scour. Estuarine silts and clays have accumulated in these depressions.

The broad linear swamp, located behind the Silver Bluff Ridge and extending from the Tomoka Basin southward to Turnbull Hummock ("Silver Bluff Terrace" of previous authors) is an excellent example of a lagoonal area behind a barrier ridge which developed during a lower high stand of sea level. Drainage was blocked on a previously formed regressional beach plain, the Princess Ann Plain. Partial reflooding back of this beach ridge during Silver Bluff time resulted in some deposition of lagoonal deposits. Likewise, at the time of development of Rima Ridge during maximum Pamlico flooding, there was deposition of silt and clay in a lagoonal area that is now Tiger Bay.

The most conspicuous swamp requiring another explanation is the northwest-southeast trending portion of Bennett Swamp. This linear feature reflects a structural trend concordant with the lineaments of some swamplands that are not due to the depositional fabric of the recessional plains. In fact, some portions of the areas mapped as swamp reflect another, but less conspicuous, structural trend in a northeast-southwest direction. Both the dominant and the subordinal linear trends are known to represent the fracture patterns in the underlying limestone, constituting the Floridan aquifer. In some cases, the lineament is represented by small cypress heads aligned in flatwoods such as observed north of US 92 on the Talbot Plain. In most instances, the lineament is expressed by the rectilinear patterns of the sloughs, creeks, and streams (Appendix A).

Does this mean that karst features have developed subsequent to deposition of the surficial soils? It is true that Scoggin Lake , Coon

Pond, and Indian Lake (associated with Rima Ridge) are in an area of infiltration and Floridan aquifer recharge. These deep lakes are due to solution of the underlying limestone. The small differences in relief associated with the shallow retilinear pattern of swamps in the flatwoods possibly reflect the fracture trends in the underlying limestone. This might be due to differential compaction of clays and other fine grained clastic sediment related to a buried karst landscape.

Often cypress heads are due to incipient sinkhole development; however, extensive testing in the flatwoods north of Gainesville prove most cypress heads are associated with underlying pockets of clay. Topographic depressions have persisted through time with multiple cycles of deposition. Low places are where silt and clay accumulate. The depressions are perpetuated by consolidation of the accumulated sediments.

Data from the core boring logs in the files of the U. S. Geological Survey, Frank Ford of Deland (attorney and mineral prospector), and Hudson Paper Company are fully in support of the above interpretation of the distribution of earth materials overlying the limestone in Volusia County as they were mapped by remote sensing techniques.

The Deland-Crescent City Ridge is distinctly different from all other areas in the County. It is underlain by sand, kaolinitic clayey sands, and sand with some shell. The high hills are residual and have existed for a much longer time than the other areas in the County that have been intermittently flooded during Middle and Late Pleistocene high stands of sea level. The Deland-Crescent City sand hills is an area of maximum infiltration to the Floridan aquifer; thus, karst features characterize this physiographic division of the County.

The remainder of the County eastward of the Deland-Crescent City Ridge is flatwoods characterized by linear swamps and narrow linear ridges. The flatwoods are underlain by heterogeneous clastic sediments, mostly fine grained, poorly sorted regressional marine deposits. The linear high ridges in this area are underlain by well sorted sand. There is progressively more shell in the deposits associated with the Atlantic and Silver Bluff ridges. Clays and clayey silts at a shallow depth are limited to swampy areas and lake basins.

For purposes of our hydrogeologic and geotechnical study it was adequate to map the (1) sand hills and ridges, (2) flatwoods, and (3) swamps. This data was obtained from the existing vegetation maps, soil maps, and was readily distinguished and mapped from CIR photography (based especially on NASA, UAg II 3007 153,17, frame 539, 73/10/30). Many field checks were made in the course of preparing the ground truth maps presented in Appendix A. The mapped units are consistent with those of "The Florida Land Use and Cover Classification System" (1976).

Hydrogeology

Protection of the ground water supply must be a foremost concern in the selection of suitable landfill sites in Volusia County. No possibility of contamination of the Floridan aquifer must exist. There are two aquifers, a shallow clastic aquifer which locally provides usable water and the underlying limestone of the Floridan aquifer which is the principle source of domestic and industrial water.

Water does not enter the ground uniformly throughout Volusia County. The predominant area of infiltration is the xeric sand hills upon which Deland and Deltona are situated. This area of internal drainage consists of only 175 square miles or 15% of the County; it contributes 35% of the total water recharge. Though some water is undoubtedly migrating downward to the Floridan aquifer in the flatwoods areas, it is probably a minor amount. Other areas of recharge are Rima Ridge and the Atlantic Coastal Ridge. It is principally in these ridges that usable water can be obtained from the shallow clastic aquifer.

In 1973 a Water Recharge Ordinance was enacted by the County based upon the premise that the "Talbot" swamps are rejecting water only because the soils are saturated due to the potentiometric surface being at or near the ground level. It was assumed that the clastic sediments consisting of sand, shell, silt, and clay overlying the Floridan aquifer is a "leaky aquitard", and that a "good hydraulic connection exists between the surface water, the water in the clastic aquifer, and the different levels of the Floridan aquifer".

It is recognized by the U.S. Geological Survey (Lichtler, 1972, page 43) that the recharge areas in Florida have certain inherent characteristics as stated: "Maximum recharge occurs where there is no surface runoff and where the water table remains below the root zone so that evapotranspiration is at a minimum. For this situation to exist, four conditions must be met: (1) The surface materials must be sufficiently permeable to absorb the heaviest rainfall without surface runoff; (2) The permeable surface must be thick enough to store the water from a prolonged rain without the water table rising to the root zone; (3) The vertical hydraulic gradient between the water table and the Floridan aquifer must be sufficient to move all available water...; (4) The transmissibility of the Floridan aquifer and the potentiometric gradient must be sufficient to move the water from the area". Based upon these criteria, the flatwoods and swamps of Volusia County are poor to very poor recharge areas. Permeability studies show the areas of the Talbot and Pamlico plains to be 1/20,000 as effective for infiltration as the clean sands of the Rima and Deland ridges.

The clastic sediments overlying the Floridan aquifer are physically and genetically different in different portions of the County. Clays, especially at shallow depths, are associated with swamps and lake basins; whereas well sorted sands are restricted to the named sand ridges.

