



**Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida
Preliminary Contamination Assessment Report**

**SIS Report Number 2005-03
Issued June 2005**

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Table of Contents

	Page
1.0 Introduction.....	1
2.0 Background	1
2.1 Site Description.....	1
2.2 Site History	2
3.0 SIS Investigation	3
3.1 Scope of Field Work	3
3.2 First Ravine Assessment	5
3.2.1 Sediment Sampling	5
3.2.2 Surface Water Sampling	7
3.2.3 Direct Push Conductivity Profiling.....	7
3.2.4 Microwell Installation and Sampling.....	8
3.2.5 Manually Installed Temporary Monitor Well Network.....	9
3.2.6 Ground Water Level Measurements and Top-of-Casing Survey	9
3.3 Fill Area Assessment.....	10
3.4 Former Peach Orchard Assessment.....	11
3.5 Second Ravine and Waterfront Assessment.....	12
3.6 Assessment of the Merritts Mill Pond	13
3.7 Profiling the Upper Floridan Aquifer	14
3.8 GPS Location of Sample Points	15
3.9 Additional Potable Well Sampling by JDOH.....	15
3.10 Assessment of Area Located East of Merritts Mill Pond.....	15
4.0 Site Conditions	18
4.1 Regional Geomorphology and Stratigraphy	18
4.2 Site Topography and Lithology	20
4.3 Site Hydrogeology	21
5.0 Analytical Results.....	23
5.1 Soil/Sediment Sample Analytical Results	23
5.2 Surface and Ground Water Sampling Analytical Results.....	26
6.0 Conclusions.....	28
References	32
Figures.....	34
Photographs.....	62
Tables.....	72

Table of Contents (Continued)

	<u>Page</u>
Appendix A Request for Assistance	103
Appendix B Historical Aerial Photographs	106
Appendix C SIS Environmental Assessment Timeline	118
Appendix D Electrical Conductivity and Rate of Penetration Logs	123
Appendix E FSU Academic Dive Team Report of Findings.....	137
Appendix F Geologic Presentations.....	139

List of Figures

<u>Figure</u>	<u>Page</u>
1 Study Site Location Map	35
2 Study Site and Surrounding Area	36
3 Study Site Ravine Features	37
4 Arsenic Concentrations in Supply Wells	38
5 Arsenic Concentrations in Supply Wells (Close Up)	39
6 First Ravine Sediment Sample Locations	40
7 SIS Monitor Well Locations	41
8 Location of 1955 Fill Area.....	42
9 Location of 1955 Fill Area (Close Up).....	43
10 Fill Area Soil Sample Locations	44
11 1970 Site Map	45
12 Second Ravine Area and Water Front Sample Locations.....	46
13 Merritts Mill Pond Sediment Sample Locations.....	47
14 SIS Shallow Floridan Aquifer Monitor Well Locations	48
15 Arsenic Concentrations in Supply Wells (JDOH 2004 Sampling).....	49
16 SIS Sediment and Surface Water Sample (East) Locations.....	50
17 Eastern Study Area (Circa 1940)	51
18 SIS Eastern Study Area Microwell Locations	52
19 Surficial Aquifer Ground Water Surface (08/25/2003)	53
20 Floridan Aquifer Regional Potentiometric Surface (1986, 1991).....	54
21 Floridan Aquifer Regional Potentiometric Surface (1995, 1996).....	55
22 Floridan Aquifer Regional Potentiometric Surface (1998, 2000).....	56
23 Floridan Aquifer Ground Water Surface (03/02/2004)	57
24 Floridan Aquifer Ground Water Surface (09/04/2004)	58
25 Arsenic in Soil/Sediment Analytical Results	59
26 Lead in Soil/Sediment Analytical Results	60
27 Distribution of Arsenic in the Floridan Aquifer	61

Table of Contents (Continued)

List of Photographs

<u>Photograph</u>	<u>Page</u>
1 First Ravine.....	63
2 Soil 21 Sample Location.....	64
3 First Ravine Sediment Sampling	65
4 SIS Direct Push Geoprobe	66
5 Rotosonic Drilling.....	67
6 Merritts Mill Pond Dam (1922)	68
7 Florida State University Academic Dive Team.....	69
8 Indian Springs Road Karst Feature	70
9 Former Arable Land in Pond's Eastern Extent	71

List of Tables

<u>Table</u>	<u>Page</u>
1 Area Supply Well Construction Details.....	73
2 Jackson County Department of Health Supply Well Survey Results (2003)	76
3 Sediment and Soil Sample Collection Intervals.....	79
4 Construction Data of SIS Installed Monitor Wells	84
5 Water Level Measurements	85
6 Jackson County Department of Health Supply Well Survey Results (2004)	89
7 Arsenic and Lead in Sediment/Soil Analytical Results	90
8 Organic Compound Detections in Soil/Sediment Analytical Results.....	96
9 Arsenic and Lead in Water Analytical Results	97
10 Ground Water Parameters.....	100
11 Organic Compound Detections in Water Analytical Results	101

1.0 Introduction

On April 25, 2003, a request for assistance was received by the Florida Department of Environmental Protection's (FDEP) Site Investigation Section (SIS) from the FDEP Northwest District Office in Pensacola, Florida ([Appendix A](#)). The District Office requested that SIS determine the source(s) of arsenic and lead impacting private drinking water wells in a neighborhood located adjacent to Merritts Mill Pond near Marianna, Florida. The results of this SIS environmental investigation are provided herein.

2.0 Background

2.1 Site Description

The SIS study area is located along the southern extent of Merritts Mill Pond in Jackson County, Florida ([Figure 1](#)). A dam located along U.S. Highway 90 creates this four-mile long lake. Located approximately one-mile northwest of the site is the city limits of Marianna.

On the western side of the pond, the study area encompasses the vicinity east of Merritts Mill Pond Road, south of Davis Drive and north of U.S. Highway 90 ([Figure 2](#)). At the southern extent of the study area's western side and fronting U.S. Highway 90 is the Arrowhead Campground. Along the eastern side of the pond, the study area is in proximity to Indian Springs Road and Old Hickory Creek Circle. The entire site is within Section 12, Township 4 North, Range 10 West.

Single-family homes located on one to two-acre size lots are characteristic of the area. All homes are supplied with potable water from private supply wells that are approximately 150 feet in depth ([Table 1](#)). Most of the supply wells are four-inches in diameter and utilize submersible pumps to withdraw ground water and bring it to the

surface. Some supply wells located immediately next to the pond employ jet pumps. These lots are lower in elevation and consequently the ground water is closer to land surface.

Within the study area are numerous ravines containing intermittent streams that empty into Merritts Mill Pond (Figure 3). Located on the western side of the study area are two such ravine features. The larger of the two is aligned generally north to south and crosses Davis and Rooks Drive and Flynt Circle; this ravine has a drop in elevation at its deepest point of approximately 25 feet. The second ravine, which is much smaller in scope, is located just east of Flynt Circle Drive, north-northeast of the intersection of Flynt Circle and Rooks Drives. Although not depicted on Figure 3, a third ravine within the study area is located on the pond's eastern shore south of Old Hickory Creek Circle.

2.2 Site History

Beginning in February 2003, the Jackson County Department of Health (JDOH) collected samples from supply wells located in the vicinity of the Toole well at 2678 Mathis Drive. In anticipation of Florida's Primary Drinking Water Standard for arsenic being lowered from 50 micrograms per Liter (ug/L) to 10 ug/L in 2005, JDOH initiated the sampling of wells located near wells known to have arsenic concentrations that would exceed the new standard. Years ago because of chronic health problems experienced by their family, the Tooles had their well sampled for arsenic. The reported concentration of arsenic present in their well was at that time below the Primary Standard as set forth in Florida Administrative Code Chapters 62-520 and 550.

During this initial sampling, JDOH identified several wells in proximity to the Toole well containing elevated levels of arsenic. In response, JDOH quickly expanded their scope of testing. During this extended sampling event (over 100 private supply wells evaluated), JDOH identified more than twenty wells in the vicinity with arsenic concentrations exceeding 10 ug/L. Several of these wells produced levels of arsenic in

excess of 100 ug/L. JDOH also identified a cluster of supply wells that contained concentrations of arsenic above 500 ug/L (Table 2). The center of this cluster is in proximity to the intersections of Rooks Drive with Mathis Drive and Flynt Circle (Figures 4 and 5). The FDEP Division of Water Resource Management has since funded the installation of filters on impacted wells. Presently, a domestic water line is being installed to service the area.

In its Request for Assistance, the FDEP Northwest District Office suggested several potential source areas responsible for the high levels of arsenic including a creosote wood treating plant, a closed landfill, and the use of herbicides long ago in the Mill Pond.

3.0 SIS Investigation

3.1 Scope of Field Work

Using sample information supplied by JDOH, SIS was able to discount the creosote plant and closed landfill as potential sources. The creosote plant was reportedly located off of U.S. Highway 90, south and west of the study area. The closed landfill is located north and west of the site off of Merritts Mill Pond Road. Both of these locations are separated from the area with very high levels of arsenic by several supply wells reported to have concentrations commensurate with typical background levels (Figure 4).

During the course of its investigation, SIS identified seven additional areas of suspicion. The first includes the ravine that bisects the western study area. The Peacock supply well, which is impacted with the highest level of arsenic reported by JDOH (640 ug/L), is located approximately two hundred feet east of this ravine. The removal of overlying sediments by erosion within the ravine provides a preferential pathway for contaminants such as arsenic, if spilled or dumped, to leach into the underlying aquifers. It is possible that a cattle dip vat could have been located in proximity to this ravine. From the 1910's through the 1950's, these vessels were filled with an arsenic solution for

the control and eradication of the cattle fever tick. By state law, all cattle, horses, mules, goats, and other susceptible animals were required to be dipped every 14 days. Under certain circumstances, the arsenic and other pesticides remaining at the site may present an environmental or public health hazard. Some of the sites have been located and are currently under investigation. However, most of the listings are from old State Livestock Board records, which listed each vat as it was put into operation. In addition, some privately operated vats may have existed which were not listed by the Livestock Board. Over 100 vats were known to have operated in Jackson County (DEP, 2003). A 1924 listing mentions a vat called Merritts Mill; its exact location is unknown.

The second locale of interest identified by SIS is an area of disturbed land associated with a clearing identified in 1940 and 1955 aerial photos ([Appendix B](#)). This disturbed land, possibly indicative of excavation or backfilling activities, is located on the southern portion of the Peacock property and extends eastward across Mathis Drive. It was speculated that arsenic based herbicides might have been used to help clear the tract of unwanted vegetation. This suspect area is located within the cluster of supply wells impacted with the highest concentrations of arsenic.

A third potential source area was identified through historical aerial photographs and conversations with long-term residents. A peach orchard was formerly located north and east of the high arsenic cluster area. Fruit orchards are recognized users of arsenic based insecticides and herbicides.

The fourth suspicious area identified was a small ravine that extends from near Flynt Circle, north of Rooks Drive, to the pond. Considerations applied to the first ravine apply to this feature as well.

The area along the pond's waterfront and the pond itself was also considered a potential source area for arsenic. The location of the waterfront has changed over the years due to times of drought or when the pond was drained to allow service or reconstruction to the dam. Historical aerial photographs presented in [Appendix B](#) show

the shoreline's range of extent between high and low water marks. The photographs suggest that the water level before circa 1940 was considerably lower than present times due to the previous dam's construction details. During low water episodes, areas presently under water could have received arsenic through the application of herbicides or a cattle dip vat. If a karstic feature within the pond is located nearby, a conduit for the arsenic connecting the surface to the underlying limestones may be present.

If herbicides were a source of arsenic, their presence would likely be from use by private citizens. Only chelated copper and Endothall, neither of which contain arsenic, have been used by the State of Florida for invasive plant management in the Mill Pond (VanDyke, 2003).

SIS also considered that the source of arsenic maybe non-anthropogenic. During the installation of monitor wells on location, abundant glauconite was identified in sample cores. Naturally occurring glauconite has a geochemical association with arsenic.

Lastly, during the latter stages of its investigation, SIS identified a geomorphic karst feature located on the eastern side of the pond. Sinkholes provide an avenue for contamination to bypass low permeability surface sediments and impact underlying aquifers. These sinkholes may be connected to fractures present within the limestone that provide preferential pathways for ground water flow within the Floridan aquifer.

Following receipt of site access from Jackson County and local residents, SIS initiated fieldwork activities by collecting ground water, surface water, soil, and sediment samples from suspected source areas. A time line of the SIS investigation is presented in [Appendix C](#).

3.2 First Ravine Assessment

3.2.1 Sediment Sampling

On May 13, 2003, SIS initiated field activities at the Merritts Mill Pond site. A sediment sample network was established along the ravine adjacent to the Peacock supply

well. Sample points labeled Soil 1 through 43 were collected on thirty-foot centers. The network extended from Davis Drive to approximately 200 feet south of Rooks Drive (Figure 6, Table 3 and Photograph 1). Samples were collected from four different intervals including surface scrapes, 12 to 18 inches below land surface (BLS), 36 to 42 inches BLS, and generally 78 to 92 inches BLS. After collecting samples from the network at a particular interval, SIS would await the laboratory results before returning to collect samples from a lower interval. These deeper sample intervals were thought necessary due to the potential transport of sediment during large storm events within the ravine. Additional ravine samples were collected in the vicinity of location Soil 21 where laboratory results indicated slightly elevated concentrations of arsenic. There is an atypical bend in the intermittent creek at this location (Photograph 2).

All of the samples were collected utilizing hand driven stainless steel bucket augers. The dense foliage and large trees within the ravine precluded the use of power equipment. The lithology encountered was primarily medium to coarse grain, unconsolidated quartz sands underlain by silts and clays. In order to collect the deeper interval samples, four-inch PVC surface casing was employed to prevent running sands from backfilling into the borehole (Photograph 3).

Sediment samples collected were stored on ice and delivered under chain-of-custody to the FDEP Central Laboratory for EPA Method 6020 (arsenic and lead) analyses. EPA Method 200.8 (arsenic and lead) was utilized for equipment rinsate blank sample analyses.

All of the SIS sediment samples were collected in accordance to the FDEP Standard Operating Procedures Manual. Laboratory results are presented in Section 5.0 of this report.

3.2.2 Surface Water Sampling

Water samples were collected from the flowing stream at four locations to characterize surface water quality. The creek was clear flowing and care was used not to introduce turbidity. Samples designated Creek 10, 18, 25, and 38 were collected near locations Soil 10, 18, 25, and 38, respectively. The samples were collected in accordance to the FDEP Standard Operating Procedures Manual. Laboratory results are presented in Section 5.0 of this report. EPA Method 200.8 (arsenic and lead) was utilized for surface water sample analyses.

3.2.3 Direct Push Conductivity Profiling

To characterize the study site's unconsolidated lithology, a Geoprobe Systems® SC400 conductivity probe was utilized during this assessment. Information provided from the probe offered insight to where the ground water surface may be present and identify potential ground water preferential pathways. Electric conductivity logs or ECLs were generated by driving a probe rod equipped with the conductivity tool into the subsurface with the SIS direct push rig ([Photograph 4](#)). As the tool is advanced, it simultaneously measures the conductivity of the adjacent soils in MilliSiemens per centimeter. In general, the higher the percentages of fines present in the lithology matrix, the more conductive the material and consequently, the greater the response on the ECL. The system presents real time data as the probe is advanced. It also measures the probe's rate-of-penetration (ROP). The ECL was terminated at each location when refusal was encountered, most likely the top of competent limestone. After an ECL profile was completed at a sample location, the probe rods were withdrawn, and the borehole abandoned. [Appendix D](#) presents the SIS acquired ECL logs. Information culled from the ECLs was used to determine appropriate screened intervals for ground water microwells. The findings are discussed in Section 4.0 of this report.

3.2.4 Microwell Installation and Sampling

Microwells were installed at several locations to evaluate ground water quality in the surficial aquifer system immediately adjacent to the intermittent stream. Two-well clusters (shallow and deep), designated DEP, were positioned in locations as close to the stream as allowed for by site conditions (Figure 7). The shallow well-screened intervals (typically 8 to 12 feet BLS) were positioned above a zone of low permeability indicated by ECL profiles. The clustered deep well was set where refusal was encountered. This depth was generally 18 to 22 feet BLS. At monitor well DEP 4D, which was located within the ravine, refusal was encountered 8.5 feet BLS due to competent limestone.

The microwells were installed by advancing 2-inch inside diameter probe rods attached to an expendable point into the substrate with the direct push rig. A 5-foot section of prepacked 0.010 inch slotted screen coupled with $\frac{3}{4}$ inch inside diameter PVC schedule 40 casing was then inserted through the probe rods and fastened to the expendable point. The microwell's prepacked sand pack sieve size was 80/120. This sieve was selected due to the presence of elevated conductivity values presented by the ECLs. After a well screen was secured to the expendable point, glass beads were then poured into the annular space to complete the well screen's sand pack and to provide a seal above the screened interval.

Due to the fact that the wells were to be temporary, the annular seal was not grouted with cement. The microwells were properly abandoned upon completion of sampling and water level collection activities. Final SIS well construction details are presented in Table 4.

Ground water samples were collected from the microwell network according to the FDEP Standard Operating Procedures Manual (FS 2200). Quiescent sampling procedures were utilized to minimize turbidity. The water samples were collected, preservation checked on location, chilled with ice, and then delivered under chain-of-custody to the FDEP Central Laboratory for analyses. EPA Method 200.8 was utilized

for the analysis of arsenic and lead. Ground water parameters including temperature, specific conductivity, pH, dissolved oxygen, and turbidity were collected with field calibrated water quality meters. Water sample laboratory results are presented in Section 5.0 of this report.

3.2.5 Manually Installed Temporary Monitor Well Network

In addition to the network of microwells installed with the direct push rig, four monitor wells (Ravine MW 1-4) were also installed within the heart of the ravine utilizing stainless steel bucket augers. Four-inch diameter PVC surface casing was utilized to keep a borehole open until a stiff clay or refusal because of competent rock was encountered. A 5-foot length of 80/120 sieve prepacked 0.010 inch slotted screen was then inserted through the surface casing. Clean silica sand was then emplaced around the screen while the surface casing was withdrawn from the borehole. The manually installed wells were set from 6 to 7.75 feet BLS ([Figure 7, Table 4](#)). These monitor wells were designated Ravine MW-1, 2, 3, and 4. They were installed adjacent to soil sample locations Soil 13, 18, 23 and 33 respectively, and were sampled in a manner identical to that used to sample the SIS microwells.

3.2.6 Ground Water Level Measurements and Top-of-Casing Survey

During the course of this investigation, several sets of water level measurements were collected ([Table 5](#)). The ground water levels in the monitor wells and in selected private supply wells were measured using an electronic water level indicator from a mark established by a top-of-casing elevation survey. This survey linked the elevations of the monitor and supply wells into a single network. The top-of-casing elevation survey was performed using a level and stadia rod employing standard surveying techniques. The measured water levels were then subtracted from the top-of-casing elevations to obtain ground water elevations in reference to NGVD. These elevations were then used to

create graphical depictions of the ground water surface in both the surficial and Floridan aquifer systems. In addition, a survey was performed to associate the elevation of the pond's surface to the ground water surface. A more detailed discussion is presented in Section 4.0 of this report.

3.3 Fill Area Assessment

Soil sample locations Soil 44 through 65 were collected within an area identified from a 1955 United States Soil Conservation Service aerial photograph (Figures 8 and 9) as a potential fill area. This area of concern is centrally located between the four supply wells reported to have the highest levels of arsenic. The soil sample locations were positioned on a grid with twenty-foot centers as best allowed for by site conditions (Figure 10 and Table 3). Several trees were located within the grid and a septic drain field was located along its northern periphery. The samples were collected from a four-foot long core barrel that was driven six feet into the substrate by the SIS direct push rig. The core itself was collected within a PVC liner positioned within the core barrel. Once the core was brought to the surface, the liner was removed from the barrel and then sliced open to reveal the sample matrix. Samples were stored on ice and delivered under chain-of-custody to the FDEP Central Laboratory for EPA Method 6020 (arsenic and lead) analyses. EPA Method 200.8 (arsenic and lead) was utilized for equipment rinsate blank sample analyses.

Several microwells were installed inside and immediately next to the fill area utilizing the Section's direct push rig (Figure 7 and Table 4). They were constructed and sampled in a manner identical to that discussed in Section 3.2.4. Of the fill area wells, only DEP 6D, 7D, 8D, 10D, and 12D produced water. Monitor wells DEP 9D, 11D, 13D and 14D were dry because refusal occurred before the ground water surface was encountered.

3.4 Former Peach Orchard Assessment

A 1970 Florida Department of Transportation aerial photograph indicated the presence of a tree farm adjacent to Flynt Circle, just north of the elevated arsenic cluster ([Figure 11](#)). Discussions with long-term residents confirmed that the property's owner had attempted to establish a peach orchard. After several failed attempts, he allowed the tract to go fallow. Fruit orchards are notorious receptors of arsenic based insecticides and herbicides (Washington Department of Agriculture, 2003).

Just prior to SIS field activities, the property's current owners constructed a new supply well. This well was positioned within the boundaries of the former orchard. SIS collected ground water samples from the well and delivered them under chain-of-custody to the FDEP Central Laboratory for EPA Method 200.8 (arsenic and lead) analyses. In addition, another supply well located across the street at 4924 Flynt Circle was also sampled. This well was earlier reported to be laboratory nondetect by JDOH, however, the well water had passed through an iron reduction filter prior to sample collection. SIS attached appropriate plumbing to the well piping which allowed for the collection of a unfiltered sample.

To further clarify whether the former peach orchard could be a contributing source of arsenic, three two-inch diameter monitor wells screening the Floridan aquifer were installed around the area exhibiting the highest concentrations of arsenic ([Table 4 and Figure 7](#)). These monitor wells, designated FL-Deep, would provide detailed hydrogeologic information between the area with the highest levels of arsenic and the former orchard location. The monitor wells were positioned where no supply wells were present so that data gaps could also be filled. The wells were installed by a drilling contractor utilizing rotosonic technology ([Photograph 5](#)). The three wells screen the Floridan aquifer approximately 10 to 30 feet below NGVD (approximately 140' below land surface). This interval spans the uppermost portion of the aquifer tapped by the area's supply wells.

3.5 Second Ravine and Waterfront Assessment

During the evaluation of the former peach orchard property, a second but much smaller ravine was identified near Flynt Circle ([Figure 12](#)). The ravine is not shown on the United States Geological Survey Marianna Series Topographic Map. The head of the ravine is approximately 100 feet east of Flynt Circle and has a vertical drop of approximately ten to fifteen feet. Ground water seeps out of the ravine's terminus, which in turn forms a small stream that flows to the pond. The ravine quickly opens up into a wide swale that merges with the shoreline. This ravine and the adjacent waterfront are in proximity to several wells that are impacted with high concentrations of arsenic.

Sediment samples were collected utilizing methods identical to those employed during the first ravine's assessment. Collection points were positioned on 30-foot centers and sample depths ranged from 18 to 40 inches below land surface depending on where a silt or clay lithology was encountered. The samples, designated Soil 66 through 91, were collected within the ravine and along the waterfront near the mouth of the ravine ([Figure 12 and Table 3](#)).

Additional soil samples were later collected near sample locations Soil 72, 73, and 74. Laboratory analysis of these samples indicated that they contained the highest concentrations of arsenic in soil identified thus far. Consequently, samples Soil 92 through 105 were positioned to evaluate the area adjacent to and downhill of the Soil 72, 73, and 74 locations; confirmation sampling was also performed at the latter locations. Several of these additional samples were collected where the intermittent stream may have traveled prior to being rerouted by the placement of a private driveway. In addition to arsenic and lead metals analysis (EPA Method 6020), additional parameters were analyzed from samples collected at Soil locations 72, 73, 74, 101, 102, 103, 104, and 105. These additional analyses included semi-volatile organic compounds (EPA Method 8270C) and organochlorine pesticides (EPA Method 8081 modified). The purpose of these analyses was to confirm the presence of the higher concentrations of arsenic

reported and determine whether compounds associated with pesticides or fuel oils were present in this area of the site. These compounds were often constituents of cattle dipping solutions (Woodward-Clyde, 1994).

Several unsuccessful attempts were made to install direct push surficial aquifer monitor wells within the second ravine area. The presence of competent limestone four to ten feet BLS prevented the direct push rig from penetrating the shallow ground water surface.

3.6 Assessment of the Merritts Mill Pond

Given the fact that some of the highest concentrations of arsenic reported were in supply wells on parcels located immediately next to the pond, consideration was given to the possibility that the source of the contamination is within the pond itself. The pond's waterfront has changed over the years in response to climatic events and modifications associated with the dam, including its replacement ([Appendix B](#)). A dam has been at this location since the 1870's (for grist) (Pratt, 2003). During much of the past, the dam has been a simple earthen berm set at a lower height than its current elevation ([Photograph 6](#)). Presently the dam is a concrete structure with a fixed gate.

The Merritts Mill Pond has a limestone base that is connected to the Floridan aquifer through a series of solution features. Many springs supply the pond with water including Jackson Blue Springs, a magnitude 1 spring located at the head of the pond. During certain conditions, these conduits also permit water to flow from the pond into the underlying limestones that house the Floridan aquifer. Jackson Blue and Indian Washtub Springs have been documented to siphon water (Pittaro, 2003).

In order to pursue the possibility that elevated concentrations of arsenic are entering the aquifer via a solution feature within the pond, SIS employed the Florida State University Academic Dive to perform a reconnaissance of the pond's western side near where the highest concentrations of arsenic are present ([Photograph 7](#)). Bottom

profilers on support boats also provided information regarding the subsurface of the pond. Diver and profiler observations indicate that the pond is generally three to seven feet deep and is covered with very soft, silty clay that is approximately 18 to 24 inches thick. Several corbiculid clamshells were observed in these soft sediments. Below this interval, the sediments contain noticeably more sand.

A meandering remnant of the former spring run travels the length of the pond, likely following a path of least resistance, perhaps a lineament (a topographic feature that reveals the presence of a fracture within the underlying limestone). Near the study site, the channel turns and parallels the immediate shoreline ([Figure 13](#)). The channel's depth here approaches 12 feet. The divers collected a network of sediment samples within the channel for arsenic analysis. Samples were collected from the sandier interval subjacent to the soft, silty clay. The only bedrock observed by the dive team was on the very northern extent of the survey area. A report detailing the dive team's observations is presented in [Appendix E](#).

3.7 Profiling the Upper Floridan Aquifer

During the installation of monitor well FL-2 Deep, an anomalous lithologic interval consisting of glauconitic nodules was encountered approximately 45' BLS. A sample of this matrix was submitted to the FDEP Central Laboratory. Analysis indicated the presence of arsenic at elevated concentrations. In order to determine the extent of this anomalous lithology and to characterize ground water quality in this portion aquifer, four two-inch diameter monitor wells were installed utilizing roto sonic technology along Flynt Circle ([Figure 14, Table 4](#)). These wells were designated FL-Shallow. The well's ten foot screened intervals were designed to intercept the glauconitic unit and determine whether arsenic may be leaching into the ground water system from this naturally occurring mineral. Lithologic cores were also collected for arsenic analysis. Laboratory results are presented in Section 5.0 of this report.

3.8 GPS Location of Sample Points

Sample collection points were located utilizing a Trimble™ GeoXT Global Positioning System (GPS) unit. All GPS locations were differentially corrected with a WAAS (Wide Area Augmentation System) signal.

3.9 Additional Potable Well Sampling by JDOH

Following the receipt of all analytical data from its network of soil, sediment, and ground water samples collected on the pond's western side, in May 2004, SIS requested JDOH to collect additional potable well samples from wells located on the eastern side of the Merritts Mill Pond. Since a source area had yet to be identified, SIS had to consider the possibility that the cause of the elevated levels of arsenic was on the eastern side of the Mill Pond.

On August 12, 2004, JDOH reported the presence of two additional supply wells on the eastern side of Merritts Mill Pond containing elevated concentrations of arsenic. These wells, located at 5083 Old Hickory Creek Circle and 2766 Indian Springs Drive, were impacted with arsenic at concentrations of 19.6 ug/L and 128 ug/L, respectively (Figure 15, Table 6).

3.10 Assessment of Area Located East of Merritts Mill Pond

On August 17, 2004, SIS performed a reconnaissance of the pond's eastern shoreline and the area in proximity to the two impacted supply wells identified by JDOH. SIS collected sediment samples from along the bank of the pond and a tributary feeding into the pond (Figure 16) for EPA Method 6020 analysis (arsenic and lead). These samples included Soil 106 through 116, and Soil 120.

While performing a walking survey within the neighborhood, SIS located a geomorphic karst feature near the southern terminus of Indian Springs Drive, which is located between the two impacted supply wells (Photograph 8). This geologic feature

appears to be the surface reflection of a sinkhole. During this visit, standing water was present at the bottom of the depression. Sinkholes provide an avenue for contamination to bypass low permeability surface sediments and impact underlying aquifers. If this low area remained wet perennially, it would be an ideal location for a cattle dip vat. A University of Florida 1940 aerial photograph of the site shows the area to be semi-cleared, possible grazing land with small trees (Figure 17). SIS collected sediment samples Soil 117, 118, and 119 from this site. Samples were analyzed for metals (EPA Method 6020), semi-volatiles (EPA Method 8270C), and organochlorine pesticides (EPA Method 8081 modified). A surface water sample (SW-1) was also collected from the standing water and analyzed for the same constituents (metals: EPA Method 200.8; semi-volatiles: EPA Method 625; organochlorine pesticides: EPA Methods 608, 617, and 1656). A second surface water sample (SW-2) was collected from a free flowing creek that flows through the ravine feature on the pond's eastern side, south of Old Hickory Creek Circle; a sediment sample (Soil 120) was also collected from this location.

During the week of August 30, 2004, SIS collected ECLs (designated ISR for Indian Springs Road and OHC for Old Hickory Creek Circle) and installed three microwells (DEP15D through DEP17D) in the vicinity of the karst feature (Table 4, Figure 18). These wells were installed utilizing the Section's direct push rig in a manner identical to that earlier described in this report. The total depth of the three wells ranged from 72 to 84 feet BLS. A conductivity probe was advanced 107 feet BLS before competent limestone was encountered testifying to the depth of this feature. Due to the depth to water (in excess of 30 feet BLS), a check ball/mechanical lifting method was utilized to purge the microwells. These samples were utilized for screening purposes because of the elevated turbidities associated with the purging method. Ground water samples were collected for metals (EPA Method 200.8), semi-volatiles (EPA Method 8270C), and organochlorine pesticides (EPA Method 8081 modified) analyses.

Four additional microwells screening the upper Floridan aquifer were constructed and sampled during the latter half of October 2004 (DEP18D through DEP21D). These wells were positioned in areas hydraulically upgradient to the Indian Springs Drive supply well that showed the most impact by arsenic (128 ug/L)(Table 4, Figure 18). Ground water samples were collected for metals (EPA Method 200.8). In addition, a 100-foot deep supply well, located at 2764 Indian Springs Drive, was discovered and sampled. This well, which is no longer in use (results indicated it to be impacted with arsenic at a level of 200 ug/L), is located next door to the 128 ug/L impacted supply well. During sampling activities, another new supply well was installed on the lot located immediately southeast of the karstic feature. A water sample was collected from the new well (designated New House-Old Hickory Circle); a sediment sample was collected from material present in the water due to the well's incomplete development.

Later in December 2004, deep screen point samples were collected in the vicinity of the 2766 and 2764 Indian Springs Drive supply wells (SP1 and SP2)(Table 4, Figure 18). This was done to ascertain the extent of arsenic in relation to depth in hopes of determining whether an arsenic source area was in proximity to this area. A screen point sample was also collected near the confluence of the linear karstic feature and the spring run lineament (SP3). It was conjectured by SIS that fractures within the limestone units housing the Floridan aquifer may be providing preferential flow pathways for ground water. The presence of these fractures may account for the unusual distribution of arsenic on both sides of the pond. The direct push was able to drive the SP3 sampler to 70 feet BLS. Direct push refusal was encountered only 10 feet BLS at two locations just 100 feet away from the SP3 location. This testifies to how thin fractures may be that are present within the underlying limestone.

Screen point samplers were utilized to collect ground water samples because they can be pushed deeper into the substrate due to their thinner profile. After the screen point sampler was pushed to refusal, an outer sheath was removed with extension rods

exposing a 0.004-inch slotted, stainless steel screen to the sample interval. Polyethylene tubing was then inserted through the rods and two feet into the ground water. Ground water was then purged using a check ball/mechanical lifting method. Ground water samples were analyzed for arsenic and lead utilizing EPA Method 200.8. Once ground water sampling was completed at the collection point, extension rods were used to knock out an expendable point, and the borehole was grouted from bottom to top, through the sampler.

Screen point sample intervals are presented in [Table 4](#). Analytical results are presented in Section 5.0 of this report.

In January 2005, sediment samples (Soil 121 to 134) were collected for EPA Method 6020 analysis from the eastern shoreline where Old Hickory Creek flows into the pond ([Figures 16 and 17, Table 3](#)). This area is located hydraulically upgradient to the highest levels of arsenic in ground water located across the western side of the pond. The vicinity adjoins land that appeared to be utilized for grazing over sixty years ago ([Figure 17, Table 3](#)). During the first week of March, a final series of samples (Soil 135 thru 160) were collected by boat within an area of the pond abutting the Old Hickory Creek confluence. During episodes when the pond water level is low, this portion of the lake becomes arable land ([Appendix B](#)). Much of the pond in this location is less than two feet deep ([Photograph 9](#)).

4.0 Site Conditions

4.1 Regional Geomorphology and Stratigraphy

Jackson County is located in northwest Florida and includes an area of approximately 942 square miles. The county's topography ranges from 70 to 320 feet above sea level. Physiographically, the county can be divided into three units: the Marianna River Valley Lowlands, the Delta Plain Highlands, and the Terraced Coastal

Lowlands, all minor units of the Coastal Plain Province. These minor units have been developed by the degradation and alluviation of streams and through coastal erosion by the sea (Moore, 1955). The geomorphology and hydrogeology of this region of Florida are typical of a karstic terrain. As the carbonate rocks beneath the residuum chemically weather and collapse, subsidence features such as sinkholes commonly develop. Jackson County has greater than 2,800 mapable surface karstic features (Collins, 1996).

The exposed geologic formations of Jackson County range from Upper Eocene (Ocala Limestone) to Recent (river floodplain deposits) in age and include the Undifferentiated Suwannee-Marianna Limestones (Lower Oligocene) and the Chattahoochee Formation (Miocene) (Scott, 2001). The gravel, sand, and clay deposits underlying the terrace surfaces represent deposition during the interval between the Miocene and the Recent (Moore, 1955).

In Jackson County, there are three primary ground water units present. These are the surficial aquifer system, an intermediate confining unit, and the Floridan Aquifer system.

The surficial aquifer system is a shallow, unconfined unit with an upper and lower zone in which the water level is free to rise and fall dependent on the downward migration of rainfall. The aquifer system is near enough to the surface so that most wells tapping into it are dug wells and very low producing, generally less than five gallons per minute. It is not extensively used for public consumption (Hydrogeology of the Northwest Florida Water Management District, 1983).

Underlying the surficial aquifer is a series of low permeability clays and sandy clays that are part of Miocene sediments. These sediments act as an intermediate confining unit for the deeper Floridan Aquifer system. Within this stratigraphic unit are thin layers of limestone interbedded with clays. These carbonates create minor water bearing zones generally yielding less than 10 gallons per minute. Due to the inconsistency of these interbedded limestones and the low amounts of water that can be

produced from this intermediate aquifer; it is not generally tapped for public use (Hydrogeology of the Northwest Florida Water Management District, 1983).

The Floridan Aquifer underlies all of Jackson County and exists in two separate zones. The first zone occurs only in the southeast corner near Gadsden County and yields water in excess of 1000 gallons per minute. The sediments within this zone are largely porous limestones with well-developed secondary porosity. The recharge for these zones comes from areas of eastern Jackson County where surficial sediments allow extensive downward migration of rainfall and other surface waters (Hydrogeology of the Northwest Florida Water Management District, 1983).

The second zone comprises the remainder of the Floridan Aquifer system in Jackson County. This zone greatly differs from the first in that it has no developed secondary porosity and no direct recharge due to the presence of overlying, low permeable Miocene sediments. As a result, recharge of this zone is solely dependent upon leakage of these sediments. Wells that tap this zone average three hundred gallons per minute (Hydrogeology of the Northwest Florida Water Management District, 1983).

The potentiometric surface of the Floridan Aquifer in Jackson County ranges from 60 to 110 feet above sea level with ground water flow direction primarily towards the south-southeast.

4.2 Site Topography and Lithology

The topography within the study site is approximately 100 feet National Geodetic Vertical Datum (NGVD, 1929) and is generally flat except for locations near the Merritts Mill Pond and the three ravines. Near those features, there are resultant decreases in elevation of ten to thirty feet. Another area where there is a decrease in elevation is the location of the collapsed/filled sinkhole between Indian Springs Road and Old Hickory Creek Circle. Competent rock was tagged at this location 107 feet BLS; elsewhere, rock

was generally tagged 20 feet BLS. A cross-sectional presentation of this feature is presented in [Appendix F](#).

Native soils are predominantly sands and silts with clay becoming more evident at depth. Sands are unconsolidated quartz, dark orange with grain sizes ranging from fine grain to gravel. Clay was observed to be light orange to gray, very plastic, and dry. Limestone and dolostone was encountered approximately 25 to 30 feet BLS except near the ravines, where it was met at approximately 8 feet BLS. ECLs displaying unconsolidated lithologies encountered at the site are presented in [Appendix D](#).

During the installation of the Floridan aquifer monitor wells, Miocene to Oligocene aged formations were encountered including limestones rich in foraminifera fossils with interbedded dry clays ([Appendix F](#)). Within the site area, the first rock encountered is part of the Chattahoochee Formation, a predominantly fine-grained, often fossiliferous, silty to sandy dolostone and limestone. Below this interval are the Undifferentiated Suwannee-Marianna Limestones, which are positioned on top of the Eocene aged Ocala Limestone. The undifferentiated limestones are a variably argillaceous marine limestone, off-white to light gray to pale orange, with small amounts of siliciclastic sediments. Abundant glauconite, an indicator mineral for this geologic unit (Scott, 2001), was identified in cores collected along Flynt Circle approximately 45 to 65 feet below land surface. Glauconite is an iron-rich, green, phyllosilicate mineral that occurs in certain sedimentary formations of marine origin. Studies have been performed that have associated soils containing glauconite with high concentrations of arsenic (Dooley, 2001). The glauconite rich interval was screened by the SIS shallow Floridan aquifer monitor wells.

4.3 Site Hydrogeology

The surficial aquifer ground water surface at the study site is encountered from 4 to 28 feet BLS depending on that location's surface elevation ([Table 5](#)). The ground

water surface within this zone attempts to mirror the topography located above. Consequently, ground water within the surficial aquifer system flows either towards the ravines located within the site or the Merritts Mill Pond (Figure 19).

Below the surficial aquifer system, a dry sequence of clays, silt, dolostone and limestone were encountered. It wasn't until approximately 45 feet BLS that damp sediments were reencountered. The shallow Floridan aquifer monitor wells installed by SIS screen this interval. Hydraulic head measurements of this portion of the aquifer (59' to 63' NGVD) are very similar to those observed in the SIS installed Floridan aquifer deep monitor wells (Table 5).

The ground water surface within the Floridan aquifer is complex. Based on Northwest Florida Water Management District historical potentiometric maps, ground water within the Floridan aquifer in proximity to the study site usually flows towards the west, with north and south vectors present. Flow at times on the western side of the pond, however, has been observed to be easterly towards the pond (Figures 20 through 22). This variance in flow direction is likely an artifact of the interaction between the fixed artificial height of the Merritt Mill Pond's surface caused by the dam and the natural rise and fall of the Floridan aquifer. The aquifer's interaction with the fluctuation of the Chipola River's height is also probably responsible for past changes in the ground water surface between the pond and the river. Another complexity associated with the Floridan aquifer's ground water flow in this area is the array of uncharted fractures present in the limestone. These fractures provide preferential ground water flow pathways that have undoubtedly aided in the heterogeneous distribution of arsenic within the site. Attempts have been made to map the surface reflection of these fractures (lineaments) (Appendix F).

During this investigation, the Marianna area was experiencing normal to above normal rainfall. SIS Floridan aquifer measurements established that ground water flow direction within the site boundaries at the time of the study was towards the west (Figures

23 and 24). In September 2004, the pond's surface elevation was measured. The elevation of the pond's surface was three to four feet higher than the Floridan aquifer's hydraulic head observed in the adjacent network of monitor and supply wells. This suggests that within the study area, the pond and the underlying Floridan aquifer have no direct connection. As earlier mentioned, this is not the case near the pond's northern terminus where a series of springs connect the aquifer to the pond.

5.0 Analytical Results

5.1 Soil/Sediment Sample Analytical Results

Samples collected from the ravine intersecting Rooks Drive were generally reported to be laboratory nondetect for arsenic (Figure 25). Minimum detection limits were between 0.28 and 0.38 milligrams per Kilogram (mg/Kg) (Table 7). Samples reported to contain the highest concentrations of arsenic include Soil21B(84-90"): 12.1 mg/Kg; Soil24(90-96"): 9.36 mg/Kg; Soil21A(84-90"): 4.96 mg/Kg; and Soil21A(3-3 1/2'): 3.97 mg/Kg. Additional soil samples were collected in the vicinity of sample location Soil21 due to the elevated concentrations of arsenic reported present (compared to other sample locations).

Concentrations of arsenic identified in samples gathered from the suspected fill area were less than 2.09 mg/Kg. Concentrations of arsenic in the pond sediments collected by the FSU Academic Dive Team were even less (below 1 mg/Kg).

Laboratory results of samples collected from within the second ravine and along the waterfront demonstrated slightly higher levels than those observed elsewhere. Locations Soil72(3-3 1/2 '), Soil73(3-3 1/2 '), Soil74(3-3 1/2 '), and Soil101(0-1') had arsenic levels of 16.7, 13.4, 13.7, and 18.5 mg/Kg, respectively. Confirmation samples at these locations, however, produced lower levels of arsenic (1.3 mg/Kg, 8.36 mg/Kg, below minimum detection limits, and 0.69 mg/Kg, respectively). Very low concentrations of

organic compounds were reported present in the follow-up samples collected from this area. Bis(2-ethylhexyl)phthalate, a plasticizer, was identified in samples Soil 72A and 74A at levels less than 1,900 micrograms per Kilogram or ug/Kg (Table 8). The pesticide DDE-p,p', was also reported present in sample Soil 72A at a level of 2.0 ug/Kg. This area receives surface run-off from Flynt Circle and adjoining lots.

As previously mentioned, during the installation of monitor well FL-2 Deep, a rich glauconitic interval was encountered approximately 45 feet BLS. A sample of this lithology was analyzed to contain arsenic at a level of 28 mg/Kg. Core samples from comparable intervals taken during the installation of the shallow Floridan aquifer monitor wells also contained elevated concentrations of arsenic. Levels ranged from 6.25 mg/Kg in sample FL-1S (45') to 20.4 mg/Kg in sample FL-4S (64').

Sediment samples collected from along the pond's eastern waterfront, the karstic feature adjacent to Indian Springs Road and the eastern extent of the pond itself near the confluence of Old Hickory Creek, were reported to contain very low concentrations of arsenic. The highest concentration of arsenic on that side of the pond was in Soil119(1-12") at a level of 7.3 mg/Kg (Figure 25, Table 7). Samples collected for organic analyses (semivolatile and pesticide compounds) were reported free of the analytes presented in Table 8.

Lead was generally identified at comparatively higher concentrations than arsenic throughout the site. In fact, lead was reported above the laboratory's minimum detection limit in every sample (Figure 26, Table 7). The highest concentration of lead reported present was in waterfront sample Soil79(1-1 ½') with a level of 55 mg/Kg. The arsenic concentration reported in that sample was 0.98 mg/Kg. The glauconitic nodule sample collected from the FL-2 (45-55') interval contained lead at a level of 52.9 mg/Kg. This sample was reported to contain arsenic at a level of 28 mg/Kg. Other sediment samples collected from the same interval during the installation of the shallow Floridan aquifer monitor wells had far reduced concentrations of lead ranging from 1.2 to 3.2 mg/Kg of

lead. Soil101(0-1'), collected from the second ravine, had a lead level of 51.2 mg/Kg (arsenic: 18.5 ug/Kg). Confirmation sample Soil101A contained lower levels of lead (10.5 mg/Kg) and arsenic (0.69 mg/Kg). Elsewhere, first ravine samples Soil36(12-18''): 25.6 mg/Kg, Soil14(3-3 ½'): 20.8 mg/Kg, and Soil16(12-18''): 20.7 mg/Kg had the next highest reported concentrations of lead. The Pond 2 sediment sample contained lead at a level of 15.9 ug/L; lead levels in the remaining pond samples were generally less than 7.5 mg/Kg. Concentrations of lead in samples collected along the eastern side of the pond were less. Soil119(0-12''), which was reported to contain the highest level of arsenic collected on the pond's eastern side, also contained the highest level of lead (17.8 mg/Kg) from that portion of the site.

There appears to be a loose relationship between sediment/soil lead and arsenic concentration trends at the study site. Samples reported to have elevated concentrations of lead were likely to have raised levels of arsenic. Thirty-five of the fifty soil samples containing the highest concentrations of lead, also contained the highest concentrations of arsenic. Of the 50 soil samples containing the lowest concentrations of lead, twenty-seven of these samples were reported nondetect for the presence of arsenic. This trend may be an artifact of the sample's lithologic grain size and type. Organic, marl, and clayey soils from wet soil suborders tend to have greater concentrations of metals due to their tendency to sorb organic and inorganic compounds (Gomez-Caminero, 2001).

All equipment blanks contained no reportable concentrations of arsenic above laboratory detection limits. Lead was reported in several equipment blanks. Auger Equipment Blank#4 (0.27 micrograms per Liter (ug/L)), Auger Equipment Blank#6 (0.35 ug/L), Auger Equipment Blank#7 (0.068 ug/L), Auger Equipment Blank#8 (0.053 ug/L), Equipment Blank Core Barrel#1 (0.11 ug/L), Equipment Blank Core Barrel#2 (1.4 ug/L), Tubing Blank #4 (2.9 ug/L), Equipment Blank Screen Point (0.24 ug/L), and Submersible Pump Equipment Blank (0.084 ug/L) contained extremely low but reportable concentrations of lead ([Table 9](#)).

5.2 Surface and Ground Water Analytical Results

One of the four surface water samples collected from the first ravine intermittent creek intersecting Rooks Drive and Flynt Circle was analyzed to contain arsenic, albeit at a very low concentration of 0.66 ug/L. Lead was present in all four samples at levels ranging from 2.3 to 15.3 ug/L (Table 9). The Creek 10 surface water sample contained both a reportable concentration of arsenic and the highest level of lead.

Concentrations of arsenic and lead in samples collected from the hand installed first ravine monitor wells were either below or just above the Central Laboratory's minimum detection limit. Ravine MW-4 contained the highest levels of arsenic (1.3 ug/L) and lead (1.6 ug/L) reported in a ravine monitor well sample (Table 9).

Low concentrations of these metals were also reported present in the network of shallow microwells installed by SIS (Table 9). The highest level of arsenic was in a sample collected from microwell DEP 8D (15.3 ug/L); the sample had an elevated turbidity value of 272 Nephelometric Turbidity Units (NTUs)(Table 10). Samples from the remaining microwells contained less than 3.8 ug/L of arsenic. The highest lead level in a SIS microwell sample was from DEP 2D (85.5 ug/L). This sample was also compromised by high turbidity values. Lead values in samples collected from the remaining network were far reduced. The next highest level of lead (16.8 ug/L) was collected from DEP 8D. The remaining samples contained concentrations less than 4.5 ug/L.

SIS collected water samples from two private supply wells located on the western side of the study site. The sample collected at 4923 Flynt Circle (New House) was reported to contain arsenic and lead at levels of 16.4 ug/L and 4.8 ug/L, respectively (Table 9). This particular well is located within the confines of the former peach orchard. A sample from the well located across the street at 4924 Flynt Circle was also impacted with arsenic (47.3 ug/L) and lead (12 ug/L). This well was previously reported by JDOH to contain no arsenic. It was later realized that the JDOH sample had passed through an

iron reduction filter prior to sample collection; this effectively removed any arsenic present from the raw sample.

Ground water samples collected from the SIS network of deeper Floridan aquifer monitor wells showed impact by arsenic, particularly in monitor wells FL-2 Deep (214 ug/L) and FL-3 Deep (118 ug/L). The sample from monitor well FL-1 Deep contained arsenic at a level of 27.6 ug/L. Lead concentrations were far reduced in these samples; levels were less than 0.33 ug/L.

Concentrations of arsenic in the shallow Floridan aquifer monitor wells were also minimal. The highest concentration of arsenic reported present was 2.2 ug/L in monitor well FL-4 Shallow. Levels of lead were also very low except for a concentration of 12.2 ug/L reported in sample FL-2 Shallow. Arsenic was reported below laboratory detection limits in that particular sample.

On the eastern side of the pond, supply well samples collected from the 2766 and 2764 Indian Springs Road addresses indicated the elevated presence of arsenic at levels of 78.3 and 200 ug/L. The screen point sample (SP1) collected adjacent to the 2764 Indian Springs Road well contained arsenic at a level of 18.8 ug/L. The difference in depth between the well and the screen point's sampled interval is 43 feet. The SP2 sample, collected in the vicinity of the 2766 Indian Springs Road well contained arsenic at a concentration of 5.6 ug/L. The SP3 sample, collected within the fracture zone associated with the karstic feature was reported to contain arsenic at a concentration of 116 ug/L. This is the highest level of arsenic observed in a shallow interval sample (collected from an interval less than 70 feet BLS). The network of microwells installed upgradient of these impacted supply wells and near the karst feature showed no significant impact by arsenic ([Table 9](#)).

No organic compounds were identified in water samples collected from the karst surface water feature and the adjacent microwells (DEP15D thru DEP17D)([Table 11](#)).

All submersible pump and tubing equipment blanks contained no arsenic above the laboratory detection limit; lead was reported present at extremely low levels (0.040 ug/L).

6.0 Conclusions

Although the distribution of arsenic in the Floridan aquifer has been delineated through the efforts of the Jackson County Department of Health and this study, the arsenic source area within the Merritts Mill Pond area remains undiscovered. The highest levels of arsenic in ground water are found near the intersection of Flynt Circle and Rooks Drive (Figure 27). The plume's boundary extends south to the Arrowhead Campground and west towards Merritts Mill Pond Road. There is an eastern component to the plume on the other side of the pond in the vicinity of Indian Springs Road. The supply wells and SIS sample points showing impact in this area are located in close proximity to the pond's eastern shoreline. Concentrations of arsenic in sample points located immediately east of those showing impact quickly reduce to levels commensurate with background. This heterogeneous distribution of arsenic is likely a result of preferential ground water flow pathways in the form of uncharted fractures within the limestone units housing the Floridan aquifer. In addition, historically large variances in ground water flow direction within the Floridan aquifer are also likely responsible for the wide distribution of arsenic. These directional changes are likely a consequence of the interaction between the artificially fixed Merritts Mill Pond water surface and the natural rise and fall of the Chipola River located west of the site.

Several potential source areas were identified and assessed during the course of this study. These areas include:

1. A ravine located immediately west of the Peacock supply well. Water from this well contains the highest levels of arsenic observed in ground water. The depth of the

ravine provides an easier pathway for arsenic, if spilled or dumped, to enter the underlying limestones that house the impacted aquifer. A cattle dip vat may have been located in this area several decades ago. Sediment samples from forty-three locations collected at various depths were analyzed from within the ravine. Surface and ground water samples were also garnered. Only one sample was reported to contain elevated levels of arsenic. This particular sediment sample was collected near an unusual bend in the intermittent creek located within the ravine. Confirmation samples collected from the same area were reported to contain only levels of arsenic analogous to background levels.

2. A possible fill area associated with a clearing identified in 1940 and 1955 aerial photos. This anomalous region is located on the southern portion of the Peacock property and extends eastward across Mathis Drive. It was speculated that arsenic based herbicides might have been used to help clear the tract of unwanted vegetation. This suspect area is located within the cluster of supply wells impacted by the highest concentrations of arsenic. Twenty-two soil samples and several surficial aquifer ground water samples were collected within this area. No samples were reported to contain anomalous concentrations of arsenic.

3. A former peach orchard once located on Flynt Circle north and east of the high arsenic cluster area. Fruit orchards are receptors of arsenic based insecticides and herbicides. A sample from a supply well located within the boundaries of the former orchard was reported to contain only slightly elevated concentrations of arsenic.

4. A second smaller ravine that extends from near Flynt Circle, north of Rooks Drive, to the pond. Considerations applied to the first ravine are relevant to this feature as well. Several sediment samples were collected from within the heart of this ravine and the western waterfront that the associated intermittent stream flows into. Elevated concentrations of arsenic were identified in five sediment samples ranging from 11.0 mg/Kg to 18.5 mg/Kg. Confirmation samples collected from the same locations were reported to contain arsenic at far reduced levels indicating that the higher levels initially

reported were not widespread and were likely an artifact of deposition. Samples collected for organic compound analysis were laboratory nondetect for the analytes of interest. Shallow ground water samples could not be collected within this ravine because the ground water surface was positioned below where direct push refusal was encountered. Shallow Floridan aquifer wells installed with roto sonic technology on Flynt Circle hydraulically down gradient of this ravine contained only background levels of arsenic.

5. The area along the pond's waterfront and the pond itself. The location of the waterfront has changed over the years due to times of drought or when the pond was drained to allow service or reconstruction to the dam. Historical aerial photographs show the shoreline's range of extent between high and low water marks. The photographs suggest that the water level before circa 1940 was considerably lower than present times due to the previous dam's construction details. During low water episodes, areas presently under water could have received arsenic through herbicides or a cattle dip vat. If a karstic feature within the pond is located nearby, a conduit for the arsenic connecting the surface to the underlying limestones may be present. If herbicides were a source of arsenic, their presence would likely be from use by private citizens. Only chelated copper and Endothall, neither of which contain arsenic, have been used by the State of Florida for invasive plant management in the Mill Pond. The Florida State University Academic Dive Team collected several samples within the pond adjacent to the western shoreline; none were reported to contain significant levels of arsenic.