Vertical hydraulic conductivity is poor or nonexistent in the swampy areas. This is proven by the occurrence of clays and clayey sands recorded in all of the available core boring logs. This is further supported by the fact that the potentiometric maps of May 1973, 1974, and 1975 (U.S.G.S., open file reports) show the swamps on both the Talbot Plain and the Pamlico Plain to be perched five to 15 feet above the pressure level in the Floridan aquifer.

The chloride content in the water of the upper portion of the Floridan aquifer clearly illustrates the location of recharge. The freshened areas are associated with the ridges, especially the Deland-Crescent City Ridge and the Rima Ridge (Wyrick, 1960; Knochenmus and Beard, 1971).

A recent pumping test performed by the U.S. Geological Survey on a well on Rima Ridge, just to the west of Indian Lake, showed that the water levels in shallow monitoring wells responded to a drawdown in the Floridan aquifer (Peter Bush, personal communication). However, another pumping test was performed by the Hudson Paper Company on a well located west of Rima Ridge in the area of Tiger Bay Swamp. After an extended period of pumping no change of water level was observed in the shallow monitoring wells. These facts should be conclusive proofs that recharge and potential recharge are associated with the sand ridges in the County and not the swamps.

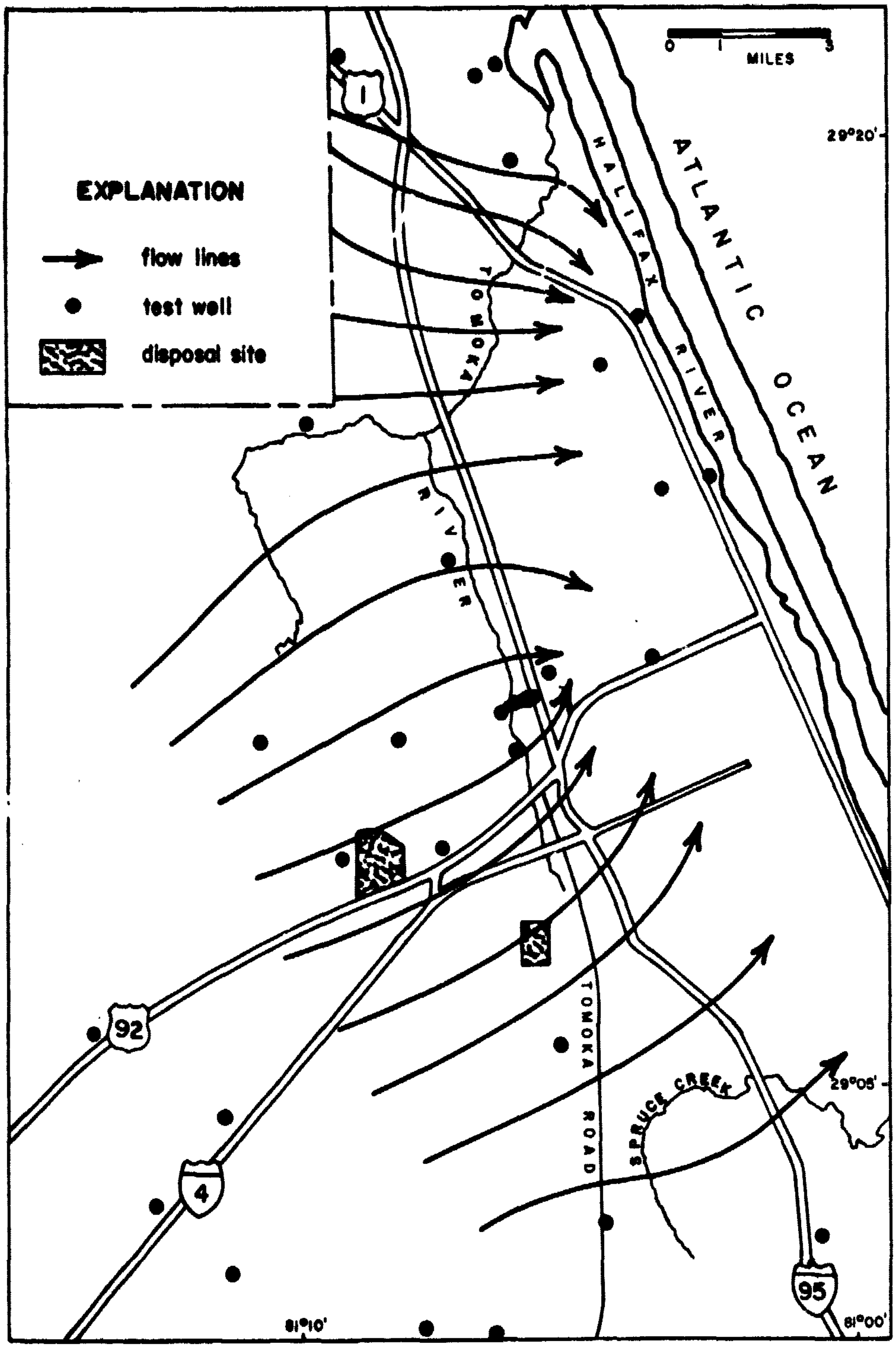
Rock solution occurs in terrain where surface water infiltrates limestone. For every million gallons of rain water entering the Floridan aquifer one cubic yard or more of rock is dissolved. Thus, through time, areas of recharge become clearly evident because of development of karst features such as sinkholes, solution basin lakes, etc. As presented in the discussion of the physiographic and stratigraphic features of the County, there are no proven karst features associated with the Talbot and Pamlico plains. Karst features are restricted to the Deland-Crescent City Ridge, Rima Ridge, and to lesser extent, the Atlantic Coastal Ridge.

SANITARY LANDFILL SITES

The best soil conditions and stratigraphic relationships for sanitary landfill sites in the County are in the flatwoods and swamp areas. These areas do not fulfill the State requirements that the water table be five feet or more below the normal surface of the ground (D.E.R., Chapt. 17-7-04). However, they are the safest areas in the County to bury solid waste. These marginal, poorly drained lands could be upgraded to a higher use through sanitary landfill.