6. The source of arsenic may be non-anthropogenic. During the installation of monitor wells on location, abundant glauconite was identified in sample cores. Naturally occurring glauconite has a geochemical association with arsenic. Some of the most elevated levels of arsenic reported (20.4 and 28 mg/Kg) were in samples collected from the interval rich in glauconite. Ground water samples collected from these wells, however, were determined to contain very low concentrations of arsenic. It is apparent

that arsenic is not leaching from the glauconitic sediments into the aquifer.

7. A geomorphologic feature located near Indian Springs Road. This geologic feature appears to be the surface reflection of a collapsed sinkhole. Sinkholes provide an avenue for contamination to bypass low permeability surface sediments and impact underlying aquifers. If this low area remained wet perennially, it would be an ideal location for a cattle dip vat. A University of Florida 1940 aerial photograph of the site shows the area to be semi-cleared, possible grazing land with small trees. The only samples collected in this vicinity to contain elevated levels of arsenic were in proximity to the eastern waterfront. Samples collected immediately adjacent to the sinkhole feature contained only background levels of arsenic.

8. The pond along the eastern waterfront near the confluence with Old Hickory Creek. This area was also arable land several decades ago when the pond's surface water level was lower than it is today. Several tens of sediment samples were collected from this area because it once bordered land that was possibly used for cattle grazing. Old Hickory Creek could also be positioned along a lineament, which is a surface reflection of a possible fracture within the subjacent limestone. None of the samples collected from this area were reported to contain elevated concentrations of arsenic.

Because the source of arsenic remains undetermined, it can only be conjectured by SIS that the original contamination was either excavated by residents long ago, was once located on land now covered and disseminated by moving water or remains hidden underneath the Merritts Mill Pond.

References

- Caminaro, Gomez P. Arsenic and Arsenic Compounds, Second Edition. Published under the joint sponsorship of the United Nations Environment Programme, the International Labour Organization, and the World Health Organization, and produced within the framework of the Inter-Organization Programme for the Sound Management of Chemicals. World Health Organization Geneva, 2001.
- Collins, Jerilyn J. Reconnaissance of Water Quality at Four Swine Farms in Jackson County, Florida, 1993. U.S. Geological Survey, Open File Report 95-770.
- Dooley, John H. Baseline Concentrations of Arsenic, Beryllium and Associated Elements in Glauconite and Glauconitic Soils in The New Jersey Coastal Plain. The New Jersey Geological Survey Investigation Report, 2001. Http Address: (<http://njedl.rutgers.edu/ftp/Images/djvu/1941.djvu>)
- Florida Administrative Code Chapter 62-520, 2003, Tallahassee, Florida
- Florida Administrative Code Chapter 62-550, 2003, Tallahassee, Florida.
- Florida Department of State. Florida Memory Collection. Http Address: <http://www.floridamemory.com/PhotographicCollection/>
- FDEP Comprehensive Quality Assurance Plan For Ground Water and Soil Sampling, 2005.
- FDEP, 2003. Cattle Dip Vats in Florida. Http Address: www.dep.state.fl.us/waste/quick_topics/publications/wc/cattlevats.doc
- FDOT, 2003. Surveying and Mapping Office aerial photographs.
- VanDyke, Jesse. E-mail communication, October 16, 2003.
- Lichtler, William F. Geology and Ground Water Resources of Martin County, Florida. Florida U.S. Geologic Survey, Report of Investigations Number 23.
- Moore, Wayne E., 1955. Geology of Jackson County, Florida. Florida Geologic Survey Geological Bulletin No. 37.
- Pittaro, Cristian, P. E-mail communication, November 25, 2003.
- Pratt, Tom. E-mail communication, December 12, 2003.

References (Continued)

NWFWMD, 1983. Hydrogeology of the Northwest Florida Water Management District.
80. Florida Geological Survey, 2001.

U.S.G.S., 1982. 7.5 Minute Topographic Quadrangle, Marianna, Florida.

Wisconsin Department of Agriculture, 2003. Lead and Arsenic in Soil of Old Fruit
Orchards. Http Address: [http://datcp.state.wi.us/arm/agriculture/pest-
fert/pesticides/accp/pdf/pba_qa_rev3.pdf](http://datcp.state.wi.us/arm/agriculture/pest-fert/pesticides/accp/pdf/pba_qa_rev3.pdf)

Figures

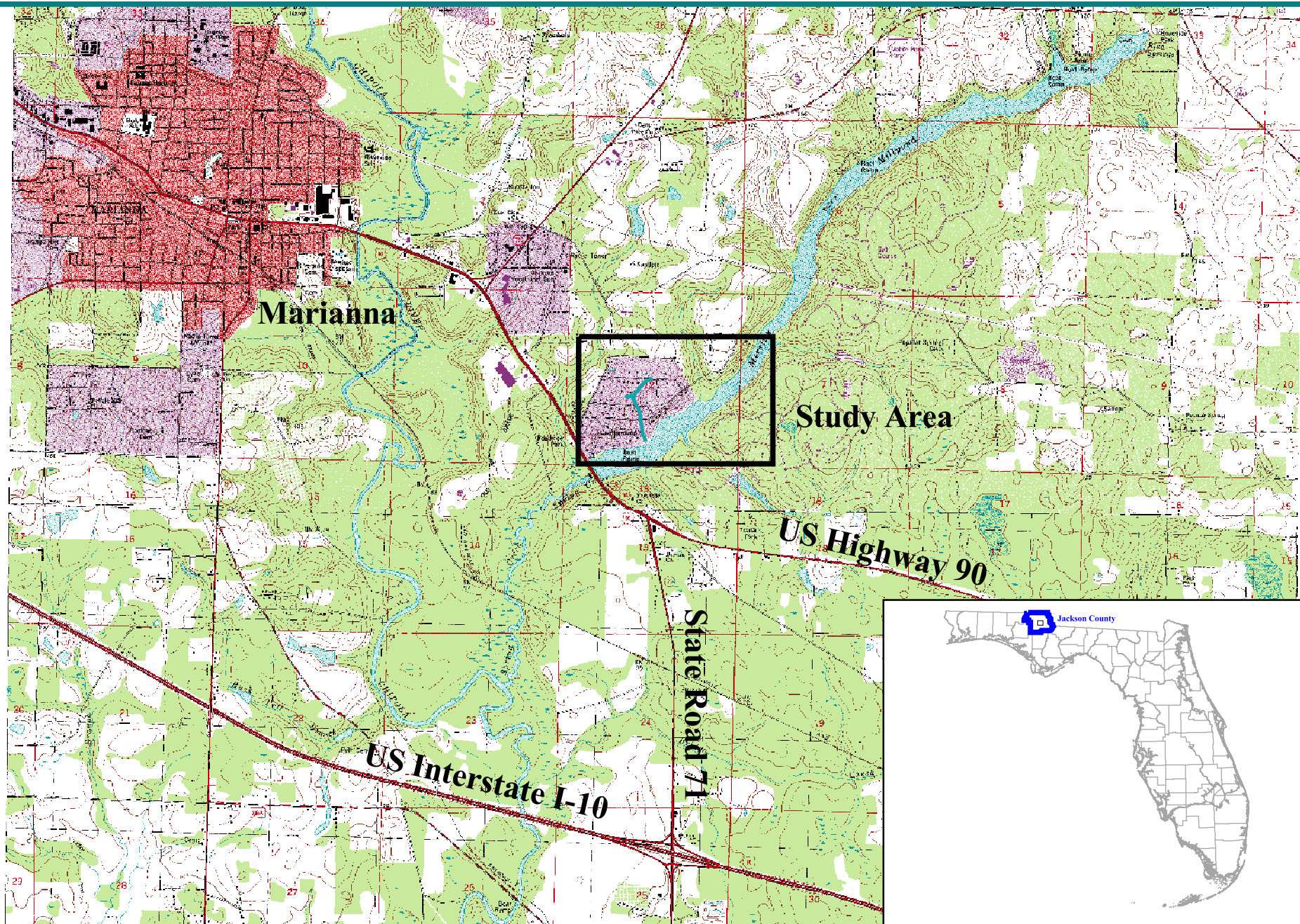
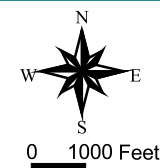


Figure 1
Study Site Location Map
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



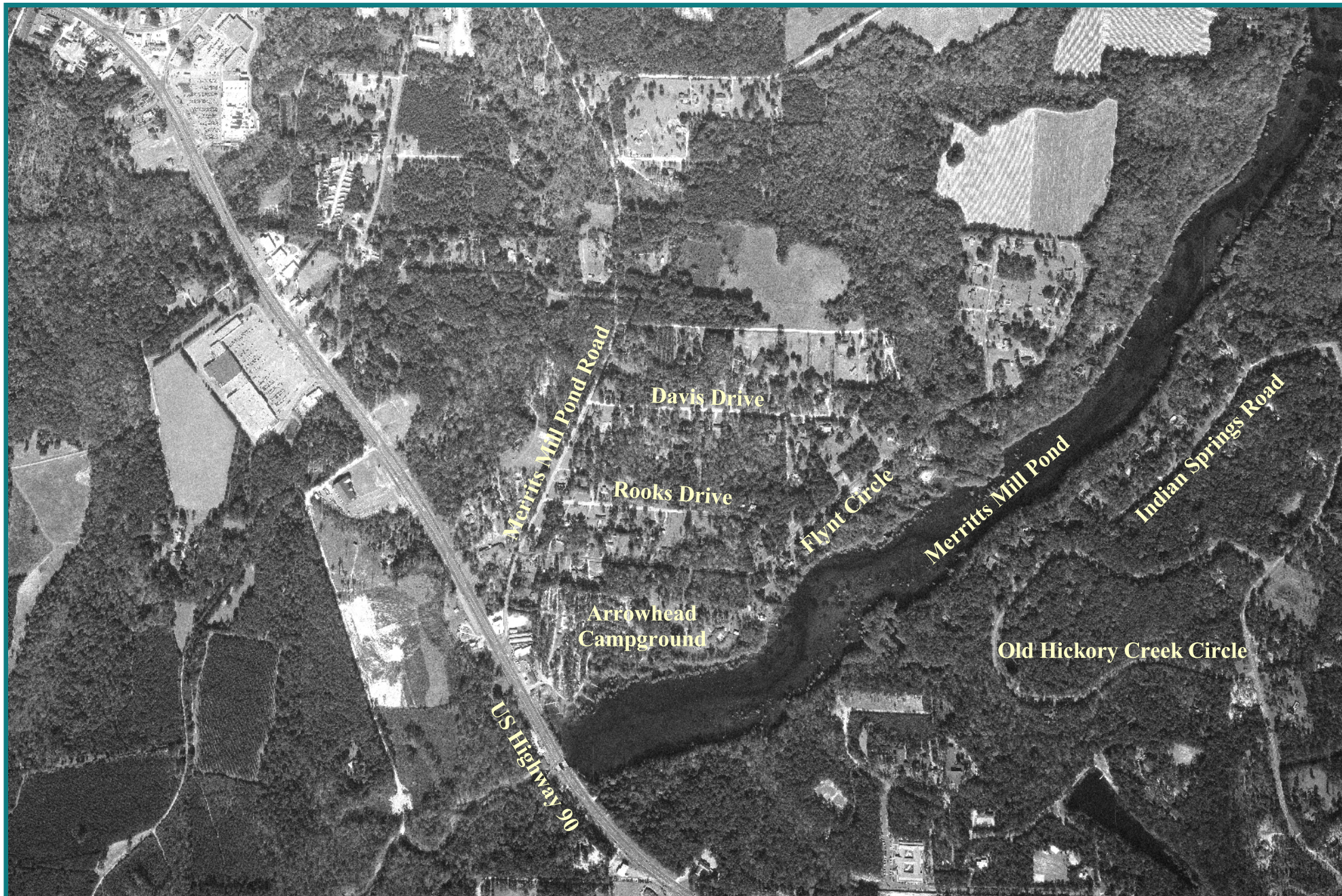


Figure 2
Study Site and Surrounding Area
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

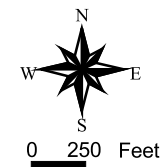
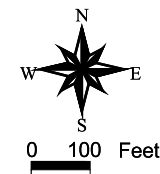




Figure 3
Study Site Ravine Features
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



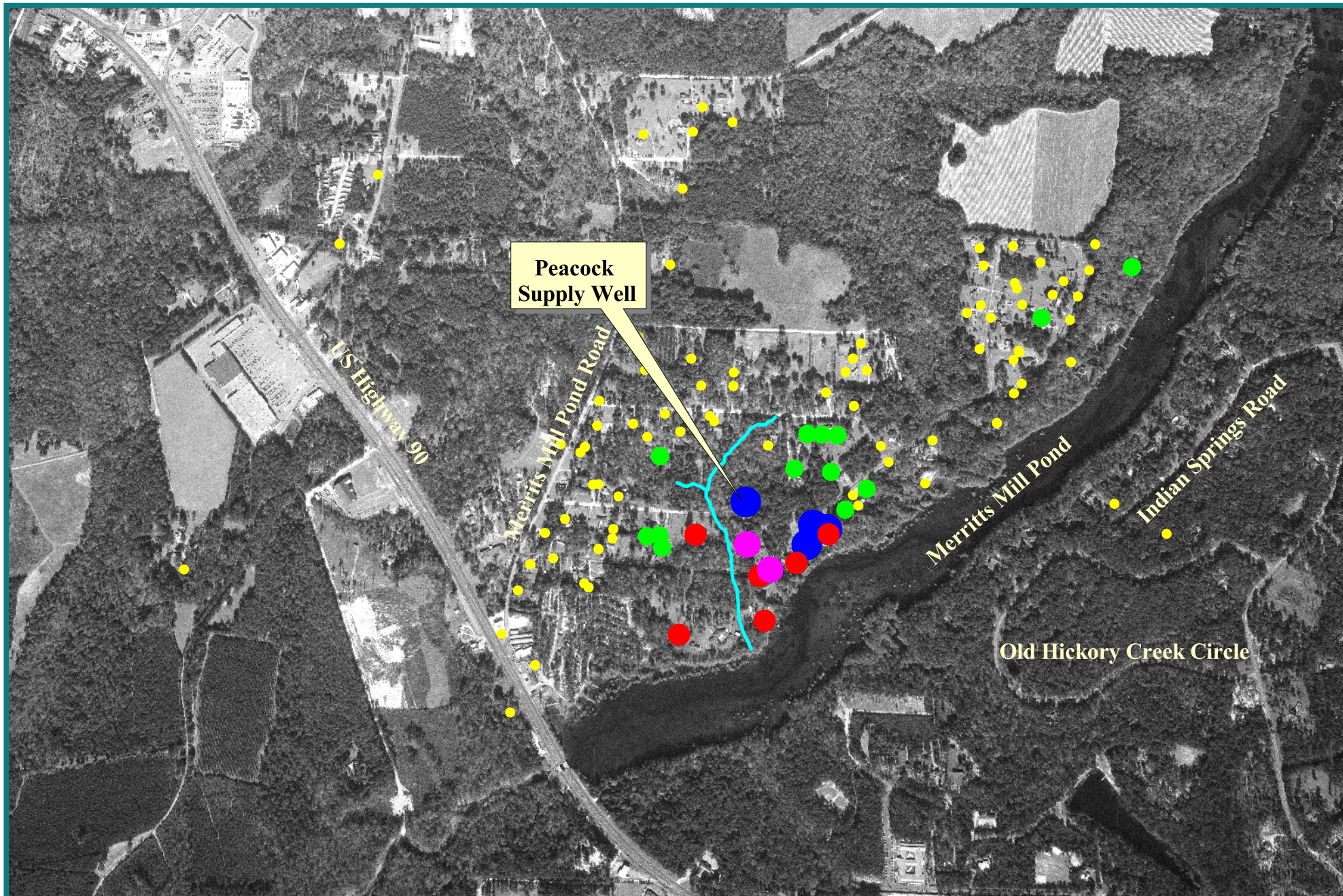
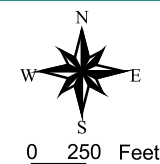


Figure 4
Arsenic Concentrations in Supply Wells
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Arsenic (Micrograms per Liter)



2003 JDOH
Sampling Results



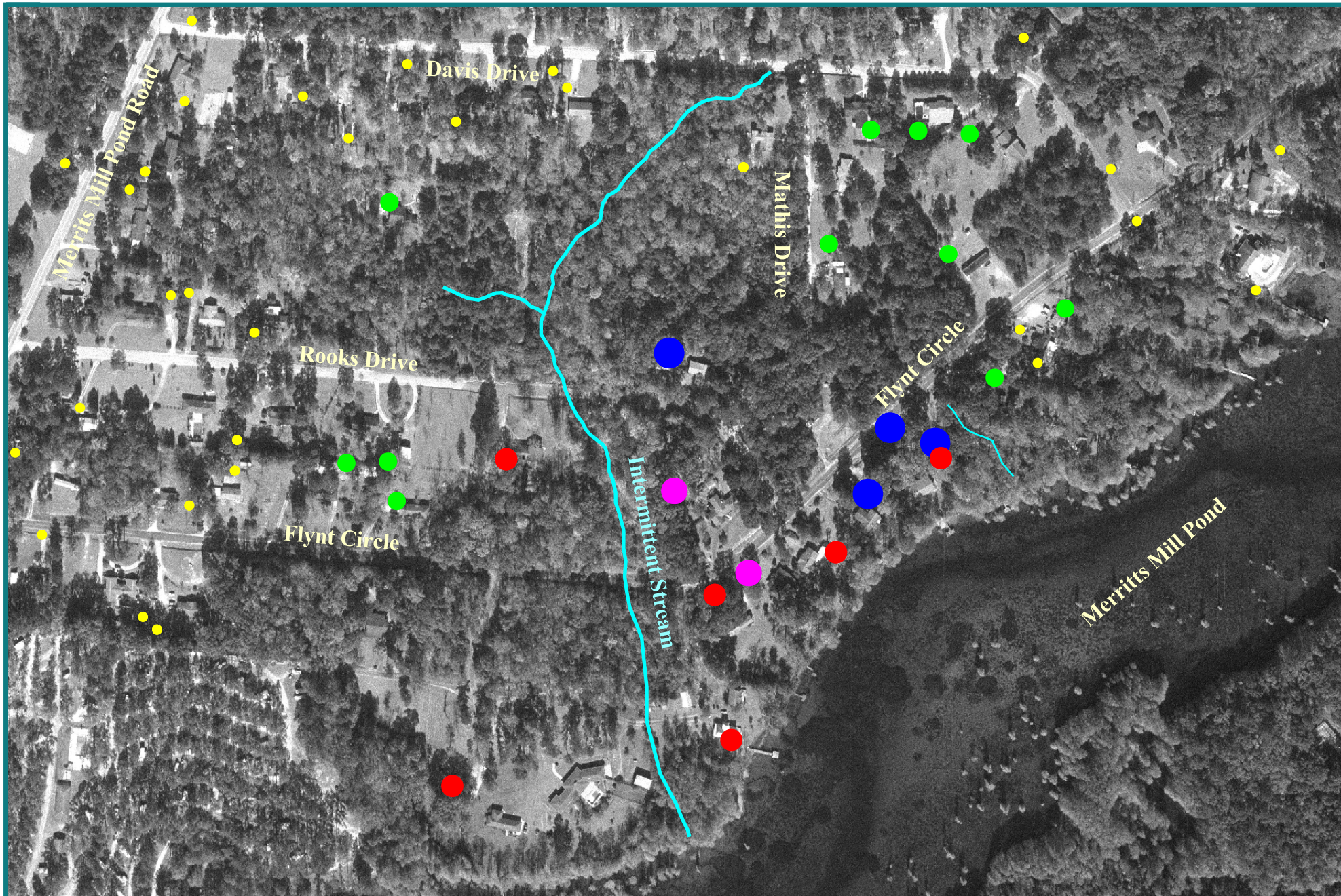
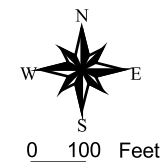


Figure 5
Arsenic Concentrations in Supply Wells (Closeup)
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Arsenic (Micrograms per Liter)



2003 JDOH
Sampling Results



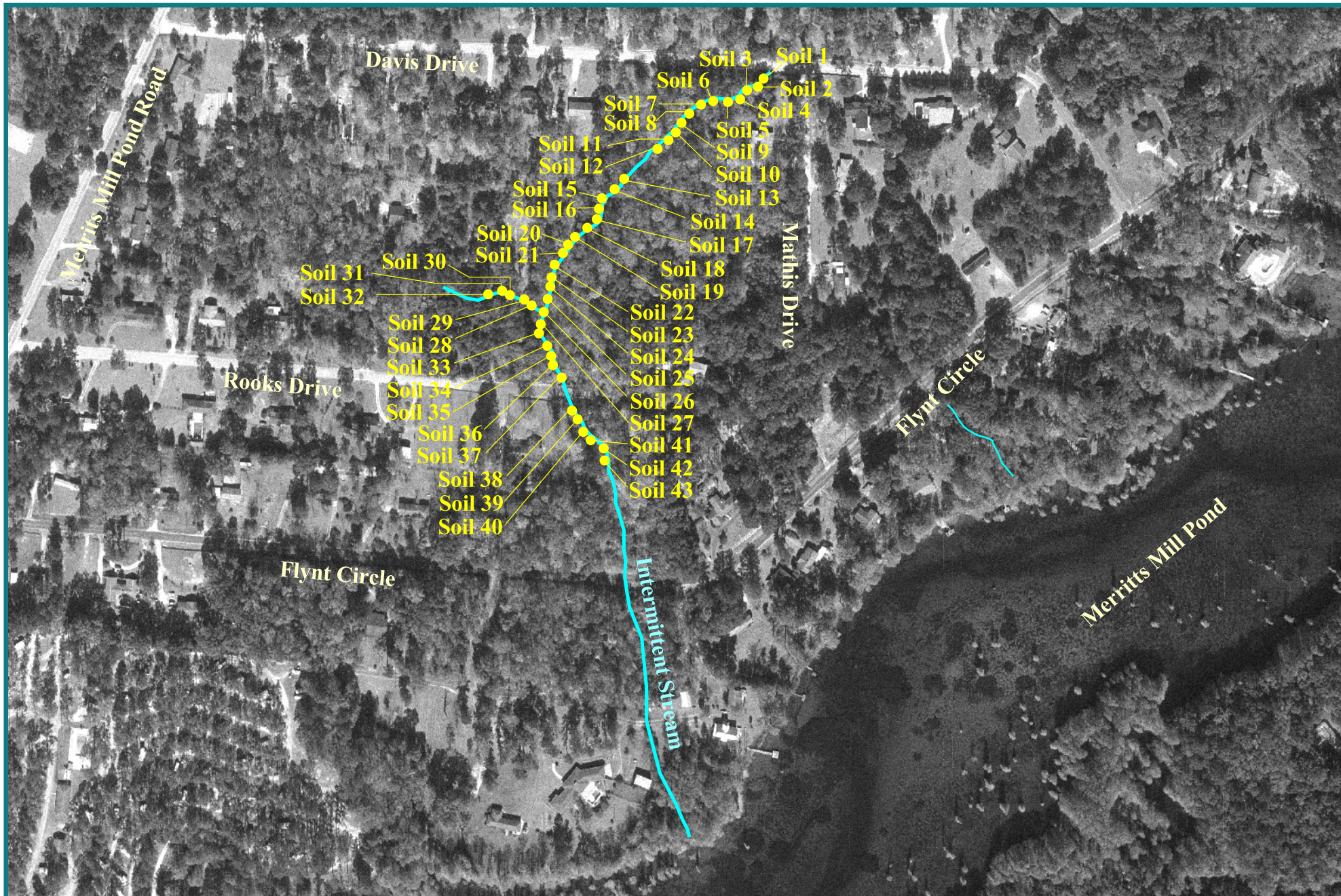
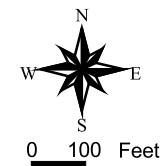


Figure 6
First Ravine Sediment Sample Locations
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



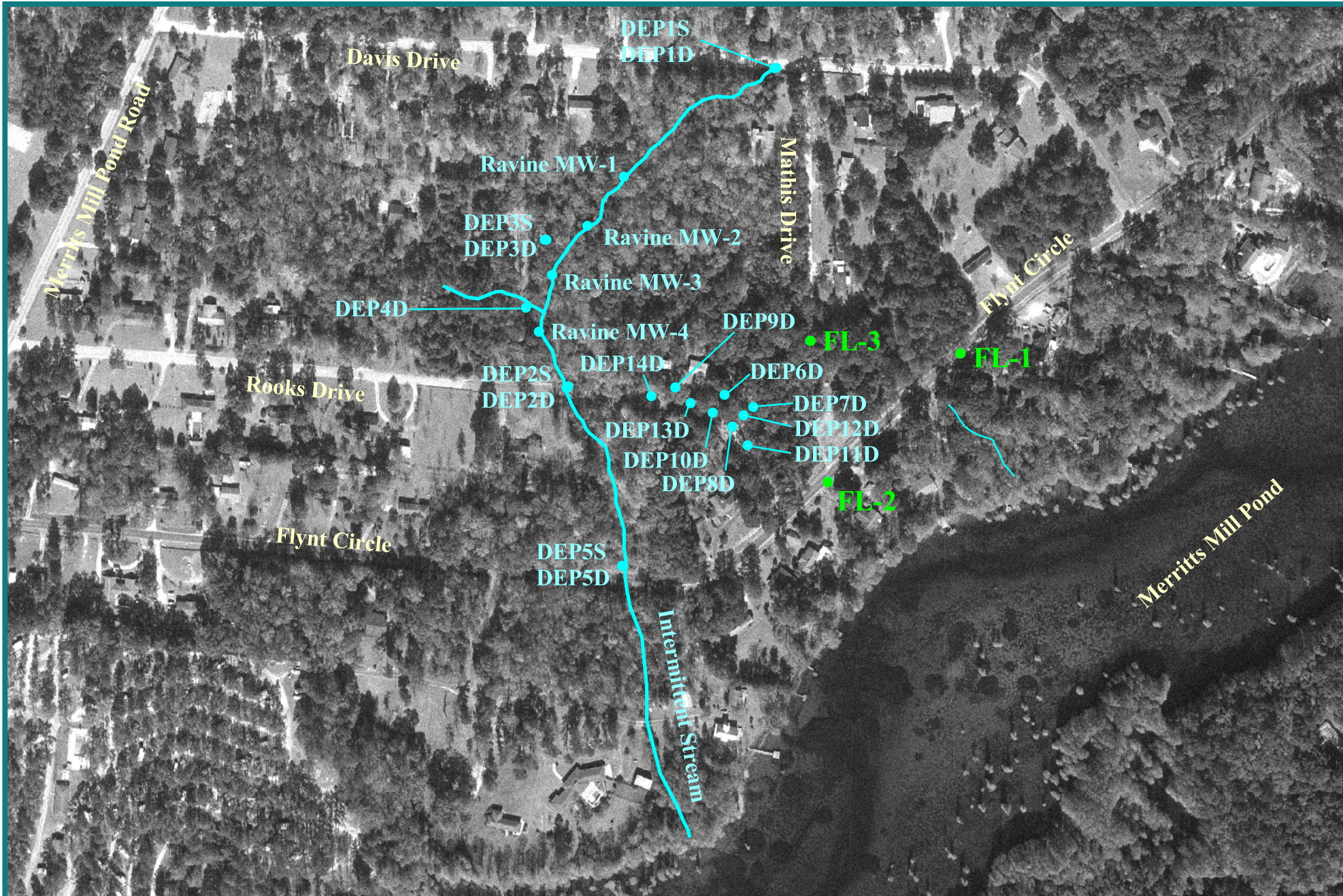
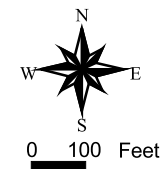


Figure 7
SIS Monitor Well Locations
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

- SIS Surficial Aquifer Monitor Well
- SIS Floridan Aquifer Monitor Well



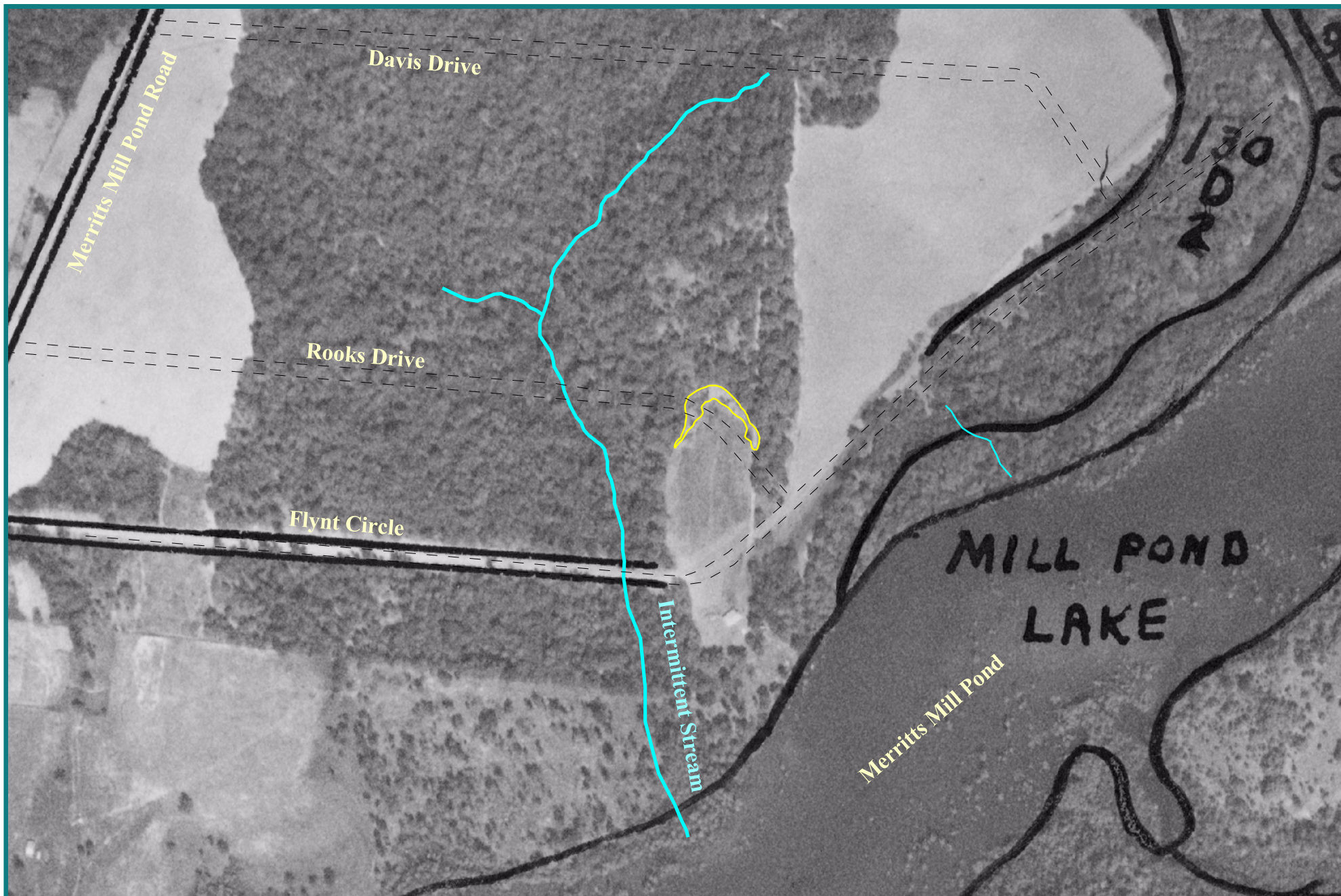
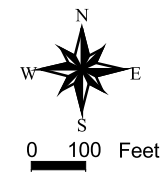


Figure 8
Location of 1955 Fill Area
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



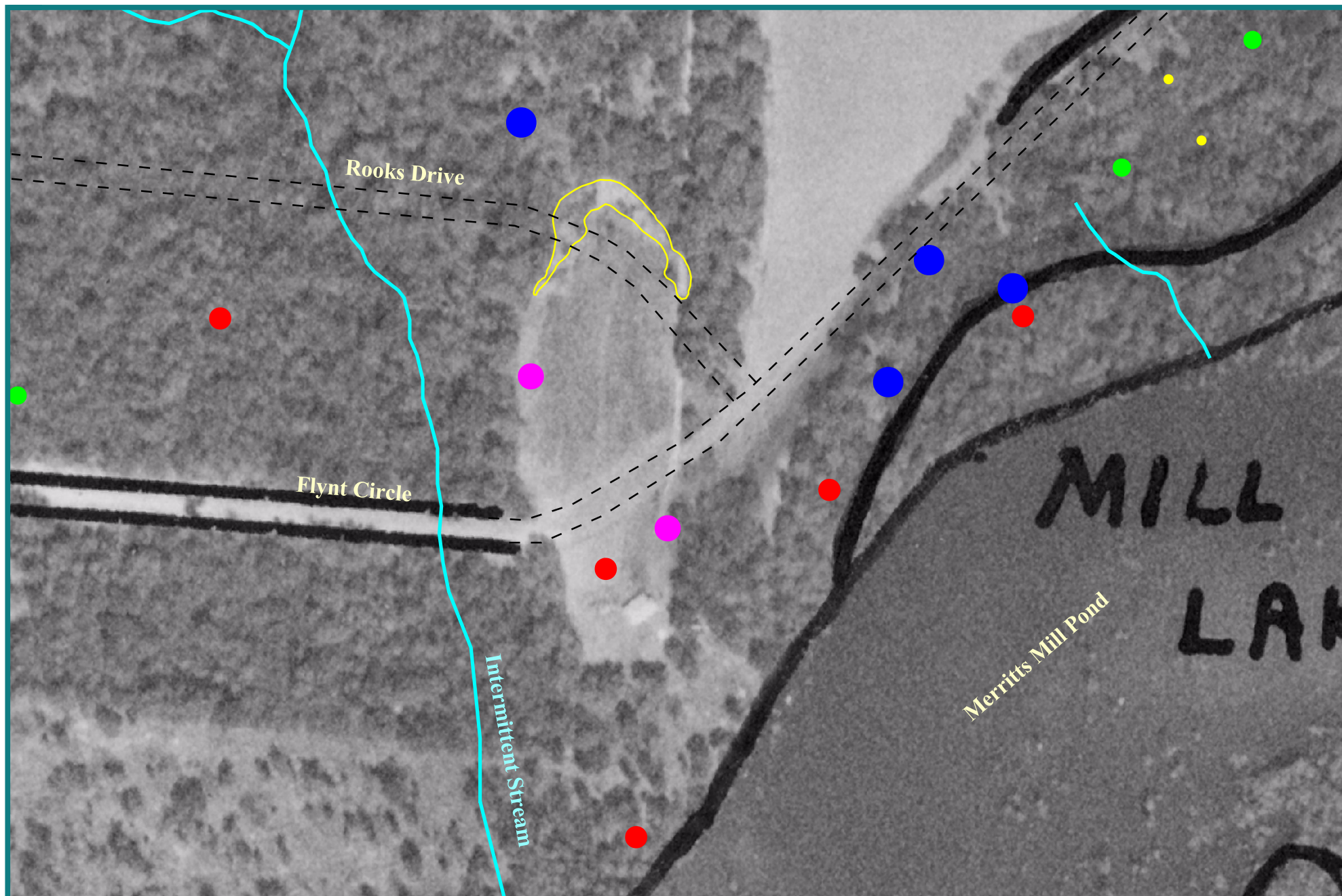
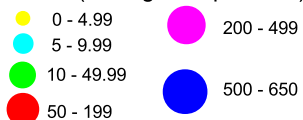


Figure 9
Location of 1955 Fill Area (Closeup)
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Arsenic (Micrograms per Liter)



2003 JDOH
Sampling Results

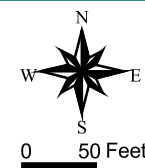




Figure 10
Fill Area Soil Sample Locations
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

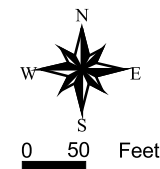
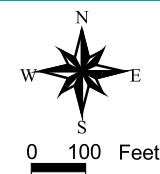




Figure 11
1970 Site Map
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



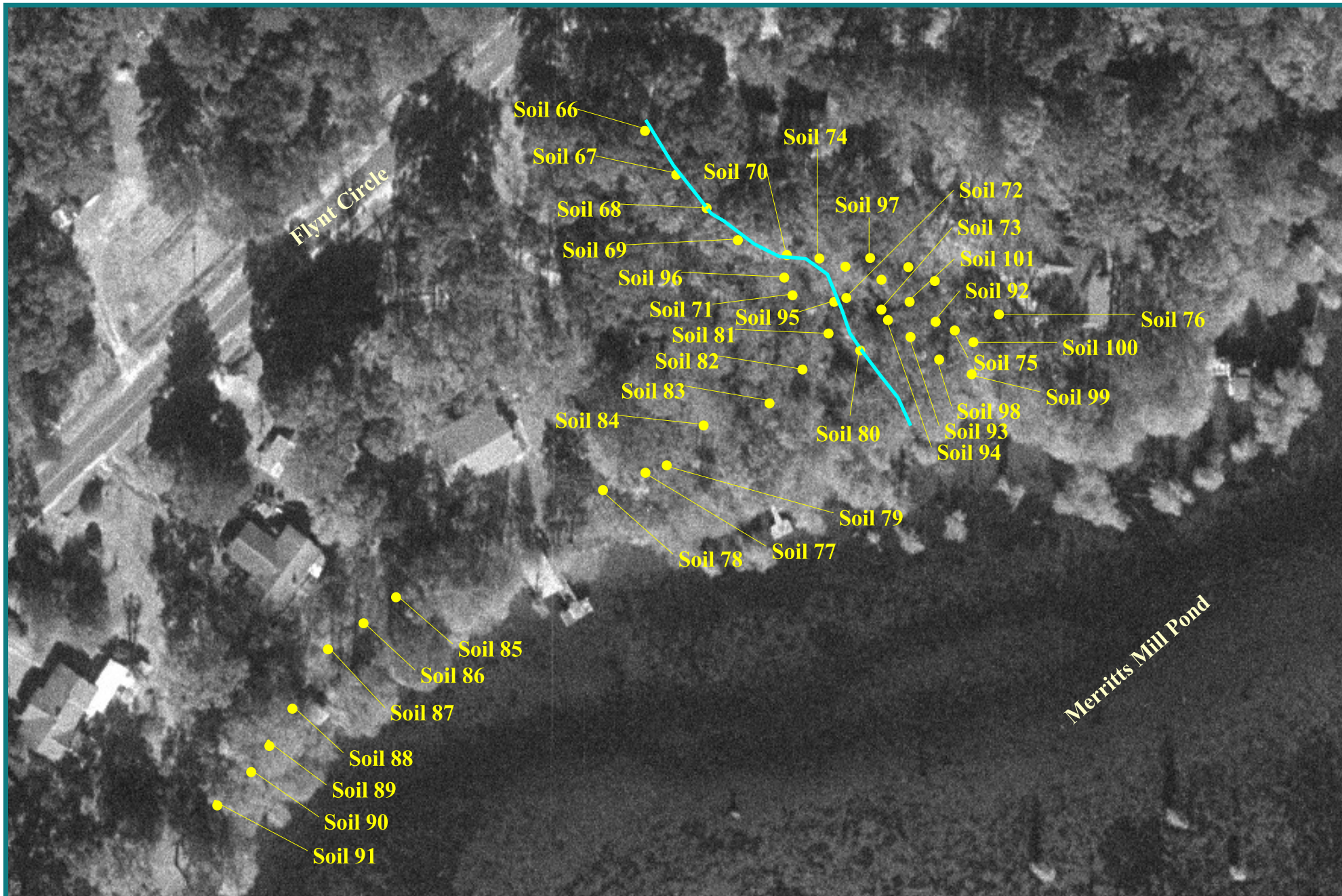
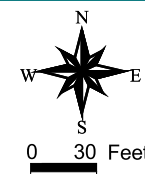


Figure 12
Second Ravine Area and Water Front Sample Locations
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



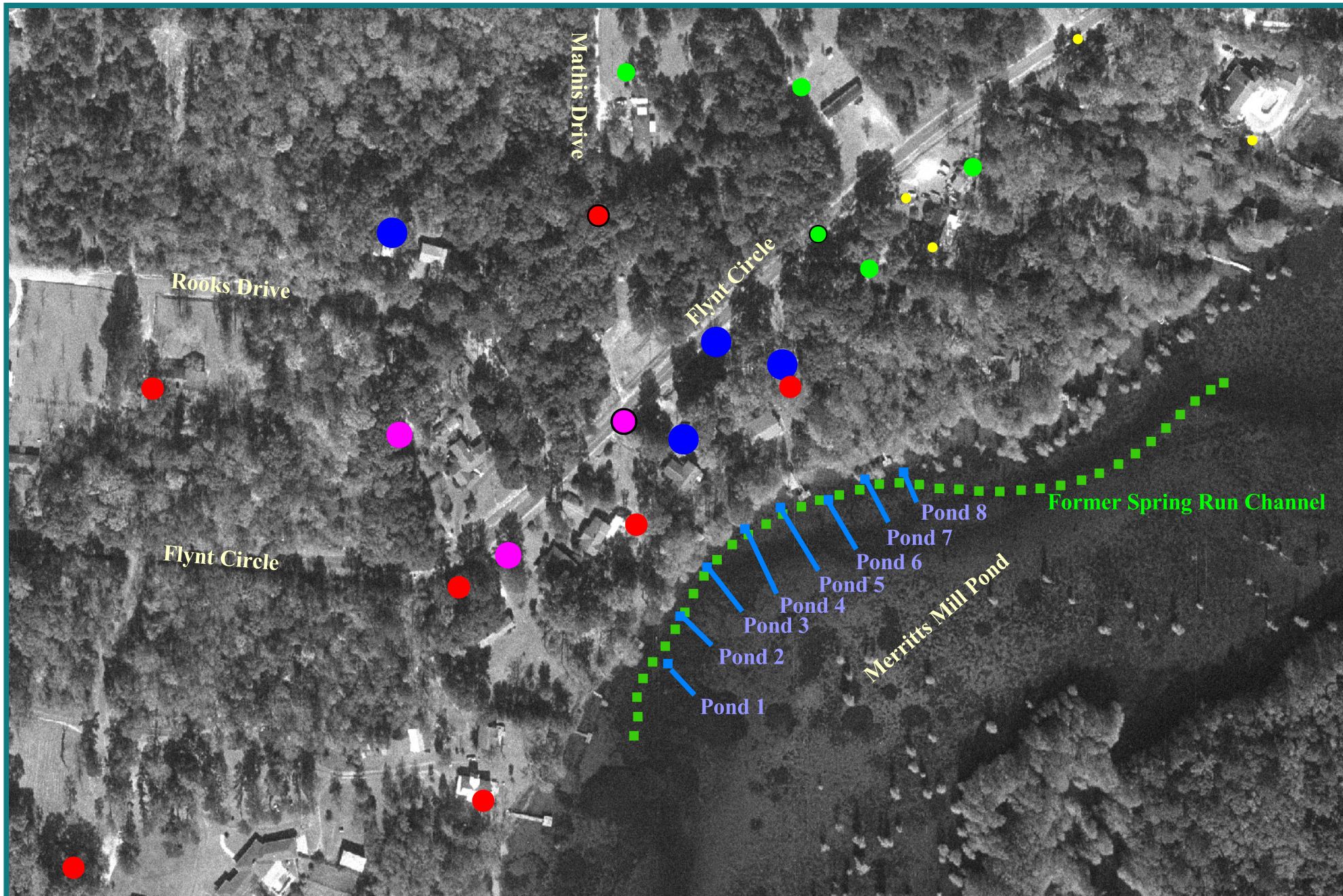


Figure 13
Merritt's Mill Pond Sediment Sample Locations
Merritt's Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Arsenic in Supply Wells (Micrograms per Liter)



Colored dot with black border
 is a SIS installed monitor well

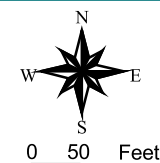
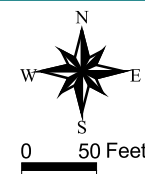




Figure 14
Shallow SIS Floridan Aquifer Monitor Well Locations
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



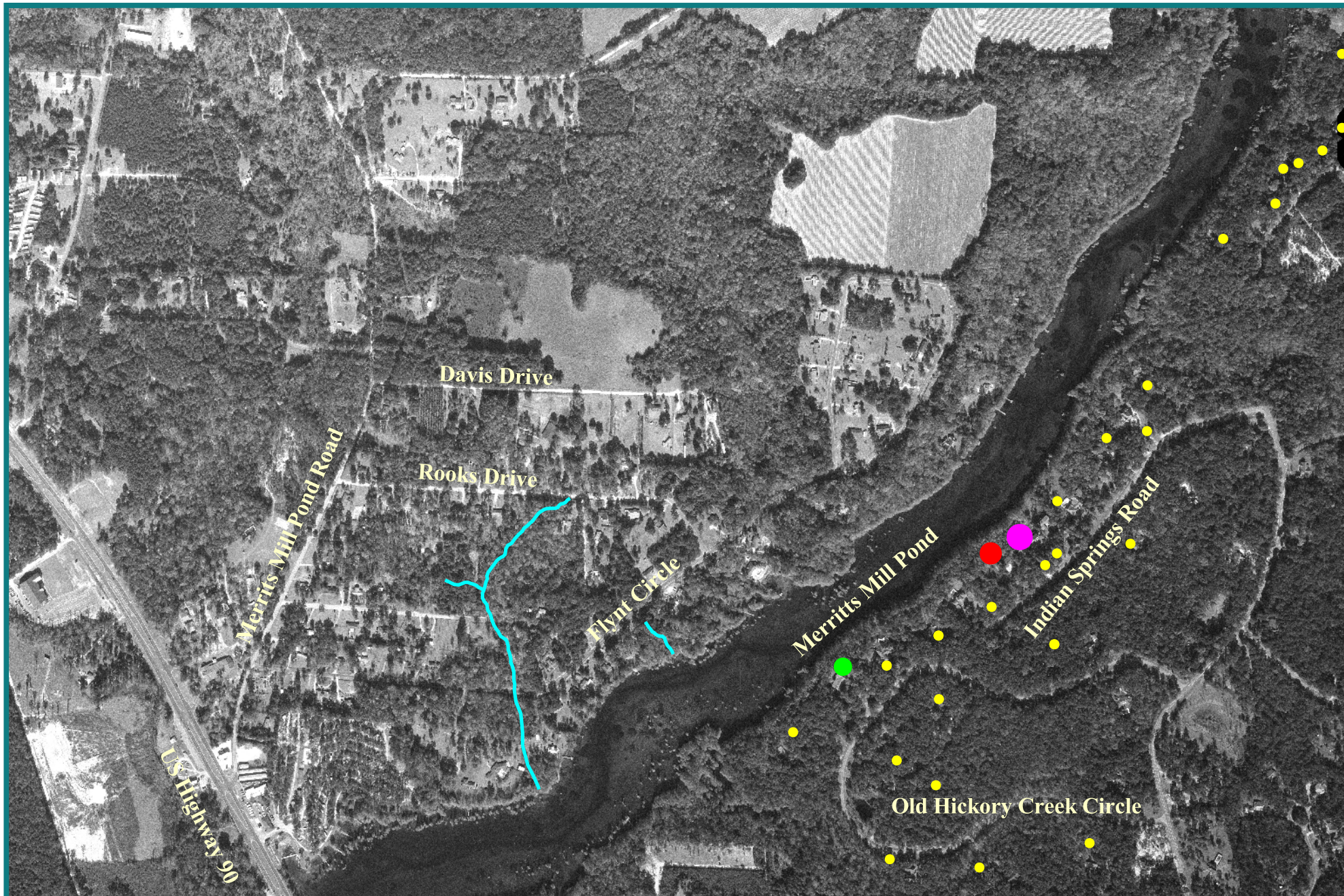
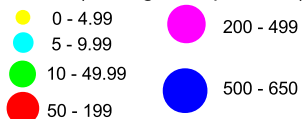
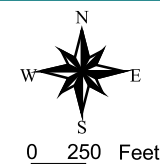


Figure 15
Arsenic Concentrations in Supply Wells
(JDOH 2004 Sampling)
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Arsenic (Micrograms per Liter)



2004 JDOH
Sampling Results



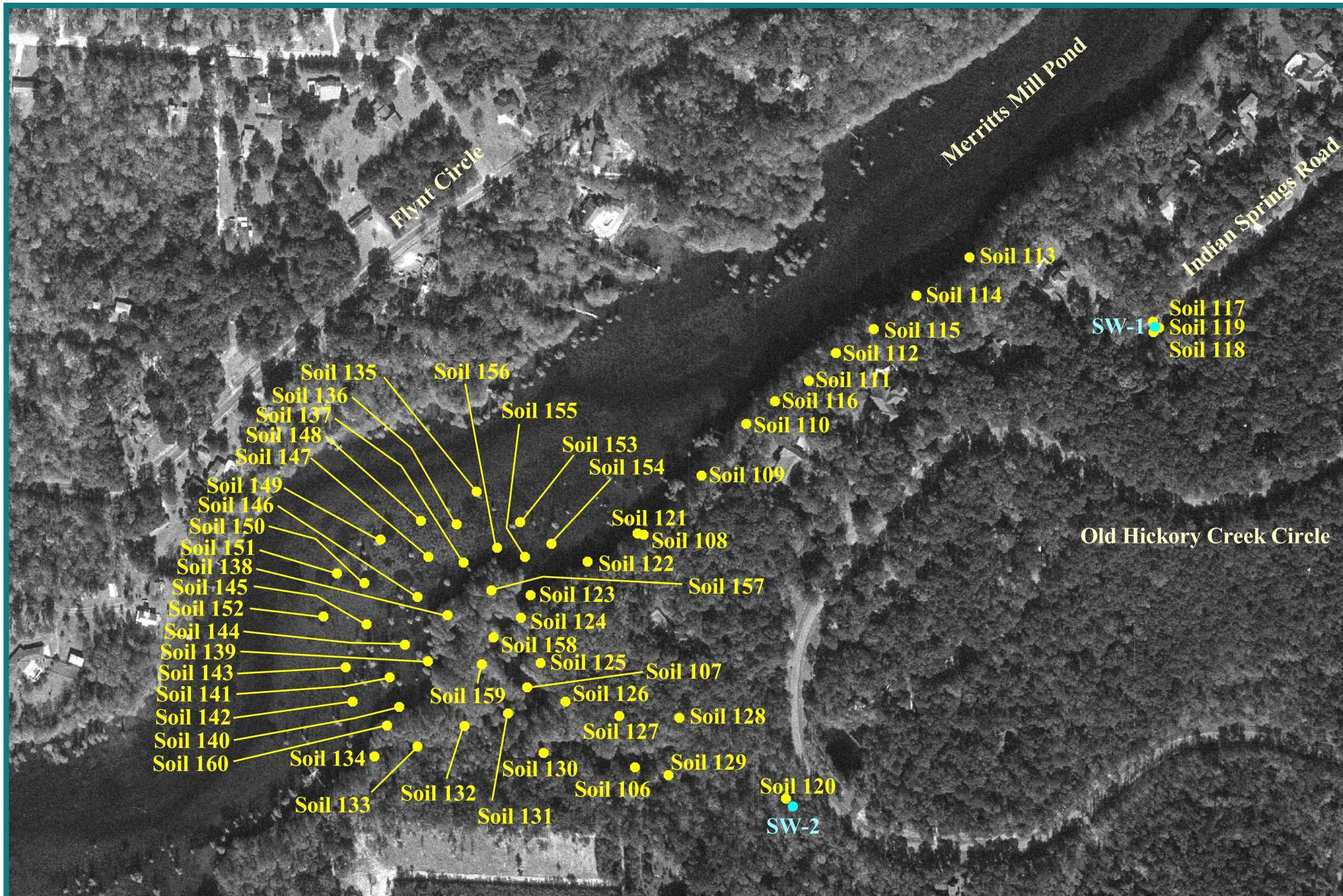
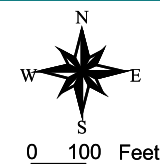


Figure 16
SIS Sediment and Surface Water Sample (East) Locations
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