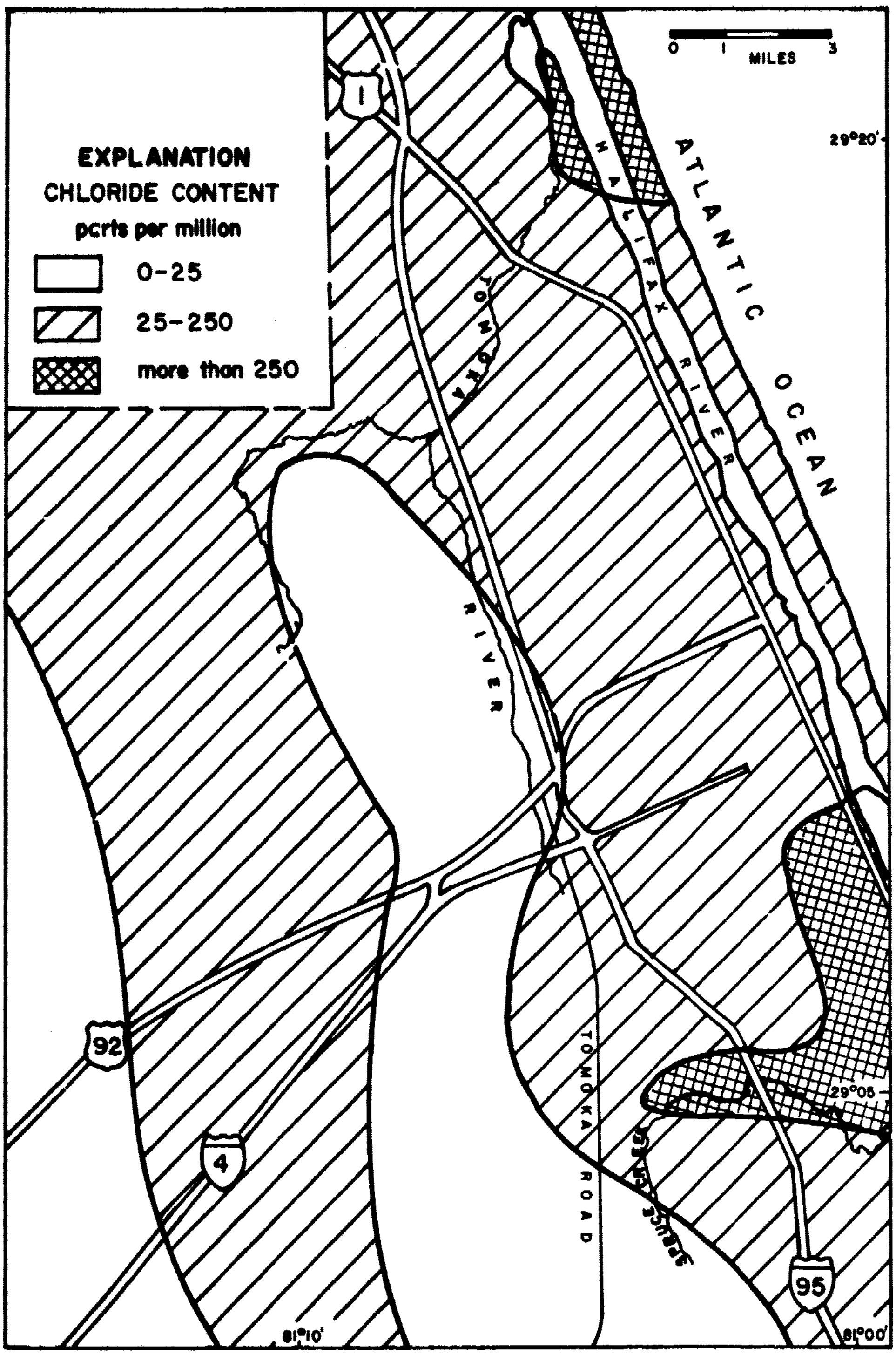
There is less danger of pollution of the Floridan aquifer in flatwoods and swamps, especially at the Tomoka Farm site. Not only would the relatively finer sand mixed with clay retard downward flow, but filtration of organic leachates would occur and there would be some absorption of the chemical pollutants.

Flow lines of the water in the Floridan aquifer interpreted from the 1975 potentiometric map (U.S.G.S., Figure 2), show water would flow directly from the proposed central County site on Rima Ridge to the Daytona Beach well field. Once leachate entered the cavernous limestone of the Floridan aquifer, there would be no further filtration. The time of travel to the well field would be of relatively short duration, possibly only a few days or even hours. Pollution of the Daytona Beach water supply by leachate from the Tomoka Farm disposal site is relatively



FLOW LINES DEPICTING MOVEMENT OF WATER IN FLORIDAN AQUIFER
based upon
POTENTIOMETRIC SURFACE OF THE FLORIDAN AQUIFER
IN EAST CENTRAL FLORIDA, MAY, 1975

FIGURE 2



CHLORIDE CONTENT OF GROUND WATER FROM UPPER PART
OF FLORIDAN AQUIFER IN NORTHEAST VOLUSIA COUNTY
(based upon Knochenmus and Beard, 1971)

FIGURE 3

remote. Also, the water quality in the Florida aquifer is of poorer quality southward toward Spruce Creek, as illustrated in Figure 3.

Further tests need to be performed to determine the permeability and other geotechnical parameters of the sediments surrounding and underlying the Tomoka Farm disposal site. With adequate information on the migration and purification of leachate through these fine grained soils, it may even be possible to dispense with the plastic liners that are currently being used. In the near future, core samples will be obtained and monitoring wells established.

We are confident that data and recommendations presented herein will best serve the needs of Daytona Beach.

REMOTE SENSING OF TERRAIN ELEMENTS

Aerial photography and satellite Landsat imagery were used in the analysis of the terrain west of the city of Daytona Beach. High altitude color infrared (CIR) photography was used in conjunction with Landsat imagery to classify terrain elements that relate to soils and hydrogeologic units. Computer tapes containing data for the four spectral bands from Landsat imagery were processed on the IMAGE 100 interactive multispectral image analysis system to produce maps (themes) that depicted specific categories of land use. The results of these efforts are presented in Appendix A, B, and C.

The base map and overlays in Appendix A depict water, swamps, sand hills, and flatwoods as separate terrain categories and geological structure. The resolution and detail on the photography were excellent for interpretation purposes. However, major features such as lineaments depicting geologic structure were subdued and not easily identified without the aid of classification maps (themes) produced by the IMAGE 100 system.