- Surface Water Sample Location
- Sediment Sample Location



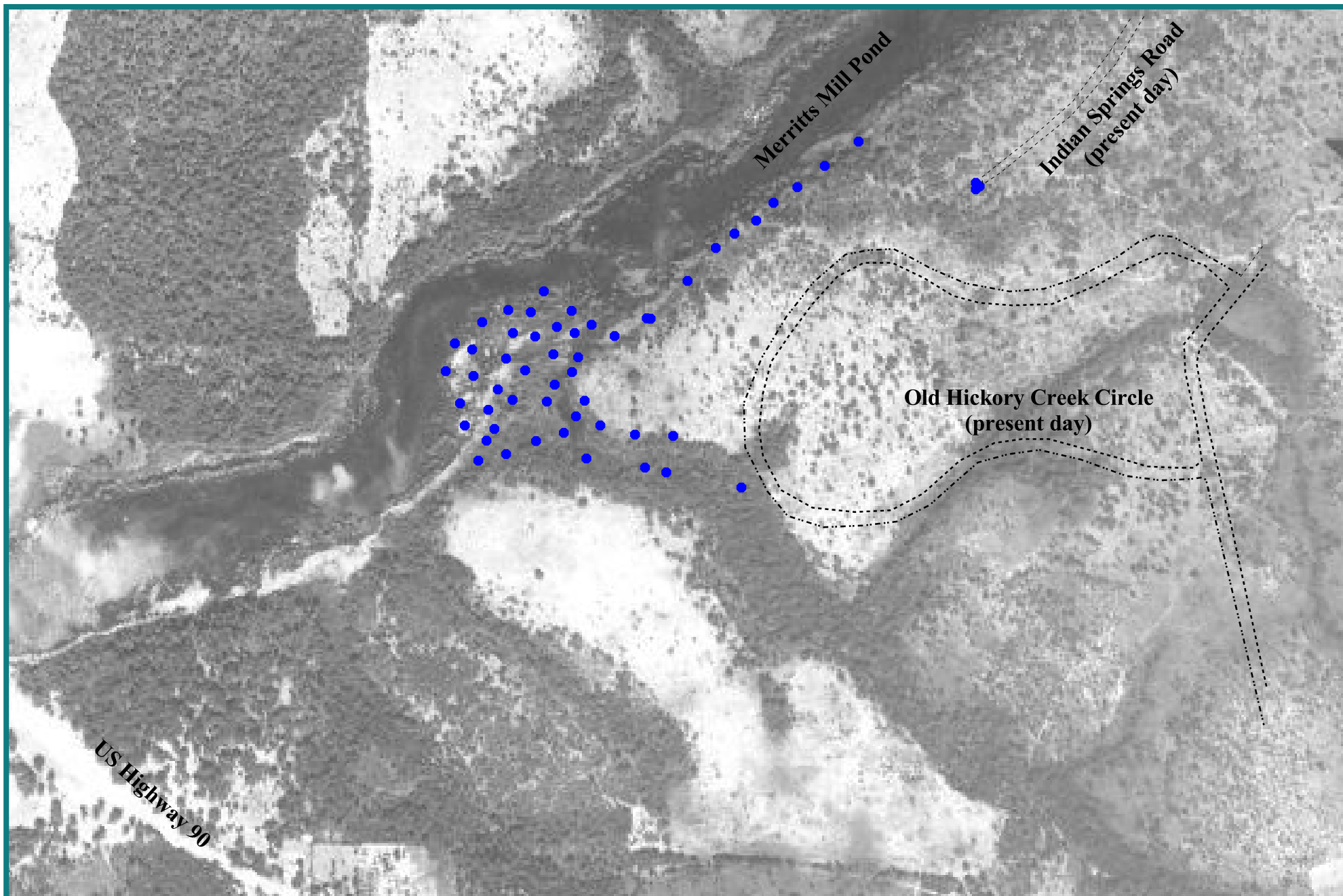
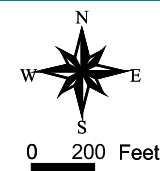


Figure 17
Eastern Study Area (Circa 1940)
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

● SIS Sediment Sample Location



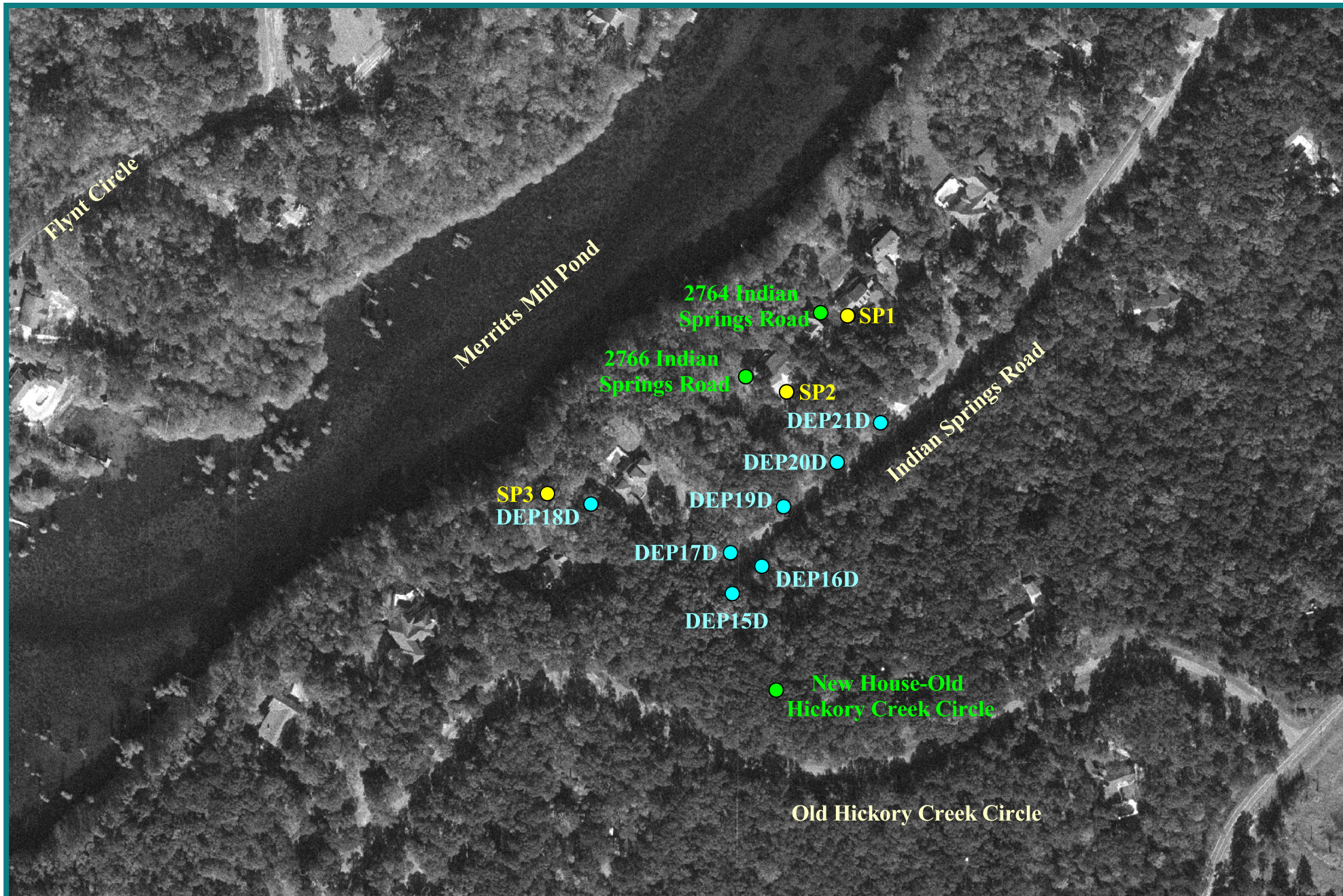


Figure 18
SIS Eastern Study Area Microwell Locations
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

- **Private Supply Well**
- **SIS Screen Point Sample Location**
- **SIS Microwell Location**

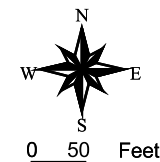
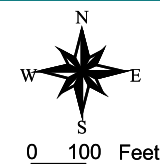




Figure 19
Surficial Aquifer Ground Water Surface (08/25/2003)
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

— Surficial Aquifer Ground Water Surface Equalpotential line
 89.58': Elevation of ground water surface NGVD



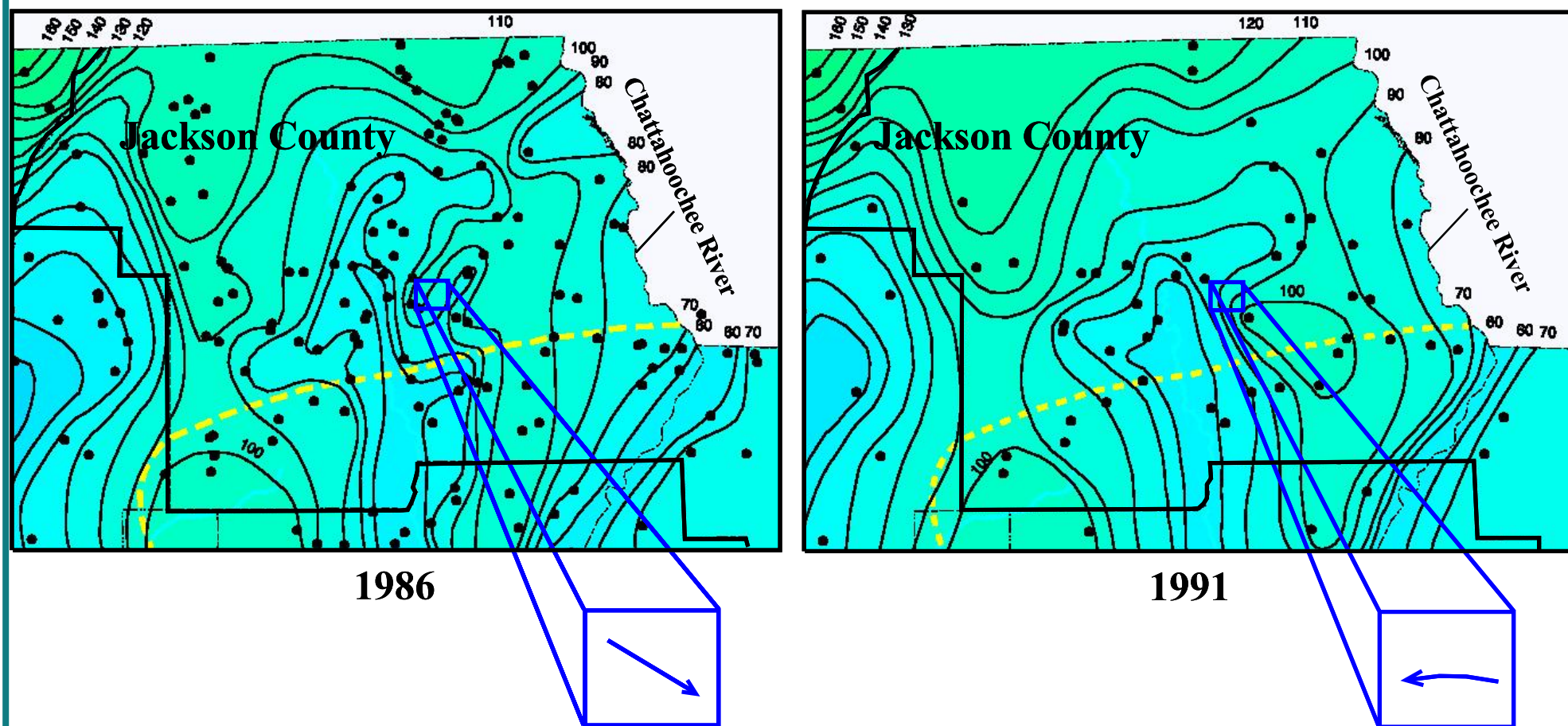


Figure 20
Floridan Aquifer Regional Potentiometric Surface
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Study Area West of Pond is in Blue Square
Arrow Indicates Direction of
Ground Water Flow in Floridan Aquifer



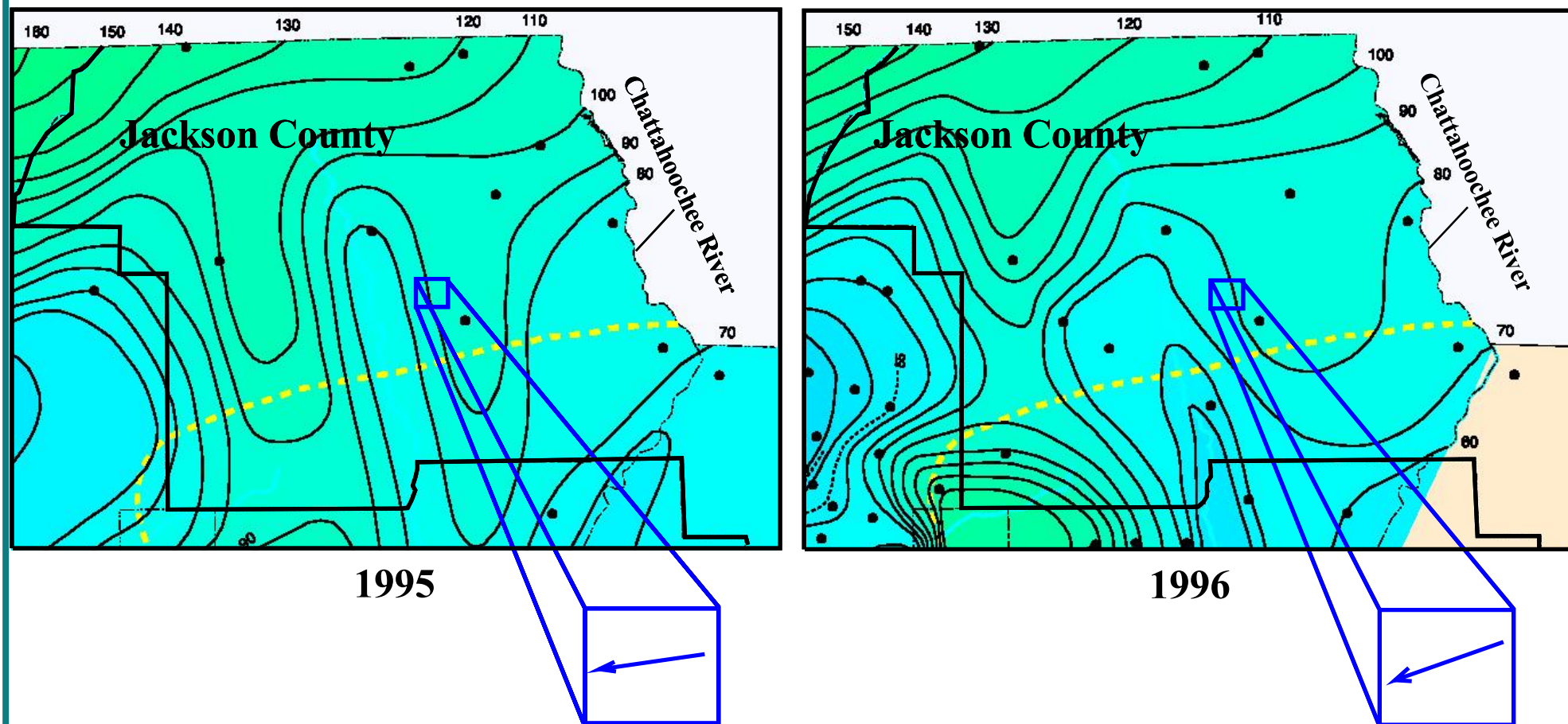


Figure 21
Floridan Aquifer Regional Potentiometric Surface
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Study Area West of Pond is in Blue Square
Arrow Indicates Direction of
Ground Water Flow in Floridan Aquifer



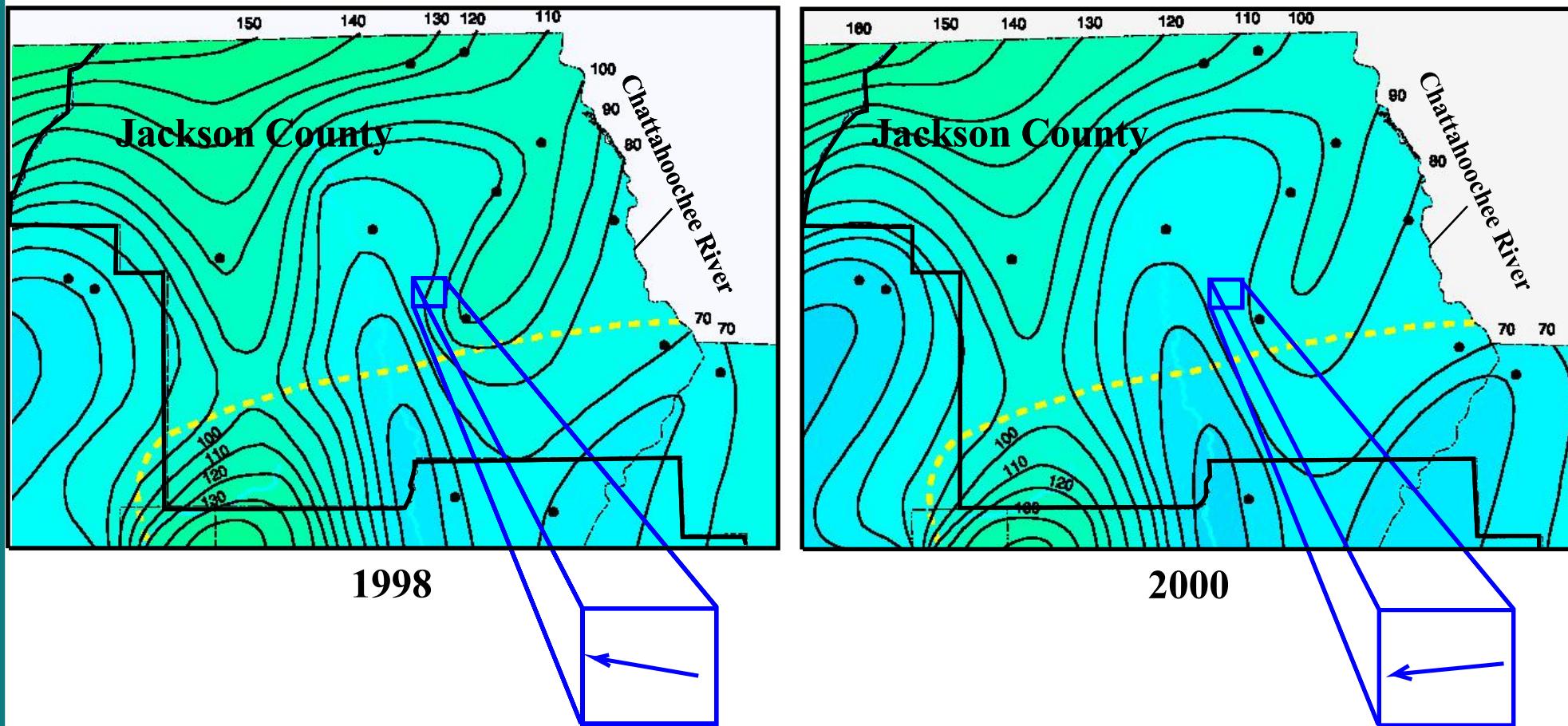


Figure 22
Floridan Aquifer Regional Potentiometric Surface
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

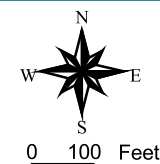
Study Area West of Pond is in Blue Square
Arrow Indicates Direction of
Ground Water Flow in Floridan Aquifer





Figure 23 Floridan Aquifer Ground Water Surface (03/02/2004)
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

- **Pond Surface Water Elevation**
- **58.86' Floridan Aquifer Ground Water Measurement (NGVD)**



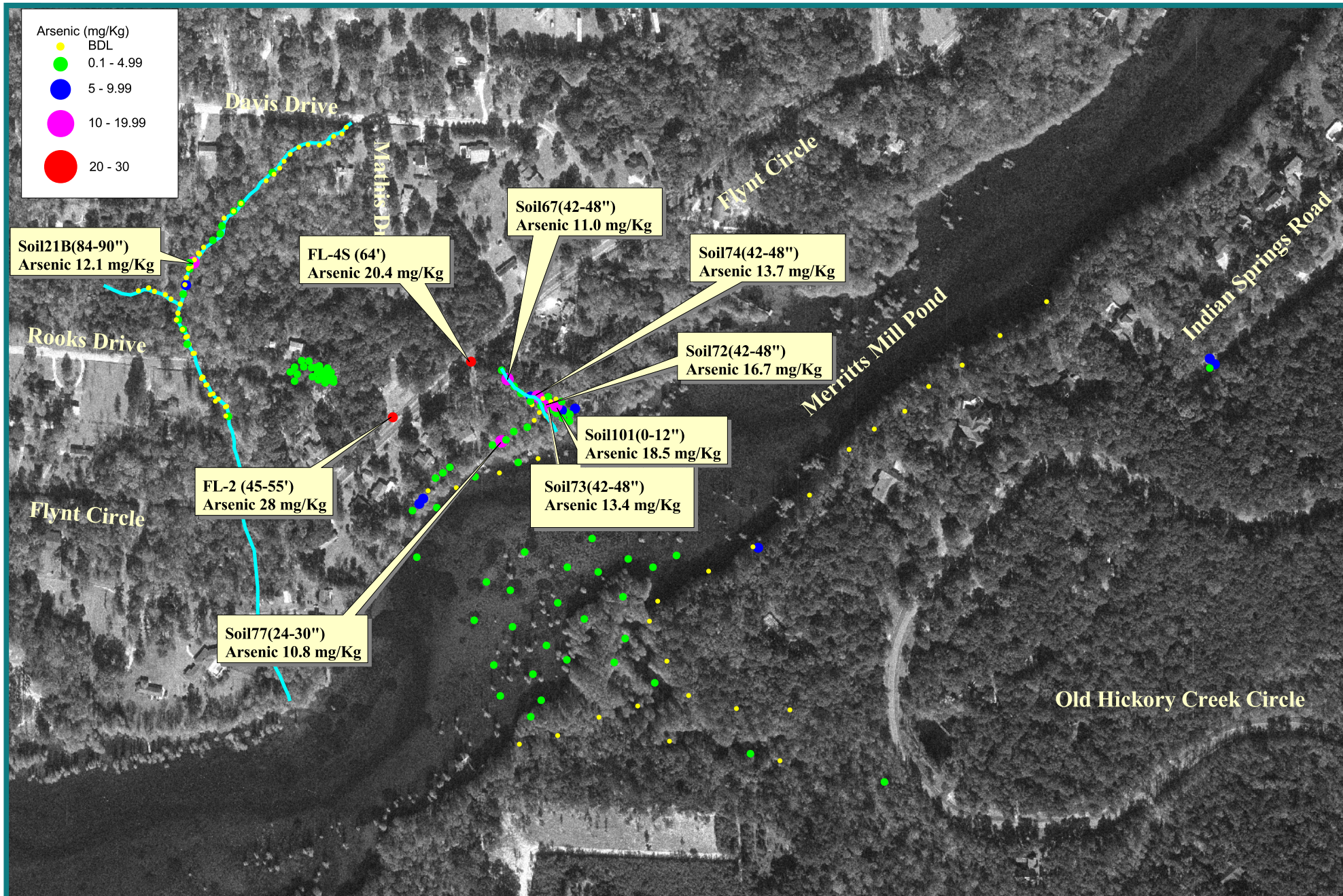
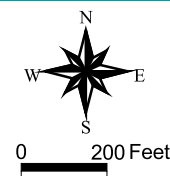
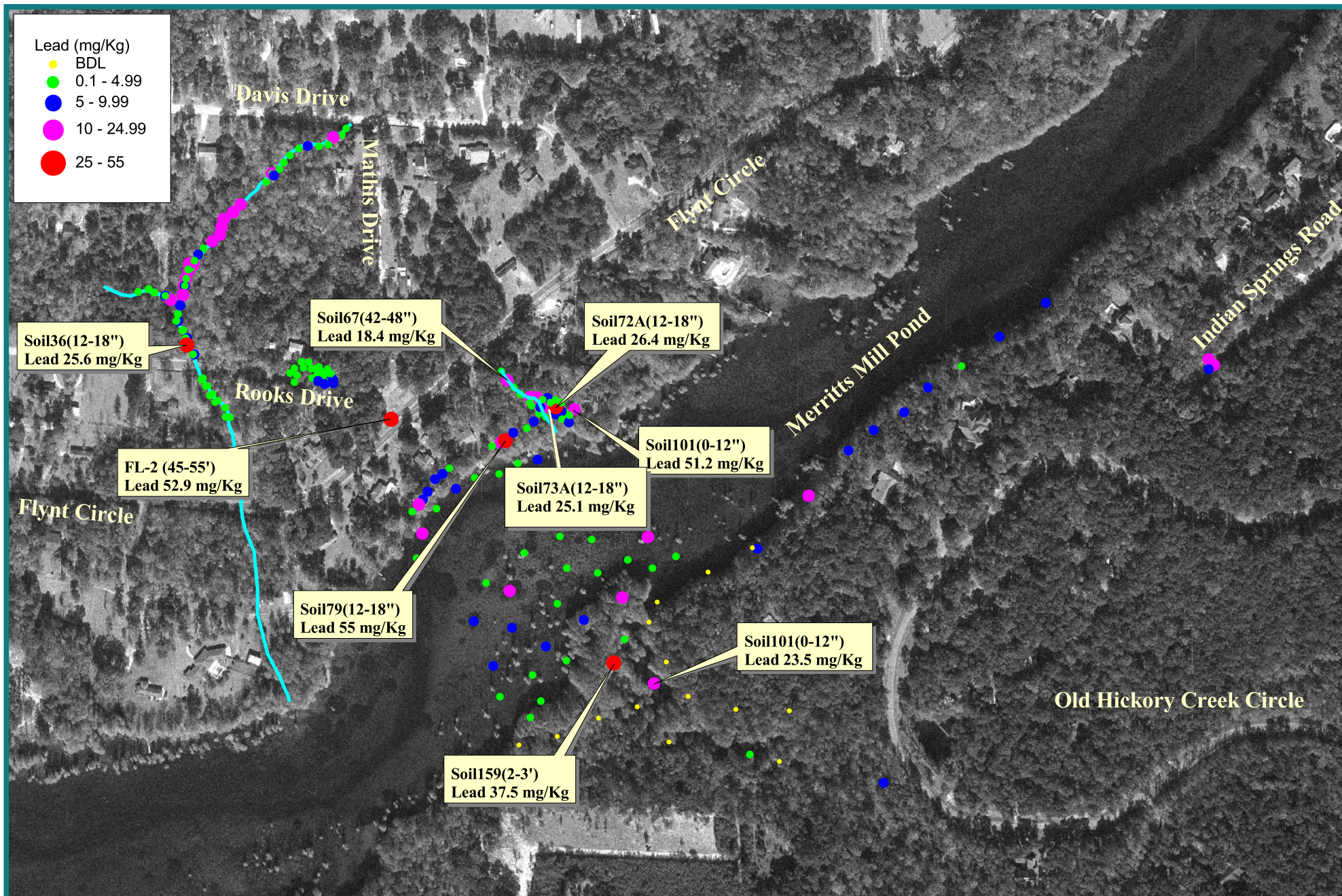


Figure 25
Arsenic in Soil/Sediment Analytical Results
(Compilation of All Depths Sampled)
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Notable Concentrations of Arsenic are Presented





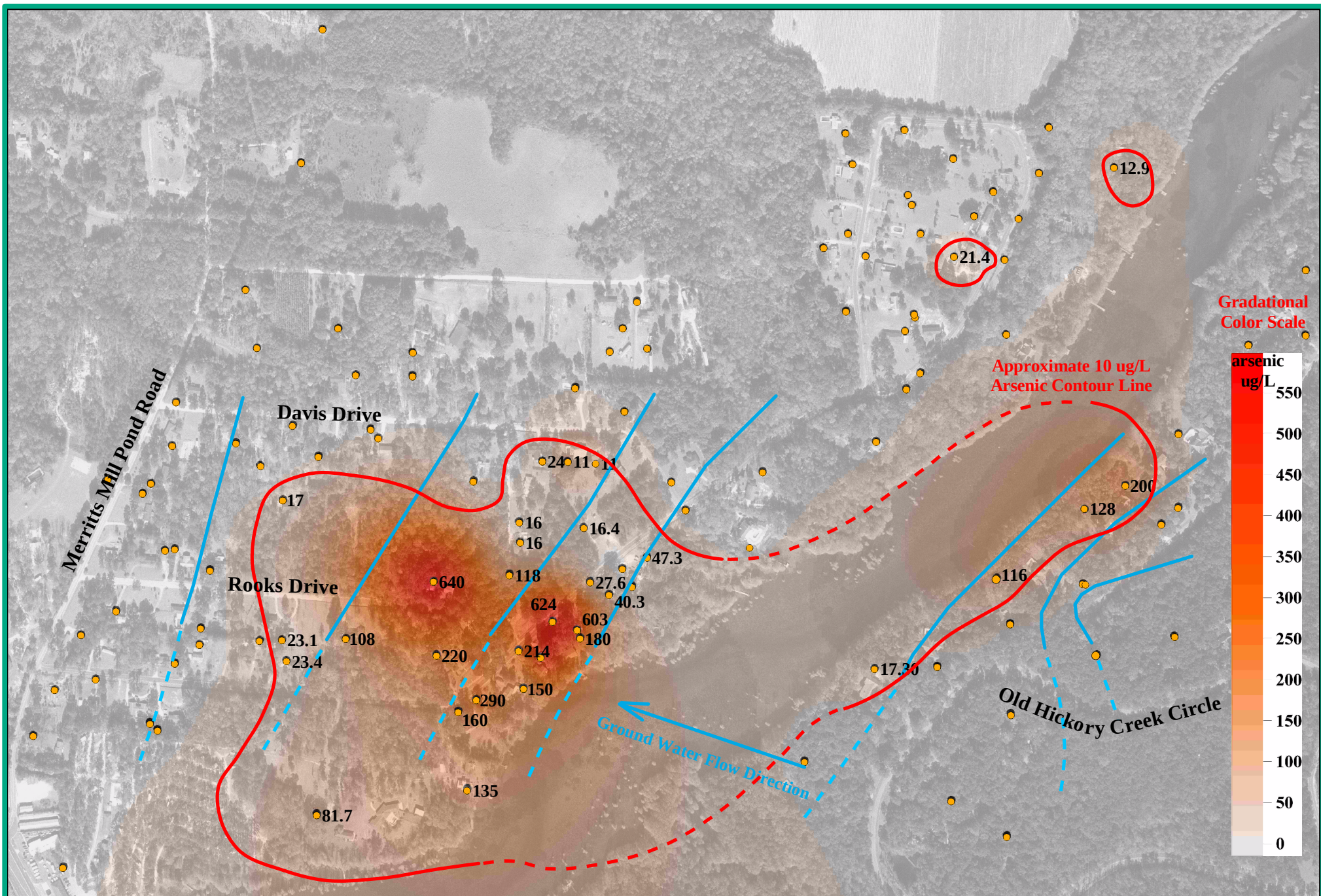
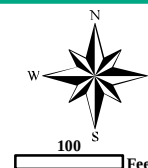


Figure 27
Distribution of Arsenic in the Floridan Aquifer
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

- **Floridan Aquifer supply or monitor well location**
- **Arsenic concentrations in excess of 10 ug/L are indicated**
- **Dash lines: inferred**
- ~ **Floridan Aquifer ground water surface**



Photographs



Photograph 1
First Ravine
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida





Photograph 2
Soil 21 Sample Location
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida





Photograph 3
First Ravine Sediment Sampling
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida





Photograph 4
SIS Direct Push Rig
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida





Photograph 5
Rotosonic Drilling
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida





Photograph 6
Merritt's Mill Pond Dam (1922)
Merritt's Mill Pond Arsenic Study
Marianna, Jackson County, Florida





Photograph 7
Florida State University Academic Dive Team
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida





Photograph 8
Indian Springs Road Karst Feature
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida





Photograph 9
Former Arable Land in Pond's Eastern Extent
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



Tables

Table 1
Area Supply Well Construction Details
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

S	T	R	Owner Name	Well Location	Diam.	Depth	Case Depth	Water Level	Use	Latitude	Longitude
12	04N	10W	Ray Tatum Contractor	Off Hwy. 90 E.	4	120	82	50	DO	304550	851131
12	04N	10W	Rich Mulder Construction Co.	Flynt Dr.	4	130	60	57	DO	304552	851044
12	04N	10W	W. E. Evans	Hwy. 90 E.	4	140	80	60	DO		
12	04N	10W	Lee Tan, M.D.	Flint Drive	4	150	105	69	DO	304533	851109
12	04N	10W	Ott King	Off Hwy. 90 E.	4	120	95	61	DO	304552	851142
12	04N	10W	Darlene Brock	Flint Drive	4	130	84	64	DO	304542	851051
12	04N	10W	Wallace Sapp	Old Hickory Drive	4	140	84	69	DO	304524	851057
12	04N	10W	Ethel Sims	Dean Road	4	110	90	40	DO	304604	851138
12	04N	10W	Frank Neel	5068 Jeannett	4	130	100	80	DO	304543	851010
12	04N	10W	Lee Tan, MD	4498 Flynt Dr.	4	160	140	60	DO	304530	851110
12	04N	10W	Wayne Melvin	Midway Fishcamp Rd.	4	180	80	90	DO	304605	851120
12	04N	10W	Tatum Associates/Larry Cobb	Flint Dr.	4	150	80	80	DO	304550	851110
12	04N	10W	Tatum & Associates	Flynt Dr	4	130	75	30	DO		
12	04N	10W	Rais	5069 Jeanette Drive	4	140	80	55	DO		
12	04N	10W	Rais	5069 Jeanette Drive	4	160	100	20	DO		
12	04N	10W	Davis	2688 Merritts Mill Road	4	140	100	50	DO		
12	04N	10W	Thompson	4890 Flynt Drive	4	160	120	30	DO		
12	04N	10W	Eastside Baptist Church	4878 Hwy 90 East	4	150	90		LA		
12	04N	10W	Sims	Veasy Lane	4	140	84	30	DO		
12	04N	10W	Edwards	5061 Jeanette Drive	4	170	147	104	DO		
12	04N	10W	Rooks	4897 Flynt Drive	4	130	40		DO		
12	04N	10W	Adams	4920 Avriett Drive	4	150	100	84	DO		
12	04N	10W	Applewhite	4783 Dean Road	4	140	90		DO		
12	04N	10W	Tatum & Associates	Lot 2, Flynt Drive	4	130	85	49	DO	304543	851052

Table 1 (Continued)
Area Supply Well Construction Details
 Merritts Mill Pond Arsenic Study
 Marianna, Jackson County, Florida

S	T	R	Owner Name	Well Location	Diam.	Depth	Case Depth	Water Level	Use	Latitude	Longitude
12	04N	10W	Pumphrey / U.S. Mobile Homes	Merritt Mill Rd.	4	120	75	40	DO		
12	04N	10W	Sneed	4841 Flynt Dr.	4	160	120	60	DO	304530	851131
12	04N	10W	Danny Barfield	Hwy. 90	4				DO		
12	04N	10W	David Fears	Off Hwy. 90	4				DO		
12	04N	10W	Columbia Homes	Route 5	4	100	75		DO		
12	04N	10W	Frank Auterman	Rt. 5 Box 437-A	4				DO		
12	04N	10W	David Boykin	Rt. 2	3				DO		
12	04N	10W	Comm Coleman	507 Maywood St.	4				DO		
12	04N	10W	Robert Granger Homes	Hwy. 90 E.	4	145	86	75	DO		
12	04N	10W	Frank Aulterman	Rt. 5	4	90	40		DO		
12	04N	10W	E. W. Granger	Rt. 2 Box 342	4				DO		
12	04N	10W	James E. Capps	1221 E Lafayette St.	4	160	97	65	DO		
12	04N	10W	E W Granger	Off Hwy. 90	4	120	101	40	DO		
12	04N	10W	Evelyn Pender	1010 Jefferson St.	4	100	32	45	DO		
12	04N	10W	Terry Kelly	Route 5	4	100	70	30	DO		
12	04N	10W	George Granger Homes	Off Hwy. 90	4	102	63	25	DO		
12	04N	10W	H E Shubrick	Route 5	4	140	70	18	DO		
12	04N	10W	Susie Garrett	Route 5	4	140	40	40	DO		
12	04N	10W	Harold Hatcher	Route 5	4	130	45	65	DO		
12	04N	10W	James Capps	Route 5	4	170	90	67	DO		
12	04N	10W	William Davis	Hwy 90	4	150	75	50	DO		
12	04N	10W	Dennis Guy	Indian Road	4	120	60	40	DO		
12	04N	10W	Wayne Sutton	Flint Drive	4	150	70	60	DO		

Table 1 (Continued)
Area Supply Well Construction Details
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

S	T	R	Owner Name	Well Location	Diam.	Depth	Case Depth	Water Level	Use	Latitude	Longitude
12	04N	10W	Rub Davis	Flint Drive	4	110	60	48	DO		
12	04N	10W	Jimmy Grant,Contr.	Lynn Street	4	175	125	75	DO		
12	04N	10W	Reed Powell	Lynn Street	4	180	90	50	DO		
12	04N	10W	Charles Hanlon	Averett Drive	4	170	80	80	DO		
12	04N	10W	Margie Grimsley	Route 5, Box 735	4	130	90	55	DO		
12	04N	10W	James Peacock	Rt. 5, Box 613, Flint Dr.	4	150	105	59	DO		
12	04N	10W	Margie Grimsley	Prison Camp Road	4	230	121	47	DO		
12	04N	10W	James H Simms	off Hwy 71	4	145	80	45	LP	304600	851133
12	04N	10W	Gene Hodges	Hwy. 90 E.	4	100	80	30	DO		
12	04N	10W	Anthony Moody	Off Hwy. 90 E.	4	100	90	46	DO	304600	851146
12	04N	10W	Harry Fuqua	Flynt Drive	4	80	45	6	DO	304536	841058
12	04N	10W	Janet Kosciw	Averitt Drive	4	130	87	80	DO	304554	851126
12	04N	10W	Howard Odom	Flint Drive	4	110	60	40	DO	304537	851103
12	04N	10W	Charles Pledger	Off Hwy. 90 E.	4	125	100	60	DO	304539	851113

Diam: well diameter.

DO: domestic supply well.

LA: landscape well.

LP: limited use public supply well.

Depths are in feet.

S: section; T: township; R: range.

Latitude and Longitude presented in decimal degrees.

Data supplied by the Northwest Florida Water Management District

Table 2
Jackson County Department of Health Supply Well Survey Results (2003)
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Name	Well Address	Arsenic (ug/L)
Almand	4980 Flynt Drive	BDL
Avriett	4914 Avriett Drive	0.23
Basford	4981 Flynt Drive	BDL
Biggers	5141 Old Hickory Circle	BDL
Blair	5065 Jeanette Drive	BDL
Broom	4857 Rooks Drive	17
Brown	4912 Flynt Drive	624
Cecylia	4839 Rooks Drive	BDL
Clark	5053 Jeanette Drive	BDL
Culbreath	5058 Jeanette Drive	BDL
Davis	4828 Rooks Drive	BDL
Davis	4941 Flynt Drive	BDL
Davis	2688 Merritts Mill Road	2.6
Davis	4818 Flynt Drive	2.4
Dean	2751 Panhandle Road	0.31
Depro	2658 Merritts Mill Road	BDL
Edwards	5061 Jeanette Drive	BDL
Evans	4913 Davis Drive	1
Fuqua	4938 Flynt Drive	BDL
Gelzer	5005 Flynt Drive	21.4
Godwin	4858 Rooks Drive	23.1
Granger	4896 Flynt Drive	290
Grant	4905 Davis Drive	1.4
Green	4916 Davis Drive	4.3
Hall	4908 Davis Drive	110
Hamilton	4870 Davis Drive	BDL
Harrison	5089 Old Hickory Circle	BDL
Hatcher	4821 US 90	BDL
Byrd	4838 Flynt Drive	0.17
Hinson	4884 Arrowhead Drive	135
Hodges	2693 Mathis Drive	1.2
Horne	4900 Davis Drive	24
Hudson	2682 Merritts Mill Road	BDL
Hughes	5049 Jeanette Drive	0.56
Johnson	4924 Flynt Drive	47.3
Keith	4846 Rooks Drive	BDL
Kelly	4870 Rooks Drive	108
Kent	2636 Merritts Mill Road	BDL
Kosciw	4860 Avriett Drive	0.41
Kosciw	4861 Davis Drive	0.59
Lawson	2685 Merritts Mill Road	BDL

Table 2 (Continued)
Jackson County Department of Health Supply Well Survey Results (2003)
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Name	Well Address	Arsenic (ug/L)
Lee	4835 Rooks Drive	BDL
Lewis	5062 Jeanette Drive	BDL
Long	4864 Davis Drive	BDL
McClure	4910 Flynt Drive	603
McCrea	4906 Flynt Drive	180
McGill	4898 Flynt Drive	150
Mears	4918 Flynt Drive	BDL
Mears	4922 Flynt Drive	BDL
Miller	4960 Flynt Drive	0.55
Moore	5095 Old Hickory Circle	BDL
Morstadt	4902 Flynt Drive	561
Neel	5068 Jeanette Drive	BDL
Newsome	2694 Merritts Mill Road	0.26
Odom	4988 Flynt Drive	0.73
Owens	4908 Davis Drive	11
Parker	4984 Flynt Drive	BDL
Peacock	4857 Flynt Drive	23.4
Peacock	4885 Rooks Drive	640
Peacock	5022 Flynt Drive	BDL
Pelt	4883 Davis Drive	3.8
Phillips	4824 Flynt Drive	BDL
Pumphrey	2716 Merritts Mill Road	BDL
Pumphrey	4849 Davis Drive	BDL
Quiet Haven MHP	4757 Grand Oaks Circle	BDL
Reddoch	4874 Arrowhead Drive	81.7
Richards	5052 Jeanette Drive	BDL
Rooks	4897 Flynt Drive	220
Rosburg	5030 Flynt Drive	BDL
Sanchez	4990 Flynt Drive	BDL
Seaton	5012 Flynt Drive	BDL
Shubrick	5026 Flynt Drive	12.9
Sneed	4841 Flynt Drive	2.1
Southern Expo #10	4804 US 90	BDL
Spence	2774 Indian Springs Road	BDL
Stewart	5057 Jeanette Drive	BDL

Table 2 (Continued)
Jackson County Department of Health Supply Well Survey Results (2003)
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Name	Well Address	Arsenic (ug/L)
Tan	4948 Flynt Drive	BDL
Thompson	4890 Flynt Drive	160
Tindel	4860 Davis Drive	0.44
Toole	2678 Mathis Drive	16
Ward	4837 Flynt Drive	2.3
Whitehead	4916 Flynt Drive	40.3
Williams	5046 Jeanette Drive	BDL
Young	5013 Flynt Drive	BDL
	4839 Davis Drive	BDL

ug/L: Micrograms per Liter
BDL: Below Detection Limit

Table 3
Sediment and Soil Sample Collection Intervals
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Surface Scrape	(0"–18")	Approximately (3'–3 ½')	Greater than 60"
	Soil 1 (12-18")		
	Soil 2 (12-18")		
	Soil 3 (12-18")		
	Soil 4 (12-18")		
	Soil 5 (12-18")		
	Soil 6 (12-18")		
	Soil 7 (12-18")		
	Soil 8 (12-18")		
	Soil 9 (12-18")		
Surface 10	Soil 10 (12-18")		
	Soil 11 (12-18")		
	Soil 12 (12-18")		
	Soil 13 (12-18")	Soil 13 (3-3 ½')	
	Soil 14 (12-18")	Soil 14 (3-3 ½')	
	Soil 15 (12-18")	Soil 15 (3-3 ½')	
	Soil 16 (12-18")	Soil 16 (3-3 ½')	
	Soil 17 (12-18")	Soil 17 (3-3 ½')	
Surface 18	Soil 18 (12-18")	Soil 18 (3-3 ½')	
	Soil 19 (12-18")	Soil 19 (3-3 ½')	
	Soil 20 (12-18")	Soil 20 (3-3 ½')	Soil 20 (96-102")
	Soil 21 (12-18")	Soil 21 (3-3 ½')	Soil 21 (90-96")
		Soil 21A (3-3 ½')	Soil 21A (84-90")
			Soil 21B (84-90")
			Soil 21C (74-84")
	Soil 22 (12-18")	Soil 22 (3-3 ½')	Soil 22 (90-96")
	Soil 23 (12-18")	Soil 23 (3-3 ½')	Soil 23 (90-96")
	Soil 24 (12-18")	Soil 24 (3-3 ½')	Soil 24 (90-96")
Surface 25	Soil 25 (12-18")	Soil 25 (3-3 ½')	Soil 25 (90-96")
	Soil 26 (12-18")	Soil 26 (3-3 ½')	Soil 26 (84-90")
	Soil 27 (12-18")	Soil 27 (3-3 ½')	Soil 27 (102-108")
	Soil 28 (12-18")	Soil 28 (3-3 ½')	
	Soil 29 (12-18")	Soil 29 (3-3 ½')	
	Soil 30 (12-18")	Soil 30 (3-3 ½')	
Surface 31	Soil 31 (12-18")	Soil 31 (3-3 ½')	
	Soil 32 (12-18")	Soil 32 (3-3 ½')	
	Soil 33 (12-18")	Soil 33 (3-3 ½')	Soil 33 (104-110")
	Soil 34 (12-18")	Soil 34 (3-3 ½')	Soil 34 (94-100")
	Soil 35 (12-18")	Soil 35 (3-3 ½')	Soil 35 (84-90")
	Soil 36 (12-18")	Soil 36 (3-3 ½')	Soil 36 (108-114")

Table 3 (Continued)
Sediment and Soil Sample Collection Intervals
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Surface Scrape	(0"–18")	Approximately (3'–3 ½')	Greater than 60"
	Soil 37 (12-18")	Soil 37 (3-3 ½')	Soil 37 (102-108")
Surface 38	Soil 38 (12-18")		Soil 38 (102-108")
	Soil 39 (12-18")		Soil 39 (102-108")
	Soil 40 (12-18")		Soil 40 (102-108")
	Soil 41 (12-18")		Soil 41 (72-78")
	Soil 42 (12-18")		Soil 42 (90-96")
	Soil 43 (12-18")		Soil 43 (90-96")
			Soil 44 (5-6')
			Soil 45 (5-6')
			Soil 46 (5-6')
			Soil 47 (5-6')
			Soil 48 (5-6')
			Soil 49 (5-6')
			Soil 50 (5-6')
			Soil 51 (5-6')
			Soil 52 (5-6')
			Soil 53 (5-6')
			Soil 54 (5-6')
			Soil 55 (5-6')
			Soil 56 (5-6')
			Soil 56A (5-6')
			Soil 57 (5-6')
			Soil 58 (5-6')
			Soil 59 (5-6')
			Soil 60 (5-6')
			Soil 61 (5-6')
			Soil 62 (5-6')
			Soil 63 (5-6')
			Soil 64 (5-6')
			Soil 65 (5-6')
		Soil 66 (3-3 ½')	
		Soil 67 (3-3 ½')	
		Soil 68 (3-3 ½')	
		Soil 69 (3-3 ½')	
		Soil 70 (3-3 ½')	
		Soil 71 (3-3 ½')	
	Soil 72A (12-18")	Soil 72 (3-3 ½')	
	Soil 73A (12-18")	Soil 73 (3-3 ½')	
	Soil 74A (12-18")	Soil 74 (3-3 ½')	
		Soil 75 (2-2 ½')	

Table 3 (Continued)
Sediment and Soil Sample Collection Intervals
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Surface Scrape	(0"-18")	Approximately (3'-3 ½')	Greater than 60"
	Soil 76 (12-18")		
		Soil 77 (2-2 ½')	
	Soil 78 (12-18")		
	Soil 79 (12-18")		
		Soil 80 (3-3 ½')	
		Soil 81 (3-3 ½')	
		Soil 82 (3-3 ½')	
	Soil 83 (12-18")		
	Soil 84 (12-18")		
		Soil 85 (2-2 ½')	
		Soil 86 (2-2 ½')	
	Soil 87 (12-18")		
	Soil 88 (12-18")		
		Soil 89 (1 ½ -2')	
	Soil 90 (12-18")		
	Soil 91 (12-18")		
		Soil 92 (3-4')	
		Soil 93 (3-4')	
		Soil 94 (3-4')	
		Soil 95 (3-4')	
		Soil 96 (4-4 ½')	
		Soil 97 (1 ½-2')	
		Soil 98 (1-2')	
		Soil 99 (1-2')	
		Soil 100 (1-2')	
	Soil 101 (0-12")		
	Soil 101A (12-18")		
	Soil 102 (12-18")		
	Soil 103 (12-18")		
	Soil 104 (12-18")		
	Soil 105 (12-18")		
	Soil 106 (0-12")		
	Soil 107 (0-12")		
	Soil 108 (0-12")		
	Soil 109 (0-12")		
	Soil 110 (0-12")		
	Soil 111 (0-12")		
	Soil 112 (0-12")		
	Soil 113 (0-12")		
	Soil 114 (0-12")		

Table 3 (Continued)
Sediment and Soil Sample Collection Intervals
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Surface Scrape	(0"-18")	Approximately (3'-3 ½')	Greater than 60"
	Soil 115 (0-12")		
	Soil 116 (0-12")		
	Soil 117 (0-12")		
	Soil 118 (0-12")		
	Soil 119 (0-12")		
	Soil 120 (0-12")		
	Soil 121 (12-18")		
	Soil 122 (12-18")		
	Soil 123 (12-18")		
	Soil 124 (12-18")		
	Soil 125 (12-18")		
	Soil 126 (12-18")		
	Soil 127 (12-18")		
	Soil 128 (12-18")		
	Soil 129 (12-18")		
	Soil 130 (12-18")		
	Soil 131 (12-18")		
	Soil 132 (12-18")		
	Soil 133 (12-18")		
	Soil 134 (12-18")		
		Soil 135 (3-4')	
		Soil 136 (1-2')	
		Soil 137 (2-3')	
		Soil 138 (2-3')	
		Soil 139 (2-3')	
		Soil 140 (1-2')	
		Soil 141 (1-2')	
		Soil 142 (1-2')	
		Soil 143 (2-3')	
		Soil 144 (2-3')	
		Soil 145 (3 ½- 4 ½')	
		Soil 146 (1-2')	
		Soil 147 (1-2')	
		Soil 148 (1-2')	
		Soil 149 (1-2')	
		Soil 150 (3-4')	
		Soil 151 (2-3')	
		Soil 152 (3-4')	
		Soil 153 (3-4')	
		Soil 154 (3-4')	

Table 3 (Continued)
Sediment and Soil Sample Collection Intervals
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Surface Scrape	(0"-18")	Approximately (3'-3 ½')	Greater than 60"
		Soil 155 (2-3')	
		Soil 156 (2-3')	
		Soil 157 (3-4')	
		Soil 158 (2-3')	
		Soil 159 (2-3')	
		Soil 160 (2-3')	
	Pond 1 (18-24")		
	Pond 2 (18-24")		
	Pond 3 (18-24")		
	Pond 4 (18-24")		
	Pond 5 (18-24")		
	Pond 6 (18-24")		
	Pond 7 (18-24")		
	Pond 8 (18-24")		

Table 4
Construction Data of SIS Installed Monitor Wells
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Well ID	Casing Diameter (Inches) ¹	Top of Casing Elevation ²	Total Depth (Feet)	Sand Pack Sieve Size	Screened Interval (Feet Below Land Surface)
Ravine MW-1	¾	NM	6	80/120	1 - 6
Ravine MW-2	¾	NM	6.5	80/120	1.5 – 6.5
Ravine MW-3	¾	NM	6.5	80/120	1.5 – 6.5
Ravine MW-4	¾	NM	7.75	80/120	2.75 – 7.75
DEP1S	¾	110.11	14	80/120	9 – 14
DEP1D	¾	110.10	22	80/120	17 – 22
DEP2S	¾	90.85	12	80/120	7 – 12
DEP2D	¾	90.65	17	80/120	12 – 17
DEP3S	¾	98.65	12.5	80/120	7.5 – 12.5
DEP3D	¾	98.15	18.5	80/120	13.5 – 18.5
DEP4D	¾	87.26	8.5	80/120	3.5 – 8.5
DEP5S	¾	82.47	10	80/120	5 – 10
DEP5D	¾	82.52	16	80/120	11 – 16
DEP6D	¾	109.99	28	80/120	23 - 28
DEP7D	¾	102.58	28.5	80/120	23.5 – 28.5
DEP8D	¾	101.77	32	80/120	27 - 32
DEP9D	¾	108.08	31	80/120	26 - 31
DEP10D	¾	106.40	31.5	80/120	26.5 – 31.5
DEP11D	¾	100.94	27	80/120	22 - 27
DEP12D	¾	103.46	30.4	80/120	25.4 – 30.4
DEP13D	¾	108.04	25.9	80/120	20.9 – 25.9
DEP14D	¾	104.81	23.5	80/120	18.5 – 23.5
DEP15D	¾	95.59	84	80/120	74 – 84
DEP16D	¾	93.65	82	80/120	72 – 82
DEP17D	¾	94.50	72	80/120	62 – 72
DEP18D	¾	92.39	35	80/120	30 - 35
DEP19D	¾	94.51	46	80/120	41 - 46
DEP20D	¾	95.17	60	80/120	55 - 60
DEP21D	¾	96.24	48	80/120	43 - 48
SP1 (53-57')	1/2	NM	57	NA	53 - 57
SP2 (53.5-57.5')	1/2	NM	57.5	NA	53.5 – 57.5
SP3 (66-70')	1/2	NM	70	NA	66 - 70
FL-1 Shallow	2	89.37	50	30/40	40 - 50
FL-2 Shallow	2	92.26	55	30/40	45 - 55
FL-3 Shallow	2	95.94	60	30/40	50 - 60
FL-4 Shallow	2	100.46	65	30/40	55 - 65
FL-1 Deep	2	101.42	130	30/40	110 - 130
FL-2 Deep	2	92.33	125	30/40	105 - 125
FL-3 Deep	2	109.16	142	30/40	122 - 142

1. Inside diameter.

2. Elevation was tied to a temporary benchmark with an arbitrarily assigned elevation of 100.00 feet.

NM: Not measured. Monitor well was temporary. NA: Not applicable.