Appendix B presents a false color rendition of the Landsat imagery, which was prepared by the Dicomed process, with color overlay maps that identify various terrain elements. Open water and swamps were mapped readily by spectral methods. In fact, the methods applied to this study made it possible to distinguish hardwoods from cypress swamps; whereas it was difficult to identify these features from the aerial photographs. Swamp hardwoods (eg. maple and bay) and turkey oak on sand ridges gave similar signatures. Consequently, the hardwood overlay in Appendix B depicts both categories with some overlap into sparce pine with hardwoods. This lack of separation was not critical since both photography and the false color Dicomed displays provided easy identification of depositional features (sand ridges). The pine plantation overlay is representative of fairly dense, uniform stands of pine with minimal understory. High and intermediate reflectance overlays provided clues in the search for well drained, sandy soil; but it required visual examination by the interpreter to eliminate the "cultural noise".

The overlays presented in Appendix C compare the swamp areas, obtained from the IMAGE 100 analysis of satellite imagery, for three different dates. These overlays are very similar except that the 750418 overlay includes predominate stands of hardwoods, enhancing terrain identification in some areas and obliterating it in other locations. Lineaments relating to structural and depositional features are easily identified on the swamp overlays.

The results obtained in this investigation exemplify the need for using different forms of imagery and analysis methods with reliable ground truth data. The difficulties encountered in spectral classification of land use categories were the result of human activity that altered drainage and vegetation. This information allows the interpreter to correctly evaluate the different data sources and to make rational decisions for terrain assessment.

SUMMARY AND RECOMMENDATIONS

The previous portions of this report have presented detailed information relating to the use of remote sensing and ground truth data to evalute the soils, geology, and hydrology characteristics of the northeast portion of Volusia County for selection of potential sanitary landfill sites. It has been recommended that the existing sanitary landfill at the Tomoka Farm Road site be extended into the adjacent wetlands. The justifications for this recommendation are:

1. The existing Tomoko Farm Road site is located in low permeability soils of the Pamlico Beach Plain that would retard the movement of leachates from the sanitary landfill with less danger of pollution of the shallow clastic and Floridan aquifer.

2. The site is at the divide of the Tomoka River and Spruce Creek which would provide further purification of surface leachate discharge by flowing through the headwater swamps.

3. The site and surrounding land is owned by a single company, the Rotalar Corporation. It is in a remote area and at the present time there is very little cultural development that would affect expansion of the landfill site.

4. Well drained sandy soils associated with Rima Ridge are not suitable for a landfill site because of the potential for contamination of shallow ground water and the Floridan aquifer. Flow lines for ground water movement indicate that the Daytona Beach well field would be

highly susceptible to contamination by leachate if the proposed Rima Ridge site were utilized for sanitary landfill operations.

The recomendation for expansion of the existing site has been based on sound hydrogeologic principles and conditions with consideration of the economics of tranferring the sanitary landfill operation to another location. This recommendation does not preclude the possiblity of selecting another site with desirable characteristics within the confines of poorly drained lands of the Pamilico or Talbot beach plains.