Table 5
Water Level Measurements
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Well I.D.	Top-of-Casing Elevation (NGVD) ¹	Date / Time	Water Level Below Top-of- Casing	Water Level (NGVD)
DEP1S	110.11	0837 05/14/2003 1532 05/22/2003 1041 07/23/2003	4.89 4.51 4.29	105.22 105.60 105.82
DEP1D	110.10	0836 05/14/2003 1531 05/22/2003 1043 07/23/2003	4.94 4.86 4.60	105.16 105.24 105.50
DEP2S	90.85	1004 05/14/2003 1337 05/22/2003 0942 07/23/2003	9.59 9.36 8.65	81.26 81.49 82.20
DEP2D	90.65	1003 05/14/2003 1339 05/22/2003 0943 07/23/2003	9.20 9.00 8.57	81.45 81.65 82.08
DEP3S	98.65	1250 05/14/2003 1056 05/22/2003 1002 07/23/2003	8.43 8.53 8.11	90.22 90.12 90.54
DEP3D	98.15	1251 05/14/2003 1056 05/22/2003 1004 07/23/2003	8.83 8.93 8.57	89.32 89.22 89.58
DEP4D	87.26	1332 05/14/2003 1048 05/22/2003 1000 07/23/2003	3.07 2.98 2.85	84.19 84.28 84.41
DEP5S	82.47	1433 05/14/2003 1637 05/22/2003 1101 07/23/2003	7.80 7.23 6.27	74.67 75.24 76.20
DEP5D	82.52	1434 05/14/2003 1638 05/22/2003 1103 07/23/2003	7.83 7.26 7.26	77.69 75.26 75.26
DEP6D	109.99	0833 07/23/2003	27.32	82.67
DEP7D	102.58	0827 07/23/2003	20.16	82.42
DEP8D	101.77	0831 07/23/2003	23.44	78.33
DEP9D	108.08	0835 07/23/2003	26.55	81.53
DEP10D	106.40	1030 08/25/2003	28.95	77.45
DEP11D	100.94	Dry	Dry	Dry
DEP12D	103.46	1134 08/25/2003	23.30	80.16
DEP13D	108.04	Dry	Dry	Dry
DEP14D	104.81	Dry	Dry	Dry
DEP15D	95.59	1218 09/02/2004 1016 09/09/2004 1255 10/26/2004	36.08 35.91 33.62	59.51 59.68 61.97
DEP16D	93.65	1220 09/02/2004 1015 09/09/2004 1300 10/26/2004	33.01 32.92 30.41	60.64 60.73 63.24

Table 5 (Continued)
Water Level Measurements
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Well I.D.	Top-of-Casing Elevation (NGVD) ¹	Date / Time	Water Level Below Top-of- Casing	Water Level (NGVD)
DEP17D	94.50	1157 09/02/2004 1013 09/09/2004 1305 10/26/2004	34.02 33.97 31.28	60.48 60.53 63.22
DEP18D	92.39	1040 10/26/2004	30.30	62.09
DEP19D	94.51	1215 10/26/2004	30.95	63.56
DEP20D	95.17	1307 10/26/2004	32.00	63.17
DEP21D	96.24	1347 10/26/2004	32.50	63.74
4870 Rooks Drive	103.19	1040 05/22/2003 1422 06/09/2003 1548 06/26/2003 1111 10/08/2003 1730 11/04/2003 1437 03/02/2004 1242 09/09/2004	40.71 41.07 41.68 42.60 42.52 40.22 silted up	62.48 62.12 61.51 60.59 60.67 62.97 -----
2678 Mathis Drive	118.39	1639 06/09/2003 1600 06/26/2003 1103 10/08/2003	55.80 57.05 57.36	62.59 61.34 61.03
2693 Mathis Drive	112.71	1610 06/09/2003 1607 06/26/2003 1058 10/08/2003 1652 11/04/2003 1351 03/02/2004 1237 09/09/2004	50.34 51.01 51.98 51.85 49.52 54.81	62.37 61.70 60.73 60.86 63.19 57.90
4870 Davis Drive	120.09	1639 06/09/2003 1520 06/26/2003 1142 10/08/2003 1700 11/04/2003 1402 03/02/2004 1312 09/09/2004	58.00 58.65 59.61 59.44 57.10 62.48	62.09 61.44 60.48 60.65 62.99 57.61
4828 Rooks Drive	111.15	1442 06/09/2003 1540 06/26/2003 1118 10/08/2003 1722 11/04/2003 1430 03/02/2004 1254 09/09/2004	49.89 50.45 51.47 51.38 48.73 54.17	61.26 60.60 59.68 59.77 62.42 56.98
4912 Flynt Circle	93.85	1434 06/26/2003 1030 10/08/2003 1412 11/04/2003 1522 03/02/2004 1342 09/09/2004	31.52 32.37 32.21 30.31 35.25	62.33 61.48 61.64 63.54 58.60

Table 5 (Continued)
Water Level Measurements
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Well I.D.	Top-of-Casing Elevation (NGVD) ¹	Date / Time	Water Level Below Top-of- Casing	Water Level (NGVD)
4923 Flynt Circle	118.10	1450 06/26/2003	55.98	62.12
		1038 10/08/2003	56.87	61.23
		1530 11/04/2003	56.80	61.30
		1530 03/02/2004	54.67	63.43
		1317 09/09/2004	57.98	58.32
4938 Flynt Circle	106.70	1504 06/26/2003	44.17	62.53
		1045 10/08/2003	44.95	61.75
		1539 11/04/2003	44.87	61.83
		1224 09/09/2004	47.84	58.86
4913 Davis Drive	131.37	1514 06/26/2003	69.29	62.08
		1050 10/08/2003	70.15	61.22
		1645 11/04/2003	70.10	61.27
		1344 03/02/2004	67.90	63.47
		1232 09/09/2004	73.09	58.28
2688 Merritts Mill Road	118.90	1633 06/09/2003	57.45	61.45
		1535 06/26/2003	58.10	60.80
		1125 10/08/2003	59.16	59.74
		1717 11/04/2003	59.01	59.89
		1422 03/02/2004	56.33	62.57
		1301 09/09/2004	61.89	57.01
4839 Davis Drive	117.98	1511 06/09/2003	56.39	61.59
		1530 06/26/2003	57.06	60.89
		1130 10/08/2003	58.14	59.81
		1712 11/04/2003	57.97	60.01
		1413 03/02/2004	55.18	62.80
		1306 09/09/2004	60.92	57.06
4854 Davis Drive	119.89	1530 06/09/2003	57.98	61.91
		1525 06/26/2003	58.40	61.49
		1135 10/08/2003	59.60	60.29
		1706 11/04/2003	59.49	60.40
		1409 03/02/2004	56.98	62.91
		1310 09/09/2004	62.45	57.44
2766 Indian Springs Drive	92.48	1242 09/02/2004	33.34	59.14
		1020 09/09/2004	33.11	59.37
		1327 10/26/2004	30.82	61.66
2762 Indian Springs Drive	96.49	1246 09/02/2004	36.59	59.90
		1024 09/09/2004	36.37	60.12
		1334 10/26/2004	34.11	62.38
2764 Indian Springs Drive	94.01	1340 10/26/2004	31.59	62.42
5089 Old Hickory Creek Circle	111.56	0952 09/09/2004	52.23	59.33
5083 Old Hickory Creek Circle	92.97	0945 09/09/2004	33.71	59.26

Table 5 (Continued)
Water Level Measurements
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Well I.D.	Top-of-Casing Elevation (NGVD) ¹	Date / Time	Water Level Below Top-of- Casing	Water Level (NGVD)
5095 Old Hickory Creek Circle	101.49	1103 09/09/2004	42.10 (chalk line)	59.39
FL-1 Shallow	89.37	0938 03/02/2004	25.93	63.44
		1350 09/09/2004	29.86	59.51
FL-2 Shallow	92.26	0941 03/02/2004	28.80	63.46
		1347 09/09/2004	32.94	59.32
FL-3 Shallow	95.94	0943 03/02/2004	32.42 disturbed	63.52 -----
FL-4 Shallow	100.46	0945 03/02/2004	36.93	63.53
		1340 09/09/2004	42.01	58.45
FL-1 Deep	101.42	1455 11/04/2003	39.75	61.67
		1336 03/02/2004	37.84	63.58
		1338 09/09/2004	42.78	58.64
FL-2 Deep	92.33	1325 11/04/2003	30.91	61.42
		1331 03/02/2004	28.85	63.48
		1344 09/09/2004	33.72	58.61
FL-3 Deep	109.16	1039 11/04/2003	47.90	61.26
		1506 03/02/2004	45.80	63.36
Pond 1 ²		1330 09/02/2004		63.58
		0942 09/09/2004		63.63
Pond 2 ³		1120 09/09/2004		63.65

1. NGVD: National Geodetic Vertical Datum. A temporary benchmark was assigned an arbitrary elevation of 100.00 feet NGVD.
2. Pond 1: An elevation survey was performed to determine the height of the Merritt's Mill Pond surface in relation to NGVD. The pond's elevation was measured where the water surface adjoins the 5083 Old Hickory Creek Circle address.
3. Pond 2: An elevation survey was performed to determine the height of the Merritt's Mill Pond surface in relation to NGVD. The pond's elevation was measured where the water surface adjoins the 4936 Flynt Circle address.

Table 6
Jackson County Department of Health Supply Well Survey Results (2004)
(2004 East Side of Pond)

Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Well Address	Arsenic (ug/L)	Qualifiers
2766 INDIAN SPRINGS ROAD	128	
5083 OLD HICKORY CIRCLE	17.3	
5045 OLD HICKORY CIRCLE	3	
2816 JACKSON BLUFF ROAD	2.3	
5001 OLD HICKORY CIRCLE	1.9	
5095 OLD HICKORY CIRCLE	1.7	
5095 OLD HICKORY CIRCLE	1.5	
5110 PRESIDENTS CIRCLE	1.4	
5110 PRESIDENTS CIRCLE	1.4	
5141 OLD HICKORY CIRCLE	1.2	
5141 OLD HICKORY CIRCLE	1.2	
5063 OLD HICKORY CIRCLE	1	
2819 JACKSON BLUFF ROAD	0.9	I
5053 OLD HICKORY CIRCLE	0.9	I
2787 JACKSON BLUFF ROAD	0.7	I
2764 INDIAN SPRINGS ROAD	0.6	I
2779 JACKSON BLUFF ROAD	0.5	I
2756 INDIAN SPRINGS ROAD	0.5	I
5089 OLD HICKORY CIRCLE	0.4	I
2809 JACKSON BLUFF ROAD	0.4	I
5050 OLD HICKORY CIRCLE	0.4	I
5089 OLD HICKORY CIRCLE	0.3	I
5068 OLD HICKORY CIRCLE	0.3	I
2762 INDIAN SPRINGS ROAD	0.3	I
2801 JACKSON BLUFF ROAD	0.2	I
2802 JACKSON BLUFF ROAD	0.2	I
2783 JACKSON BLUFF ROAD	0.2	I
2789 JACKSON BLUFF ROAD	0.2	I
2759 JACKSON BLUFF ROAD	0.2	I
2820 JACKSON BLUFF ROAD	0.1	U
2773 JACKSON BLUFF ROAD	0.1	U
2722 INDIAN SPRINGS ROAD	0.1	U
2732 INDIAN SPRINGS ROAD	0.1	I
2794 JACKSON BLUFF OARD	0.1	I
5098 OLD HICKORY CIRCLE	0.1	U
2757 INDIAN SPRINGS ROAD	0.1	U
2728 INDIAN SPRINGS ROAD	0.1	U

U: Analyte not detected; result is the minimum detection limit.
I: Approximate result is between the minimum detection limit and the practical quantitation limit.
ug/L: Micrograms per Liter

Table 7
Arsenic and Lead in Sediment/Soil Analytical Results
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Field ID	Component	Result (mg/Kg)	MDL	Remark	Component	Result (mg/Kg)	MDL	Remark
Soil 1 (12-18")	Arsenic	0.37	0.37	U	Lead	1.4	0.12	
Soil 2 (12-18")	Arsenic	0.37	0.37	U	Lead	2.9	0.12	A
Soil 3 (12-18")	Arsenic	0.37	0.37	U	Lead	15.5	0.12	
Soil 4 (12-18")	Arsenic	0.37	0.37	U	Lead	2.3	0.12	
Soil 5 (12-18")	Arsenic	0.36	0.36	U	Lead	4.8	0.12	
Soil 6 (12-18")	Arsenic	0.36	0.36	U	Lead	9.3	0.12	
Soil 7 (12-18")	Arsenic	0.37	0.37	U	Lead	3.2	0.12	
Soil 8 (12-18")	Arsenic	0.37	0.37	U	Lead	4.7	0.12	
Soil 9 (12-18")	Arsenic	0.36	0.36	U	Lead	1.5	0.12	
Surface 10	Arsenic	1.4	1	I	Lead	0.95	0.10	
Soil 10 (12-18")	Arsenic	0.36	0.36	U	Lead	2.1	0.12	
Soil 11 (12-18")	Arsenic	0.37	0.37	U	Lead	6.8	0.12	
Soil 12 (12-18")	Arsenic	0.37	0.37	U	Lead	1.1	0.12	
Soil 13 (12-18")	Arsenic	0.35	0.35	U	Lead	15.5	0.12	
Soil 13 (3-3 1/2')	Arsenic	0.47	0.37	I	Lead	3.2	0.12	
Soil 14 (12-18")	Arsenic	0.36	0.36	U	Lead	13.8	0.12	
Soil 14 (3-3 1/2')	Arsenic	0.39	0.35	I	Lead	20.8	0.12	
Soil 15 (12-18")	Arsenic	0.37	0.37	U	Lead	13.5	0.12	
Soil 15 (3-3 1/2')	Arsenic	0.35	0.35	U	Lead	19.8	0.12	
Soil 16 (12-18")	Arsenic	0.42	0.34	I	Lead	20.7	0.11	
Soil 16 (3-3 1/2')	Arsenic	0.36	0.36	U	Lead	18.9	0.12	
Soil 17 (12-18")	Arsenic	0.44	0.35	I	Lead	10	0.12	
Soil 17 (3-3 1/2')	Arsenic	0.37	0.37	U	Lead	3.2	0.12	
Surface 18	Arsenic	1.2	1	I	Lead	0.37	0.10	I
Soil 18 (12-18")	Arsenic	0.42	0.37	I	Lead	15.7	0.12	
Soil 18 (3-3 1/2')	Arsenic	0.37	0.37	U	Lead	6.8	0.12	
Soil 19 (12-18")	Arsenic	0.34	0.34	U	Lead	4.5	0.11	
Soil 19 (3-3 1/2')	Arsenic	0.37	0.37	U	Lead	0.98	0.12	A
Soil 20 (12-18")	Arsenic	0.37	0.37	U	Lead	5.3	0.12	
Soil 20 (3-3 1/2')	Arsenic	0.37	0.37	U	Lead	1.4	0.12	
Soil 20 (96-102")	Arsenic	0.37	0.37	U	Lead	4.9	0.12	A
Soil 21 (12-18")	Arsenic	0.36	0.36	U	Lead	4.4	0.12	
Soil 21 (3-3 1/2')	Arsenic	0.35	0.35	U	Lead	1.6	0.12	
Soil 21 (90-96")	Arsenic	0.36	0.36	U	Lead	4.5	0.12	
Soil 21A (3-3 1/2')	Arsenic	3.97	0.37		Lead	11	0.12	
Soil 21A (84-90")	Arsenic	4.96	0.35		Lead	15.1	0.12	
Soil 21B (84-90")	Arsenic	12.1	1.5	A	Lead	10.1	0.50	A
Soil 21C (74-84")	Arsenic	0.36	0.36	U	Lead	1.4	0.12	
Soil 22 (12-18")	Arsenic	0.36	0.36	U	Lead	4.7	0.12	
Soil 22 (3-3 1/2')	Arsenic	0.37	0.37	U	Lead	2.2	0.12	

Table 7 (Continued)
Arsenic and Lead in Sediment/Soil Analytical Results
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Field ID	Component	Result (mg/Kg)	MDL	Remark	Component	Result (mg/Kg)	MDL	Remark
Soil 22 (90-96")	Arsenic	0.43	0.36	I	Lead	12.9	0.12	
Soil 23 (12-18")	Arsenic	0.36	0.36	U	Lead	4.7	0.12	
Soil 23 (3-3 1/2')	Arsenic	0.37	0.37	U	Lead	1.2	0.12	
Soil 23 (90-96")	Arsenic	0.36	0.36	U	Lead	11.8	0.12	
Soil 24 (12-18")	Arsenic	0.33	0.33	U	Lead	2.4	0.11	
Soil 24 (3-3 1/2')	Arsenic	0.37	0.37	U	Lead	5.5	0.12	
Soil 24 (90-96")	Arsenic	9.36	0.36		Lead	18.6	0.12	
Surface 25	Arsenic	1	1	U	Lead	0.41	0.1	I
Soil 25 (12-18")	Arsenic	0.37	0.34	I	Lead	21.7	0.11	
Soil 25 (3-3 1/2')	Arsenic	0.35	0.35	U	Lead	2.9	0.12	
Soil 25 (90-96")	Arsenic	0.35	0.35	U	Lead	15.4	0.12	
Soil 26 (12-18")	Arsenic	0.33	0.33	U	Lead	5.4	0.11	
Soil 26 (3-3 1/2')	Arsenic	0.28	0.28	U	Lead	7.8	0.093	
Soil 26 (84-90")	Arsenic	0.36	0.36	U	Lead	9.4	0.12	
Soil 27 (12-18")	Arsenic	0.33	0.33	U	Lead	2.6	0.11	
Soil 27 (102-108")	Arsenic	0.37	0.37	U	Lead	4.3	0.12	
Soil 27 (3-3 1/2')	Arsenic	0.31	0.31	U	Lead	2.4	0.1	
Soil 28 (12-18")	Arsenic	0.34	0.34	U	Lead	12.8	0.11	
Soil 28 (3-3 1/2')	Arsenic	0.34	0.34	U	Lead	7.3	0.11	
Soil 29 (12-18")	Arsenic	0.32	0.32	U	Lead	1.8	0.11	
Soil 29 (3-3 1/2')	Arsenic	0.32	0.32	U	Lead	7.3	0.11	A
Soil 30 (12-18")	Arsenic	0.37	0.37	U	Lead	0.78	0.12	
Soil 30 (3-3 1/2')	Arsenic	0.38	0.38	U	Lead	1.5	0.13	
Surface 31	Arsenic	1.2	1	I	Lead	1.1	0.1	
Soil 31 (12-18")	Arsenic	0.33	0.33	U	Lead	1.7	0.11	
Soil 31 (3-3 1/2')	Arsenic	0.3	0.3	U	Lead	1.3	0.099	
Soil 32 (12-18")	Arsenic	0.38	0.38	U	Lead	2.4	0.12	
Soil 32 (3-3 1/2')	Arsenic	0.35	0.35	U	Lead	2.5	0.12	
Soil 33 (12-18")	Arsenic	0.37	0.37	U	Lead	1.6	0.12	
Soil 33 (3-3 1/2')	Arsenic	0.28	0.28	U	Lead	2	0.092	
Soil 33 (104-110")	Arsenic	0.41	0.37	I	Lead	5.3	0.12	
Soil 34 (12-18")	Arsenic	0.37	0.37	U	Lead	1.6	0.12	
Soil 34 (3-3 1/2')	Arsenic	0.31	0.31	U	Lead	3.5	0.1	
Soil 34 (94-100")	Arsenic	0.37	0.37	I	Lead	4.4	0.12	
Soil 35 (12-18")	Arsenic	0.37	0.37	U	Lead	2.2	0.12	
Soil 35 (3-3 1/2')	Arsenic	0.35	0.35	U	Lead	3.9	0.12	
Soil 35 (84-90")	Arsenic	0.37	0.37	U	Lead	5	0.12	
Soil 36 (12-18")	Arsenic	1.38	0.37	I	Lead	25.6	0.12	
Soil 36 (3-3 1/2')	Arsenic	0.3	0.3	U	Lead	2.1	0.099	
Soil 36 (108-114")	Arsenic	0.37	0.37	U	Lead	1	0.12	

Table 7 (Continued)
Arsenic and Lead in Sediment/Soil Analytical Results
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Field ID	Component	Result (mg/Kg)	MDL	Remark	Component	Result (mg/Kg)	MDL	Remark
Soil 37 (12-18")	Arsenic	0.37	0.37	U	Lead	2.1	0.12	A
Soil 37 (3-3 1/2')	Arsenic	0.35	0.35	U	Lead	3.1	0.12	
Soil 37 (102-108")	Arsenic	0.37	0.37	U	Lead	8.3	0.12	
Surface 38	Arsenic	1	1	U	Lead	0.26	0.1	I
Soil 38 (12-18")	Arsenic	0.37	0.37	U	Lead	1.7	0.12	
Soil 38 (102-108")	Arsenic	0.37	0.37	U	Lead	4.1	0.12	A
Soil 39 (12-18")	Arsenic	0.37	0.37	U	Lead	4.6	0.12	
Soil 39 (102-108")	Arsenic	0.37	0.37	U	Lead	4.5	0.12	
Soil 40 (12-18")	Arsenic	0.37	0.37	U	Lead	1.2	0.12	
Soil 40 (102-108")	Arsenic	0.37	0.37	U	Lead	1.4	0.12	
Soil 41 (12-18")	Arsenic	0.37	0.37	U	Lead	1	0.12	A
Soil 41 (72-78")	Arsenic	0.37	0.37	U	Lead	1.2	0.12	
Soil 42 (12-18")	Arsenic	0.35	0.35	U	Lead	2.4	0.12	
Soil 42 (90-96")	Arsenic	0.37	0.37	U	Lead	3.4	0.12	
Soil 43 (12-18")	Arsenic	0.33	0.33	U	Lead	4.6	0.11	
Soil 43 (90-96")	Arsenic	1.2	0.37	I	Lead	2.3	0.12	
Soil 44 (6-7')	Arsenic	0.51	0.28	I	Lead	3.8	0.093	
Soil 45 (5-6')	Arsenic	1.53	0.29		Lead	3.9	0.096	
Soil 46 (5-6')	Arsenic	2.09	0.28		Lead	6.8	0.094	
Soil 47 (5-6')	Arsenic	0.8	0.29	I	Lead	4.9	0.095	
Soil 48 (5-6')	Arsenic	0.63	0.28	I	Lead	4.7	0.094	
Soil 49 (5-6')	Arsenic	0.63	0.28	I	Lead	4.1	0.093	
Soil 50 (5-6')	Arsenic	0.72	0.28	I	Lead	4	0.095	
Soil 51 (5-6')	Arsenic	0.59	0.29	I	Lead	3.7	0.095	
Soil 52 (5-6')	Arsenic	0.64	0.27	I	Lead	4.2	0.089	
Soil 53 (5-6')	Arsenic	0.56	0.29	I	Lead	3.7	0.095	
Soil 54 (5-6')	Arsenic	0.42	0.29	I	Lead	3	0.097	
Soil 55 (5-6')	Arsenic	0.32	0.27	I	Lead	2.7	0.091	
Soil 56 (5-6')	Arsenic	0.58	0.27	I	Lead	3.5	0.09	A
Soil 56A (5-6')	Arsenic	0.62	0.29	I	Lead	4	0.096	
Soil 57 (5-6')	Arsenic	0.48	0.26	I	Lead	3.7	0.088	
Soil 58 (5-6')	Arsenic	0.58	0.29	I	Lead	3.9	0.096	
Soil 59 (5-6')	Arsenic	0.93	0.27	I	Lead	6.3	0.09	
Soil 60 (5-6')	Arsenic	0.44	0.37	I	Lead	3.5	0.12	A
Soil 61 (5-6')	Arsenic	2	0.37		Lead	6.6	0.12	
Soil 62 (5-6')	Arsenic	1.2	0.38	I	Lead	5.3	0.12	I
Soil 63 (5-6')	Arsenic	1.5	0.37		Lead	5.9	0.12	
Soil 64 (5-6')	Arsenic	0.99	0.37	I	Lead	4.1	0.12	I
Soil 65 (5-6')	Arsenic	0.97	0.37	I	Lead	4.3	0.12	I
Soil 66 (3-3 1/2')	Arsenic	0.33	0.27	I	Lead	4.2	0.089	

Table 7 (Continued)
Arsenic and Lead in Sediment/Soil Analytical Results
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Field ID	Component	Result (mg/Kg)	MDL	Remark	Component	Result (mg/Kg)	MDL	Remark
Soil 67 (3 1/2-4')	Arsenic	11	0.35		Lead	18.4	0.12	
Soil 68 (3-3 1/2')	Arsenic	0.36	0.32	I	Lead	3.6	0.11	
Soil 69 (3-3 1/2')	Arsenic	0.36	0.34	I	Lead	4.7	0.11	
Soil 70 (3-3 1/2')	Arsenic	6.98	0.34	A	Lead	14.8	0.11	
Soil 71 (3-3 1/2')	Arsenic	0.35	0.35	U	Lead	3	0.12	
Soil 72 (3-3 1/2')	Arsenic	16.7	0.32		Lead	11	0.11	
Soil 72A (12-18")	Arsenic	1.3	0.40	I	Lead	26.4	0.053	
Soil 73 (3-3 1/2')	Arsenic	13.4	0.33		Lead	17.7	0.11	
Soil 73A (12-18")	Arsenic	8.36	0.36		Lead	25.1	0.048	
Soil 74 (3-3 1/2')	Arsenic	13.7	0.32		Lead	14.8	0.11	
Soil 74A (12-18")	Arsenic	0.32	0.32	U	Lead	3.3	0.053	
Soil 75 (2-2 1/2')	Arsenic	0.45	0.32	I	Lead	1.6	0.11	
Soil 76 (1-1 1/2')	Arsenic	8.94	0.32		Lead	13.1	0.11	
Soil 77 (2-2 1/2')	Arsenic	10.8	0.34		Lead	11.4	0.11	
Soil 78 (1-1 1/2')	Arsenic	1.1	0.34	I	Lead	4.1	0.11	
Soil 79 (1-1 1/2')	Arsenic	0.98	0.36	I	Lead	55	0.24	
Soil 80 (3-3 1/2')	Arsenic	0.37	0.37	U	Lead	1	0.12	
Soil 81 (3-3 1/2')	Arsenic	0.36	0.36	U	Lead	4.2	0.12	
Soil 82 (3-3 1/2')	Arsenic	0.34	0.34	U	Lead	5	0.11	
Soil 83 (1-1 1/2')	Arsenic	2.12	0.35		Lead	4.1	0.12	
Soil 84 (1-1 1/2')	Arsenic	3.61	0.31		Lead	6	0.1	
Soil 85 (2-2 1/2')	Arsenic	1.4	0.36	I	Lead	3.5	0.12	
Soil 86 (2-2 1/2')	Arsenic	0.86	0.35	I	Lead	7.8	0.12	A
Soil 87 (1-1 1/2')	Arsenic	0.85	0.37	I	Lead	5.2	0.12	
Soil 88 (1-1 1/2')	Arsenic	0.54	0.54	U	Lead	6.2	0.12	
Soil 89 (1 1/2-2')	Arsenic	6.13	0.37		Lead	7.9	0.12	
Soil 90 (1 1/2-2')	Arsenic	6.35	0.37		Lead	20	0.12	
Soil 91 (1 1/2-2')	Arsenic	1.5	0.37	I	Lead	4.5	0.12	
Soil 92 (3-4')	Arsenic	6.72	0.37		Lead	7.3	0.049	
Soil 93 (3-4')	Arsenic	1.88	0.36		Lead	6.7	0.048	
Soil 94 (3-4')	Arsenic	0.78	0.32	I	Lead	4.0	0.043	
Soil 95 (3-4')	Arsenic	0.59	0.37	I	Lead	8.4	0.049	A
Soil 96 (4-4 1/2')	Arsenic	0.43	0.36	I	Lead	4.7	0.049	
Soil 97 (1 1/2-2')	Arsenic	2.75	0.36		Lead	8.1	0.049	
Soil 98 (1-2')	Arsenic	2.73	0.36		Lead	3.2	0.048	
Soil 99 (1-2')	Arsenic	0.87	0.37	I	Lead	5.4	0.049	
Soil 100 (1-2')	Arsenic	0.43	0.37	I	Lead	4.9	0.049	
Soil 101 (0-1')	Arsenic	18.5	0.34		Lead	51.2	0.091	
Soil 101A (12-18")	Arsenic	0.69	0.38	I	Lead	10.5	0.050	
Soil 102 (12-18")	Arsenic	0.38	0.38	U	Lead	3.0	0.049	