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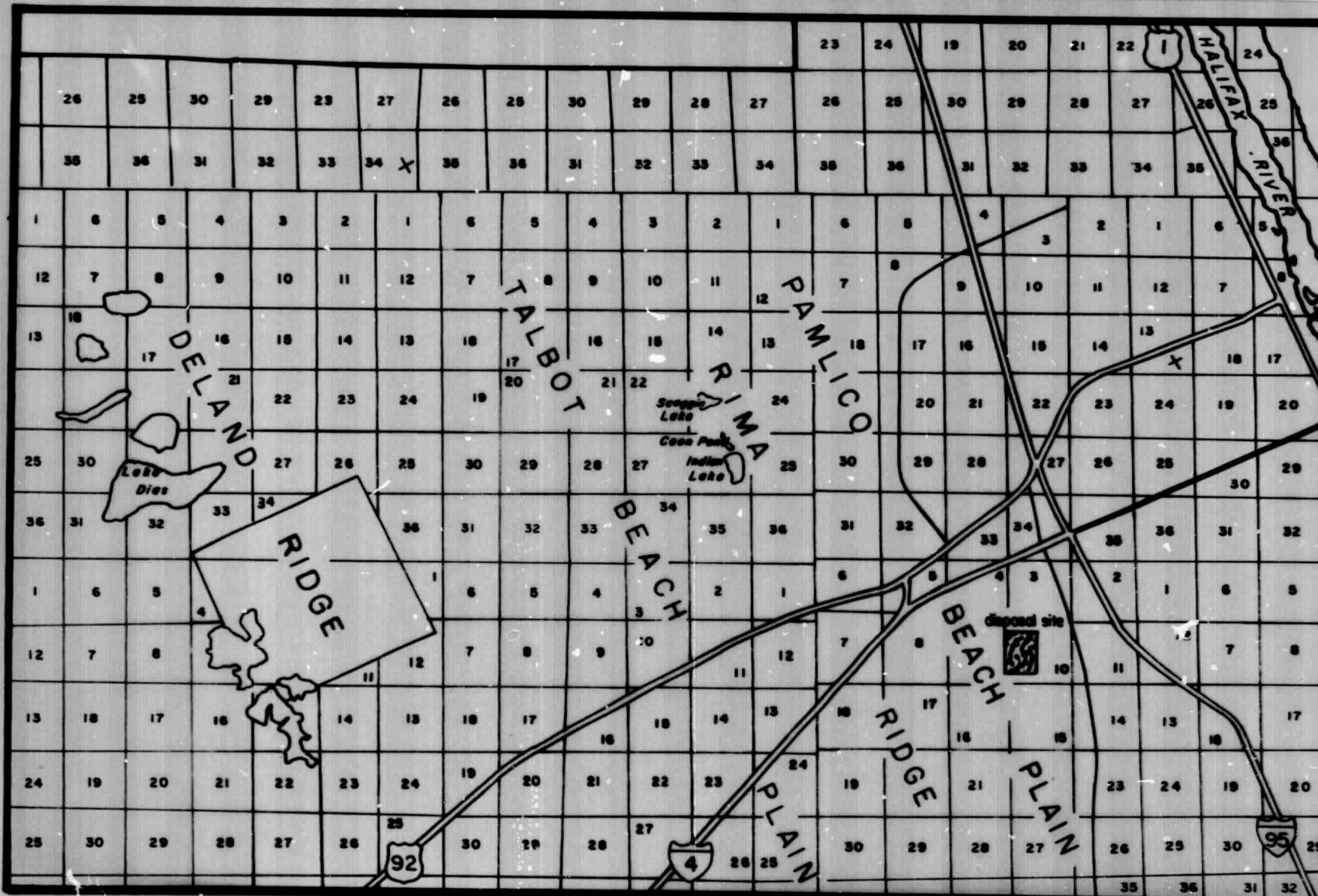
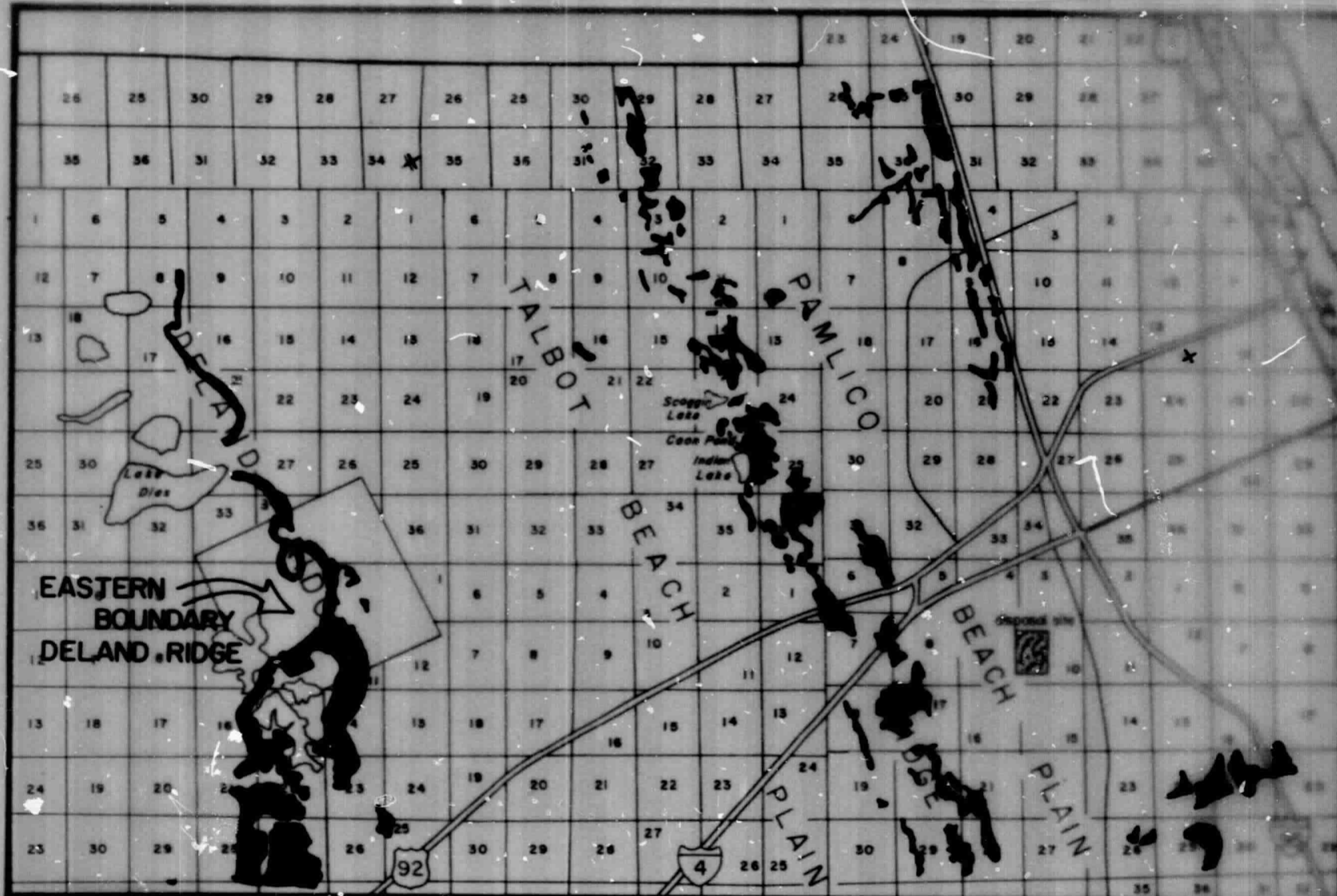
APPENDIX A



SOIL TYPES AS RELATED TO DRAINAGE CHARACTERISTICS

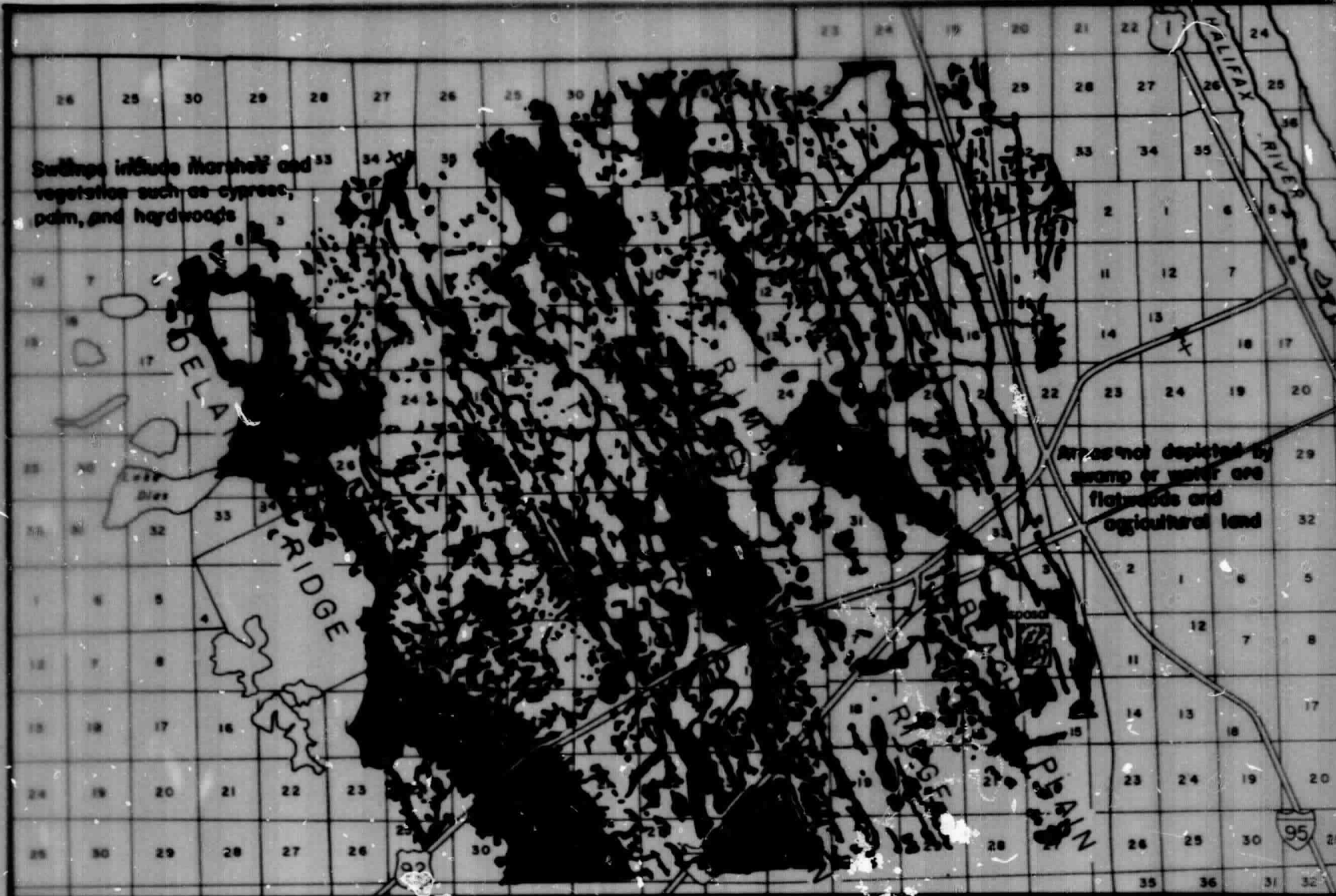
East Volusia County



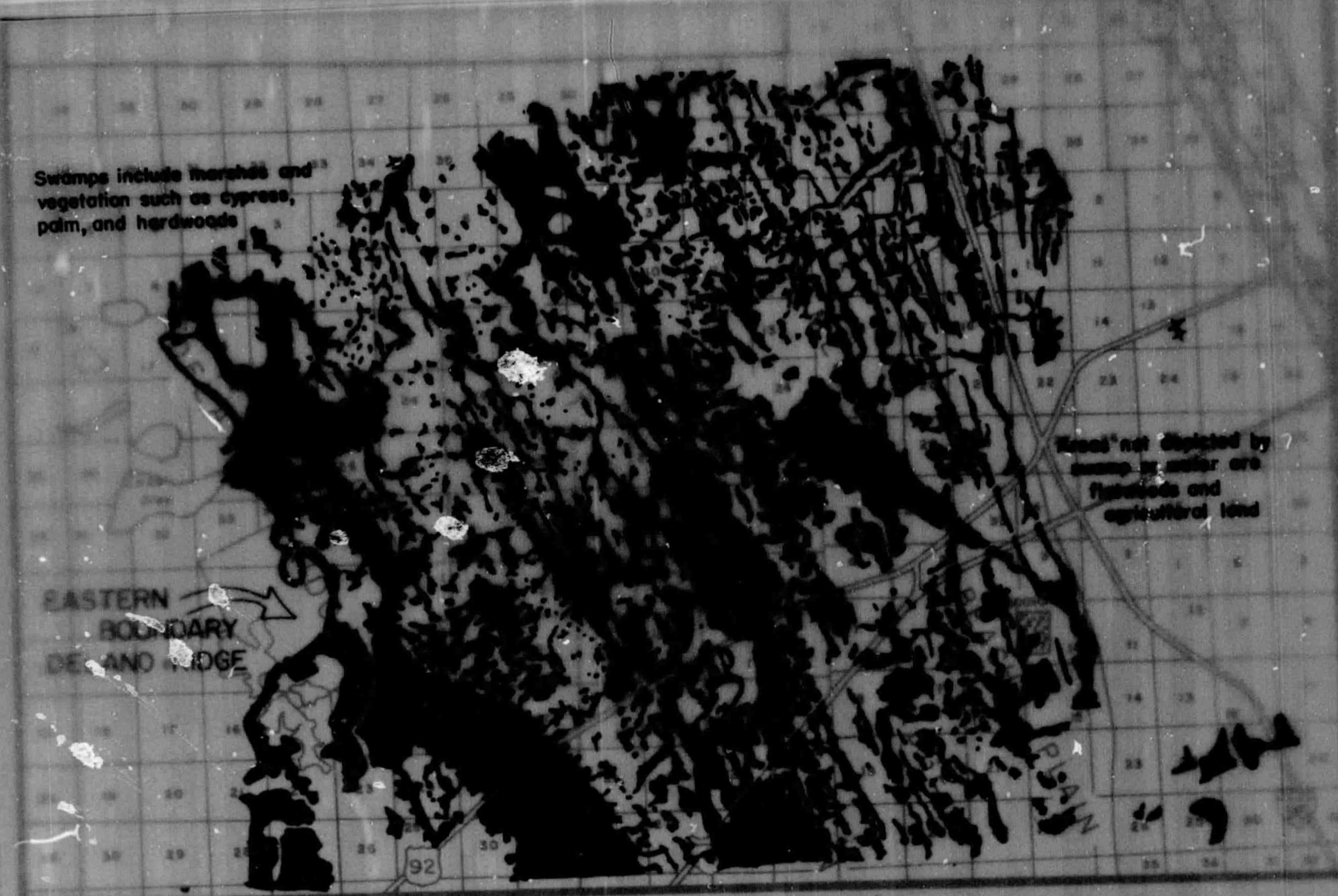
SOIL TYPES AS RELATED TO DRAINAGE CHARACTERISTICS

SAND HILLS

East Volusia County



SOIL TYPES AS RELATED TO DRAINAGE CHARACTERISTICS
SWAMPS
East Volusia County



SOIL TYPES AS RELATED TO DRAINAGE CHARACTERISTICS

SWAMPS

SAND HILLS

East Volusia County

STRUCTURAL LINEAMENTS

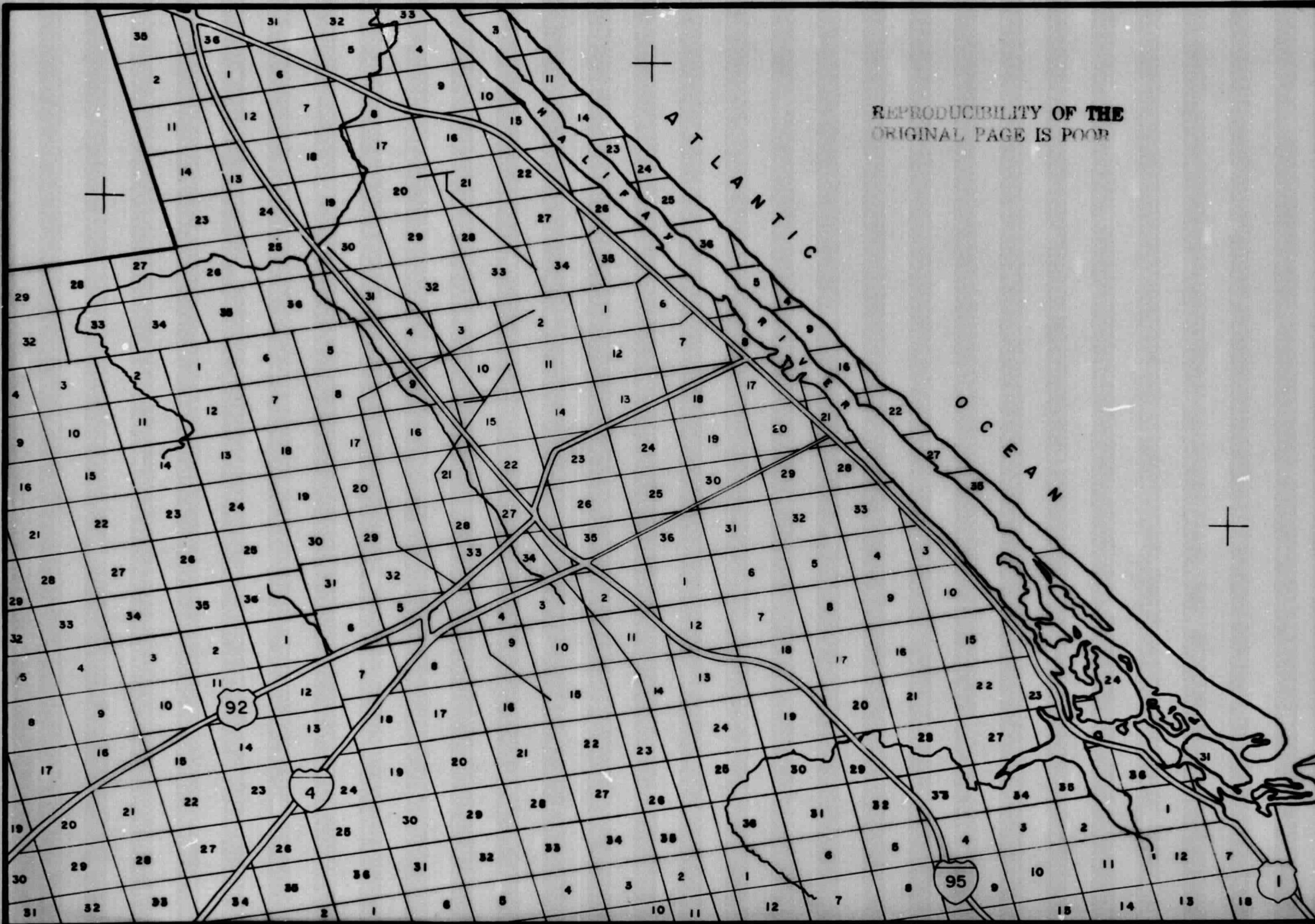
APPENDIX B

APPENDIX B

(THE DICOMED COLOR COMPOSITE)

HAS BEEN OMITTED FROM THIS REPORT

APPENDIX C

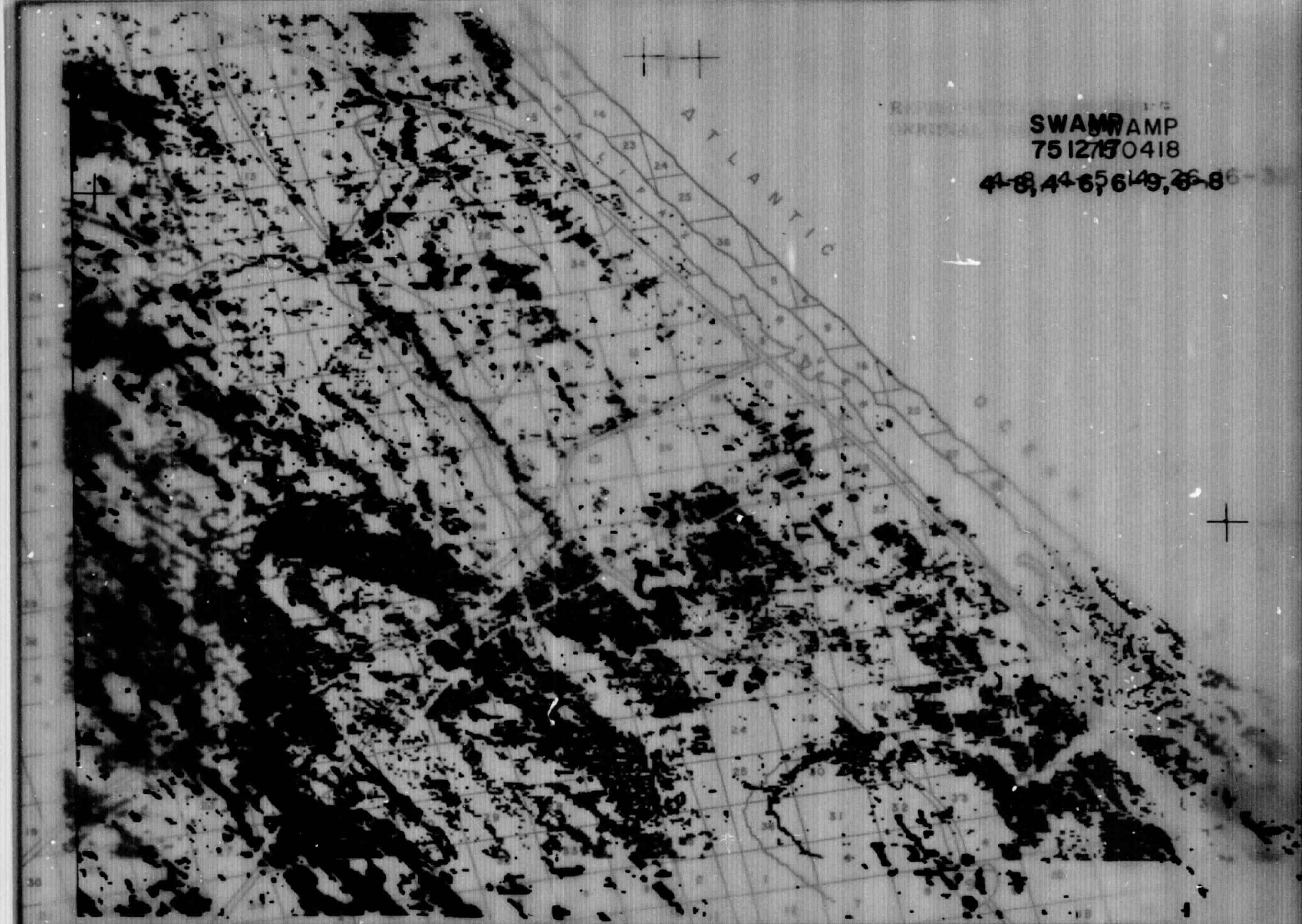


NORTHEAST VOLUSIA COUNTY

(base map dimensionally skewed to overlay 1:1 IMAGE 100 output)

NORTHEAST VOLUSIA COUNTY

(base map dimensionally skewed to overlay I.I. IMAGE 100 output)

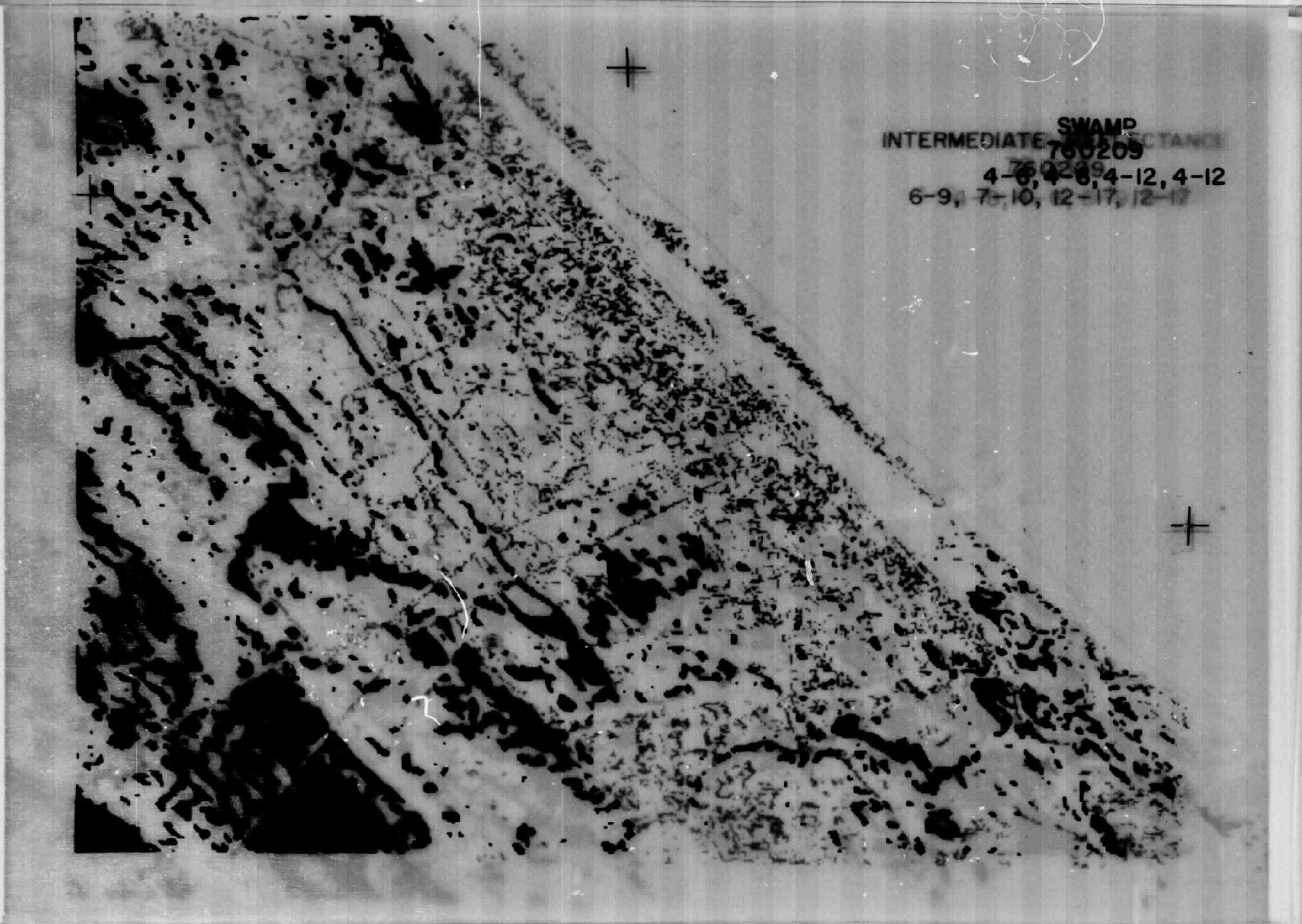


NORTHEAST VOLUSIA COUNTY

(base map dimensionally skewed to overlay 1:1 IMAGE 100 output)

NORTHEAST VOLUSIA COUNTY

(base map dimensionally skewed to overlay 1:1 IMAGE 100 output)



NORTHEAST VOLUSIA COUNTY

(base map dimensionally skewed to overlay 1:1 IMAGE 100 output)