Table 7 (Continued)
Arsenic and Lead in Sediment/Soil Analytical Results
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Field ID	Component	Result (mg/Kg)	MDL	Remark	Component	Result (mg/Kg)	MDL	Remark
Soil 103 (12-18")	Arsenic	0.38	0.38	U	Lead	1.7	0.048	
Soil 104 (12-18")	Arsenic	0.38	0.38		Lead	1.8	0.045	
Soil 105 (12-18")	Arsenic	0.50	0.36	U	Lead	3.3	0.048	A
Soil 106 (0-12")	Arsenic	0.20	0.38	I	Lead	2.5	0.12	
Soil 107 (0-12")	Arsenic	4.6	0.38		Lead	23.5	0.11	
Soil 108 (0-12")	Arsenic	5.6	0.36	AJ	Lead	5.9	0.11	AJ
Soil 109 (0-12")	Arsenic	0.12	0.12	U	Lead	15.2	0.11	
Soil 110 (0-12")	Arsenic	9.0	9.0	U	Lead	5.9	0.12	
Soil 111 (0-12")	Arsenic	7.6	7.6	U	Lead	6.7	0.12	
Soil 112 (0-12")	Arsenic	9.5	9.5	U	Lead	5.6	0.12	
Soil 113 (0-12")	Arsenic	8.2	8.2	U	Lead	6.5	0.11	
Soil 114 (0-12")	Arsenic	0.36	0.36	U	Lead	7.7	0.11	
Soil 115 (0-12")	Arsenic	12	12	U	Lead	4.5	0.11	
Soil 116 (0-12")	Arsenic	10	10	U	Lead	5.7	0.11	
Soil 117 (0-12")	Arsenic	5.8	0.38		Lead	12.9	0.12	
Soil 118 (0-12")	Arsenic	4.9	0.38		Lead	6.9	0.11	
Soil 119 (0-12")	Arsenic	7.3	0.36		Lead	17.8	0.11	
Soil 120 (0-12")	Arsenic	1.5	0.38		Lead	5.4	0.12	
Soil 121 (12-18")	Arsenic	0.56	0.095		Lead	1.87	0.24	
Soil 122 (12-18")	Arsenic	2.8	0.099		Lead	3.38	0.25	
Soil 123 (12-18")	Arsenic	1.3	0.092		Lead	1.86	0.23	
Soil 124 (12-18")	Arsenic	1.2	0.093		Lead	2.03	0.23	
Soil 125 (12-18")	Arsenic	3.8	0.085		Lead	5.48	0.21	
Soil 126 (12-18")	Arsenic	0.16	0.082	I	Lead	1.52	0.20	
Soil 127 (12-18")	Arsenic	0.20	0.089	U	Lead	0.84	0.22	I
Soil 128 (12-18")	Arsenic	0.15	0.085	I	Lead	0.75	0.21	I
Soil 129 (12-18")	Arsenic	2.4	0.083		Lead	10.4	0.21	
Soil 130 (12-18")	Arsenic	0.12	0.094	I	Lead	0.65	0.24	I
Soil 131 (12-18")	Arsenic	0.14	0.099	I	Lead	0.66	0.25	I
Soil 132 (12-18")	Arsenic	0.11	0.091	I	Lead	0.95	0.23	I
Soil 133 (12-18")	Arsenic	0.42	0.096	A	Lead	1.53	0.24	AJ
Soil 134 (12-18")	Arsenic	2.3	0.086		Lead	6.59	0.22	
Soil 135 (3-4')	Arsenic	0.40	0.098		Lead	1.25	0.25	
Soil 136 (1-2')	Arsenic	0.40	0.099		Lead	1.40	0.25	
Soil 137 (2-3')	Arsenic	0.19	0.099	I	Lead	0.64	0.25	I
Soil 138 (2-3')	Arsenic	1.2	0.10		Lead	8.44	0.25	
Soil 139 (2-3')	Arsenic	0.46	0.098		Lead	3.05	0.25	
Soil 140 (1-2')	Arsenic	0.35	0.097	I	Lead	1.78	0.24	A
Soil 141 (1-2')	Arsenic	0.54	0.10		Lead	3.43	0.25	
Soil 142 (1-2')	Arsenic	0.45	0.097		Lead	2.63	0.24	

Table 7 (Continued)
Arsenic and Lead in Sediment/Soil Analytical Results
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Field ID	Component	Result (mg/Kg)	MDL	Remark	Component	Result (mg/Kg)	MDL	Remark
Soil 143 (2-3')	Arsenic	0.87	0.097		Lead	6.94	0.24	
Soil 144 (2-3')	Arsenic	0.90	0.099		Lead	8.35	0.25	
Soil 145 (3 ½- 4 ½')	Arsenic	0.92	0.099		Lead	9.01	0.25	
Soil 146 (1-2')	Arsenic	0.32	0.099	I	Lead	1.61	0.25	
Soil 147 (1-2')	Arsenic	0.25	0.097	I	Lead	0.89	0.24	I
Soil 148 (1-2')	Arsenic	0.096	0.096	U	Lead	2.88	0.24	
Soil 149 (1-2')	Arsenic	0.29	0.099	I	Lead	3.62	0.25	
Soil 150 (3-4')	Arsenic	1.6	0.099		Lead	11.1	0.25	
Soil 151 (2-3')	Arsenic	0.25	0.097	I	Lead	0.58	0.24	I
Soil 152 (3-4')	Arsenic	0.47	0.098		Lead	5.62	0.25	
Soil 153 (3-4')	Arsenic	0.10	0.10	U	Lead	10.5	0.25	
Soil 154 (3-4')	Arsenic	0.50	0.098		Lead	2.60	0.24	
Soil 155 (2-3')	Arsenic	0.34	0.098	I	Lead	2.85	0.24	
Soil 156 (2-3')	Arsenic	0.25	0.094	I	Lead	1.32	0.24	
Soil 157 (3-4')	Arsenic	3.0	0.098		Lead	16.9	0.25	
Soil 158 (2-3')	Arsenic	0.73	0.099		Lead	4.63	0.25	
Soil 159 (2-3')	Arsenic	2.7	0.10		Lead	37.5	0.25	
Soil 160 (2-3')	Arsenic	0.57	0.10		Lead	3.71	0.25	
Pond 1 (18-24")	Arsenic	0.85	0.38	I	Lead	3.1	0.12	
Pond 2 (18-24")	Arsenic	0.59	0.33	I	Lead	15.9	0.11	
Pond 3 (18-24")	Arsenic	0.73	0.32	I	Lead	4.7	0.11	
Pond 4 (18-24")	Arsenic	0.32	0.32	U	Lead	7.6	0.11	
Pond 5 (18-24")	Arsenic	0.45	0.36	I	Lead	4.5	0.12	A
Pond 6 (18-24")	Arsenic	0.57	0.57	U	Lead	3.5	0.12	
Pond 7 (18-24")	Arsenic	0.75	0.35	I	Lead	4.6	0.12	
Pond 8 (18-24")	Arsenic	0.53	0.53	U	Lead	5.0	0.11	
Fl-2 (45-55') Nodules	Arsenic	28	0.53		Lead	52.9	0.11	
FL-1S (45')	Arsenic	6.25	0.37	AJ	Lead	1.2	0.11	AJ
FL-2S (45')	Arsenic	11.6	0.37	J	Lead	2.9	0.11	J
FL-3S (55')	Arsenic	7.38	0.38	J	Lead	2.0	0.11	J
FL-4S (64')	Arsenic	20.4	0.33	J	Lead	3.2	0.12	J
New House (Old Hickory Circle)	Arsenic	1.6	0.37	A	Lead	2.23	0.11	A

MDL: Method Detection Limit.

mg/Kg: Milligrams per Kilogram.

A: Value reported is the mean of two or more determinations.

I: The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

J: Estimated value

U: Material was analyzed for but not detected. The reported value is the method detection limit for the sample analyzed.

Table 8
Organic Compound Detections in Sediment/Soil Analytical Results
Merritt's Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Field ID	Organic Compound	Result (ug/Kg)	Remark
Soil 72A (1-1.5')	Bis(2-ethylhexyl)phthalate	1.9E+03	I
	DDE-p,p'	2.0	I
Soil 74A (1-1.5')	Bis(2-ethylhexyl)phthalate	800	I

MDL: Method Detection Limit.

ug/Kg: Micrograms per Kilogram.

I: The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

Semivolatile Organic Compounds Analyzed for in Sediment by the FDEP Central Laboratory

1,2,4-Trichlorobenzene	4-Bromophenyl phenyl ether	Bis(2-ethylhexyl)phthalate	Hexachlorobenzene
1,2-Dichlorobenzene	4-Chloro-3-methylphenol	Butyl benzyl phthalate	Hexachlorobutadiene
1,3-Dichlorobenzene	4-Chlorophenyl phenyl ether	Chrysene	Hexachlorocyclopentadiene
1,4-Dichlorobenzene	4-Nitrophenol	Di-n-butyl phthalate	Hexachloroethane
2,4,6-Trichlorophenol	Acenaphthene	Di-n-octyl phthalate	Indeno(1,2,3-cd)pyrene
2,4-Dichlorophenol	Acenaphthylene	Dibenzo(a,h)anthracene	Isophorone
2,4-Dimethylphenol	Aldrin	Dieldrin	N-Nitrosodi-n-propylamine
2,4-Dinitrophenol	Anthracene	Diethyl phthalate	N-Nitrosodimethylamine
2,4-Dinitrotoluene	Azobenzene/1,2-Diphenylhydrazine	Dimethyl phthalate	N-Nitrosodiphenylamine
2,6-Dinitrotoluene	Benzidine	Endosulfan I	Naphthalene
2-Chloronaphthalene	Benzo(a)anthracene	Endosulfan II	Nitrobenzene
2-Chlorophenol	Benzo(a)pyrene	Endosulfan sulfate	Pentachlorophenol
2-Methyl-4,6-dinitrophenol	Benzo(b)fluoranthene	Endrin	Phenanthrene
2-Nitrophenol	Benzo(g,h,i)perylene	Endrin aldehyde	Phenol
3,3'-Dichlorobenzidine	Benzo(k)fluoranthene	Fluoranthene	Pyrene
4,4'-DDD	Bis(2-chloroethoxy)methane	Fluorene	alpha-BHC
4,4'-DDE	Bis(2-chloroethyl)ether	Heptachlor	beta-BHC
4,4'-DDT	Bis(2-chloroisopropyl)ether	Heptachlor epoxide	delta-BHC
			gamma-BHC

Pesticides Analyzed for in Sediment by the FDEP Central Laboratory

Aldrin	Delta-BHC	Endrin Aldehyde	PCB-1221
Alpha-BHC	Dieldrin	Gamma-BHC	PCB-1232
Beta-BHC	Endosulfan I	Heptachlor	PCB-1242
Chlordane	Endosulfan II	Heptachlor Epoxide	PCB-1248
DDE-p,p'	Endosulfan Sulfate	Methoxychlor	PCB-1254
DDT-p,p'	Endrin	PCB-1016	PCB-1260
			Toxaphene

Table 9
Arsenic and Lead in Water Analytical Results
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Field ID	Component	Result (ug/L)	MDL	Remark	Component	Result (ug/L)	MDL	Remark
Creek 10	Arsenic	0.66	0.37	I	Lead	15.3	0.12	
Creek 18	Arsenic	0.33	0.33	U	Lead	5.3	0.11	
Creek 25	Arsenic	0.33	0.33	U	Lead	2.3	0.11	
Creek 38	Arsenic	0.3	0.3	U	Lead	3.5	0.1	
DEP 1S	Arsenic	1	1	U	Lead	0.81	0.1	
DEP 1D	Arsenic	1	1	U	Lead	0.33	0.1	I
DEP 2D	Arsenic	3.8	1	I	Lead	85.5	0.1	
DEP 2S	Arsenic	2.9	1	I	Lead	3	0.1	
DEP 3S	Arsenic	1	1	U	Lead	1.7	0.1	
DEP 3D	Arsenic	1	1	U	Lead	0.4	0.1	I
DEP 4D	Arsenic	1	1	U	Lead	4.5	0.1	
DEP 5D	Arsenic	2.8	1	I	Lead	0.67	0.1	
DEP 5S	Arsenic	2.1	1	I	Lead	0.42	0.1	I
DEP 6D	Arsenic	0.75	0.75	U	Lead	0.2	0.05	I
DEP 7D	Arsenic	0.75	0.75	U	Lead	0.097	0.05	I
DEP 8D	Arsenic	15.3	0.75		Lead	16.8	0.05	
DEP 10D	Arsenic	0.75	0.75	U	Lead	0.35	0.05	A
DEP 12D	Arsenic	0.75	0.75	U	Lead	0.37	0.05	
DEP 15D	Arsenic	1.02	0.75		Lead	1.5	0.05	
DEP 16D	Arsenic	4.23	0.75		Lead	15.2	0.05	
DEP 17D	Arsenic	7.03	0.75		Lead	16.6	0.05	
DEP 18D	Arsenic	0.25 U	0.75	U	Lead	1.1	0.05	
DEP 19D	Arsenic	2.73	0.75		Lead	0.48	0.05	
DEP 20D	Arsenic	0.25	0.75		Lead	1.9	0.05	
DEP 21D	Arsenic	2.38	0.75		Lead	10.9	0.05	
Ravine MW-1	Arsenic	1	1	U	Lead	0.19	0.1	I
Ravine MW-2	Arsenic	1	1	U	Lead	2	0.1	
Ravine MW-3	Arsenic	1.2	1	I	Lead	1.5	0.1	
Ravine MW-4	Arsenic	1.3	1	I	Lead	1.6	0.1	
FL-1 Deep	Arsenic	27.6	0.75		Lead	0.33	0.1	
FL-2 Deep	Arsenic	214	0.75		Lead	0.072	0.1	I
FL-3 Deep	Arsenic	118	1.5		Lead	0.14	0.05	I
FL-1 Shallow	Arsenic	2.0	0.75	I	Lead	0.87	0.1	
FL-2 Shallow	Arsenic	0.75	0.75	U	Lead	12.2	0.1	
FL-3 Shallow	Arsenic	1.7	0.75	I	Lead	0.12	0.1	I
FL-4 Shallow	Arsenic	2.2	0.75	I	Lead	0.15	0.1	I
4923 Flynt Circle (New House)	Arsenic	16.4	0.75		Lead	4.8	0.05	
4924 Flynt Circle	Arsenic	47.3	0.75		Lead	12	0.05	
SW-1	Arsenic	1.81	0.25		Lead	4.1	0.05	

Table 9 (Continued)
Arsenic and Lead in Water Analytical Results
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Field ID	Component	Result (ug/L)	MDL	Remark	Component	Result (ug/L)	MDL	Remark
SW-2	Arsenic	0.44	0.25	I	Lead	0.29	0.24	I
SP1 (53-57')	Arsenic	18.8	0.75		Lead	6.8	0.05	
SP2 (53.5-57.5')	Arsenic	5.6	0.75		Lead	7.1	0.05	
SP3 (66-70')	Arsenic	116	0.75		Lead	13.4	0.05	
2766 Indian Springs Drive	Arsenic	78.3	0.75	0.25	Lead	10.7	0.05	
2764 Indian Springs Drive	Arsenic	200	0.75		Lead	0.49	0.05	
New House (Old Hickory Circle)	Arsenic	1.9	1.9	U	Lead	1.9	0.05	A
Auger Equipment Blank #1	Arsenic	1	1	U	Lead	0.1	0.1	U
Auger Equipment Blank #2	Arsenic	1	1	U	Lead	0.1	0.1	U
Auger Equipment Blank #3	Arsenic	1	1	U	Lead	0.1	0.1	U
Auger Equipment Blank #4	Arsenic	1	1	U	Lead	0.27	0.1	I
Auger Equipment Blank #5	Arsenic	1	1	U	Lead	0.1	0.1	U
Auger Equipment Blank #6	Arsenic	0.75	0.75	U	Lead	0.35	0.05	A
Auger Equipment Blank #7	Arsenic	0.75	0.75	U	Lead	0.068	0.05	I
Auger Equipment Blank #8	Arsenic	0.75	0.75	U	Lead	0.053	0.05	I
Tubing Equipment Blank #1	Arsenic	1	1	U	Lead	0.1	0.1	U
Tubing Equipment Blank #2	Arsenic	1	1	U	Lead	0.1	0.1	U
Tubing Equipment Blank #3	Arsenic	0.75	0.75	U	Lead	0.05	0.05	U
Tubing Equipment Blank #4	Arsenic	0.25	0.25	U	Lead	2.9	0.05	
Equipment Blank Core Barrel #1	Arsenic	0.75	0.75	U	Lead	0.11	0.05	I
Equipment Blank Core Barrel #2	Arsenic	0.75	0.75	U	Lead	1.4	0.05	
Submersible Pump Equipment Blank	Arsenic	0.75	0.75	U	Lead	0.40	0.05	
Equipment Blank Screen Point	Arsenic	0.25	0.25	U	Lead	0.24	0.05	I
Submersible Pump Equipment Blank	Arsenic	0.75	0.75	U	Lead	0.084	0.05	I

Table 9 (Continued)
Arsenic and Lead in Water Analytical Results
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

MDL: Method Detection Limit.
ug/L: Micrograms per Liter.
A: Value reported is the mean of two or more determinations.
I: The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
U: Material was analyzed for but not detected. The reported value is the method detection limit for the sample analyzed.

Table 10
Ground Water Parameters
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Well ID	Sample Date	pH (Standard Units)	Specific Conductivity (MicroSiemens per second)	Temperature (Degrees Centigrade)	Dissolved Oxygen (%)	Turbidity (NTUs) Unfiltered
DEP1S	05/14/2003	5.29	114	20.82	23.1	32.6
DEP1D	05/14/2003	7.52	257	20.07	20.0	18.8
DEP2S	05/14/2003	6.07	156	21.72	26.2	38.6
DEP2D	05/14/2003	6.03	163	21.18	12.8	1000<
DEP3S	05/14/2003	5.70	81	21.52	73.2	63.3
DEP3D	05/14/2003	5.60	90	19.94	63.2	14.5
DEP4D	05/14/2003	5.69	141	21.80	4.7	215
DEP5S	05/14/2003	6.36	551	28.29	12.7	8.54
DEP5D	05/14/2003	6.14	465	27.05	47.1	2.56
DEP6D	07/22/2003	NC	NC	NC	NC	2.70
DEP7D	07/22/2003	6.67	133	21.58	82.0	17.9
DEP8D	07/23/2003	6.96	280	25.07	86.8	272
DEP9D	07/23/2003	Dry	Dry	Dry	Dry	Dry
DEP10D	08/25/2003	5.66	80	23.50	84.7	17.2
DEP11D	08/25/2003	Dry	Dry	Dry	Dry	Dry
DEP12D	08/25/2003	6.23	115	22.40	71.1	9.40
DEP13D	08/25/2003	Dry	Dry	Dry	Dry	Dry
DEP14D	08/25/2003	Dry	Dry	Dry	Dry	Dry
Ravine MW-1	05/29/2003	6.73	56	18.98	93.7	8.19
Ravine MW-2	05/29/2003	7.55	90	18.95	83.6	65.5
Ravine MW-3	05/29/2003	5.70	112	20.56	7.4	27.8
Ravine MW-4	05/29/2003	5.73	117	20.58	7.7	30.8
FL-1 Shallow	03/02/2004	7.34	531	26.91	8.0	14.4
FL-2 Shallow	03/02/2004	7.72	367	24.50	14.9	18.6
FL-3 Shallow	03/02/2004	7.53	394	25.16	3.8	3.50
FL-4 Shallow	03/02/2004	7.52	458	24.64	4.3	2.56
FL-1 Deep	11/04/2003	7.43	297	22.38	2.3	17.3
FL-2 Deep	11/04/2003	8.98	303	23.30	1.4	7.28
FL-3 Deep	11/04/2003	7.35	357	21.87	7.7	7.35

NC: Not collected.

NTUs: Nephelometric Turbidity Units

Table 11
Organic Compound Detections in Water Analytical Results
Merritt's Mill Pond Arsenic Study
Marianna, Jackson County, Florida

No organic compounds in water were detected by the FDEP Central Laboratory.

Semivolatile Organic Compounds Analyzed for in Water by the FDEP Central Laboratory

1,2,4,5-Tetrachlorobenzene	2-Naphthylamine	Aldrin	Dimethyl phthalate
1,2,4-Trichlorobenzene	2-Nitroaniline	Aniline	Dimethylaminoazobenzene
1,2-Dichlorobenzene	2-Nitrophenol	Anthracene	Dinoseb
1,3,5-Trinitrobenzene	2-Picoline	Azobenzene/1,2-Diphenylhydrazine	Diphenylamine
1,3-Dichlorobenzene	3,3'-Dichlorobenzidine	Benzidine	Endosulfan I
1,3-Dinitrobenzene	3,3'-Dimethylbenzidine	Benzo(a)anthracene	Endosulfan II
1,4-Dichlorobenzene	3-Methylcholanthrene	Benzo(a)pyrene	Endosulfan sulfate
1,4-Naphthoquinone	3-Nitroaniline	Benzo(b)fluoranthene	Endrin
1-Naphthylamine	4,4'-DDD	Benzo(g,h,i)perylene	Endrin aldehyde
2,3,4,6-Tetrachlorophenol	4,4'-DDE	Benzo(k)fluoranthene	Ethyl methanesulfonate
2,4,5-Trichlorophenol	4,4'-DDT	Benzyl alcohol	Fluoranthene
2,4,6-Trichlorophenol	4-Aminobiphenyl	Bis(2-chloroethoxy)methane	Fluorene
2,4-Dichlorophenol	4-Bromophenyl phenyl ether	Bis(2-chloroethyl)ether	Heptachlor
2,4-Dimethylphenol	4-Chloro-3-methylphenol	Bis(2-chloroisopropyl)ether	Heptachlor epoxide
2,4-Dinitrophenol	4-Chloroaniline	Bis(2-ethylhexyl)phthalate	Hexachlorobenzene
2,4-Dinitrotoluene	4-Chlorophenyl phenyl ether	Butyl benzyl phthalate	Hexachlorobutadiene
2,6-Dichlorophenol	4-Nitroaniline	Chrysene	Hexachlorocyclopentadiene
2,6-Dinitrotoluene	4-Nitrophenol	Di-n-butyl phthalate	Hexachloroethane
2-Acetylaminofluorene	5-Nitro-o-toluidine	Di-n-octyl phthalate	Hexachloropropene
2-Chloronaphthalene	7,12-Dimethylbenz(a)anthracene	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene
2-Chlorophenol	Acenaphthene	Dibenzofuran	Isophorone
2-Methyl-4,6-dinitrophenol	Acenaphthylene	Dieldrin	Isosafrole
2-Methylnaphthalene	Acetophenone	Diethyl phthalate	Methapyrilene
Methyl methanesulfonate	N-Nitrosopiperidine	Pentachlorophenol	alpha-BHC
N-Nitrosodi-n-butylamine	N-Nitrosopyrrolidine	Phenacetin	beta-BHC
N-Nitrosodi-n-propylamine	Naphthalene	Phenanthrene	delta-BHC
N-Nitrosodiethylamine	Nitrobenzene	Phenol	gamma-BHC
N-Nitrosodimethylamine	Nitroquinoline-1-oxide	Pyrene	m,p-Cresols
N-Nitrosodiphenylamine	Pentachlorobenzene	Pyridine	o-Cresol
N-Nitrosomethylethylamine	Pentachloroethane	Safrole	o-Toluidine
N-Nitrosomorpholine	Pentachloronitrobenzene		

Table 11 (Continued)
Organic Compound Detections in Water Analytical Results
Merritt's Mill Pond Arsenic Study
Marianna, Jackson County, Florida

Pesticides Analyzed for in Water by the FDEP Central Laboratory

Aldrin	DDT-p,p'	Endrin	PCB-1016
Alpha-BHC	Delta-BHC	Endrin Aldehyde	PCB-1221
Beta-BHC	Dieldrin	Gamma-BHC	PCB-1232
Chlordane	Endosulfan I	Heptachlor	PCB-1242
DDD-p,p'	Endosulfan II	Heptachlor Epoxide	PCB-1248
DDE-p,p'	Endosulfan Sulfate	Methoxychlor	PCB-1254
		Toxaphene	PCB-1260

Appendix A
Request for Assistance

REQUEST FOR ASSISTANCE

Bureau of Waste Cleanup

TO: William A. Martin, JR., P.G.
Administrator, Site Investigation Section
FROM: Michael S. Kennedy, P.G. *MSK*
Supervisor, Cleanup Section, NWD
DATE: April 18, 2003
SITE NAME: Merritt's Mill Pond Metals Site
COUNTY: Jackson

APR 25 2003

Site Investigation Section

DESCRIPTION OF REQUESTED ASSISTANCE:

A problem with arsenic in private drinking water wells, in the vicinity of Merritt's Mill Pond, was brought to our attention at approximately 12:59 PM on 4/16/2003. We were told by Virginia Beard that through her contacts with the Health Department, she was made aware of a group of private drinking water wells that are contaminated with arsenic and/or lead.

The wells are located in the Marianna area, in Jackson County, near the southern end and west of Merritt's Mill Pond where it intersects HWY 90. Thirteen of the thirty-one wells tested were high in arsenic. The highest levels found, so far, are 640 ppb for arsenic and 47 ppb for lead.

The laboratory doing the analysis has as of 4/17/2003, authenticated the data; however, because there are approximately 100 wells in the area, many more still need to be tested. One of the wells is a non-community public supply well (Southern Express #10), and another is a small public supply (Quiet Haven Trailer Park) well. Sampling is still being done by the DOH.

Information of the area has been reviewed and there is no obvious source. However, there are several unconfirmed possibilities: first, it is rumored that there used to be a creosote wood treating plant in the area many years ago. Further, there is also an old, closed, landfill located north of the area, not too far away on the east side of Merritt's Mill Pond Road. It was, allegedly, somewhere near the intersection of Merritt's Mill Pond Road and an unnamed road going east about 400 feet north of Avriett drive. Finally, there is the possibility that herbicides used years ago in the pond, might be a reason for the high arsenic levels.

We request that the Site Investigation Section investigate the area in (immediately north of highway 90, north to Midway Fish Camp Road, between Merritt's Mill Pond to the east, and Merritt's Mill Pond Road to the west) and around the group of contaminated wells to determine the source (s) of the arsenic and lead in the private drinking water wells. We request that the source(s) of contamination be qualitatively defined to a degree that identifies the source of the contamination, the responsible party or parties, and provides sufficient data for potential enforcement.

PRIORITY:

Emergency: _____ Normal: _____
High: X Low: _____

DISTRICT CONTACT PERSON: Victor S. Hultstrand SC 695-8360, ext. 1261

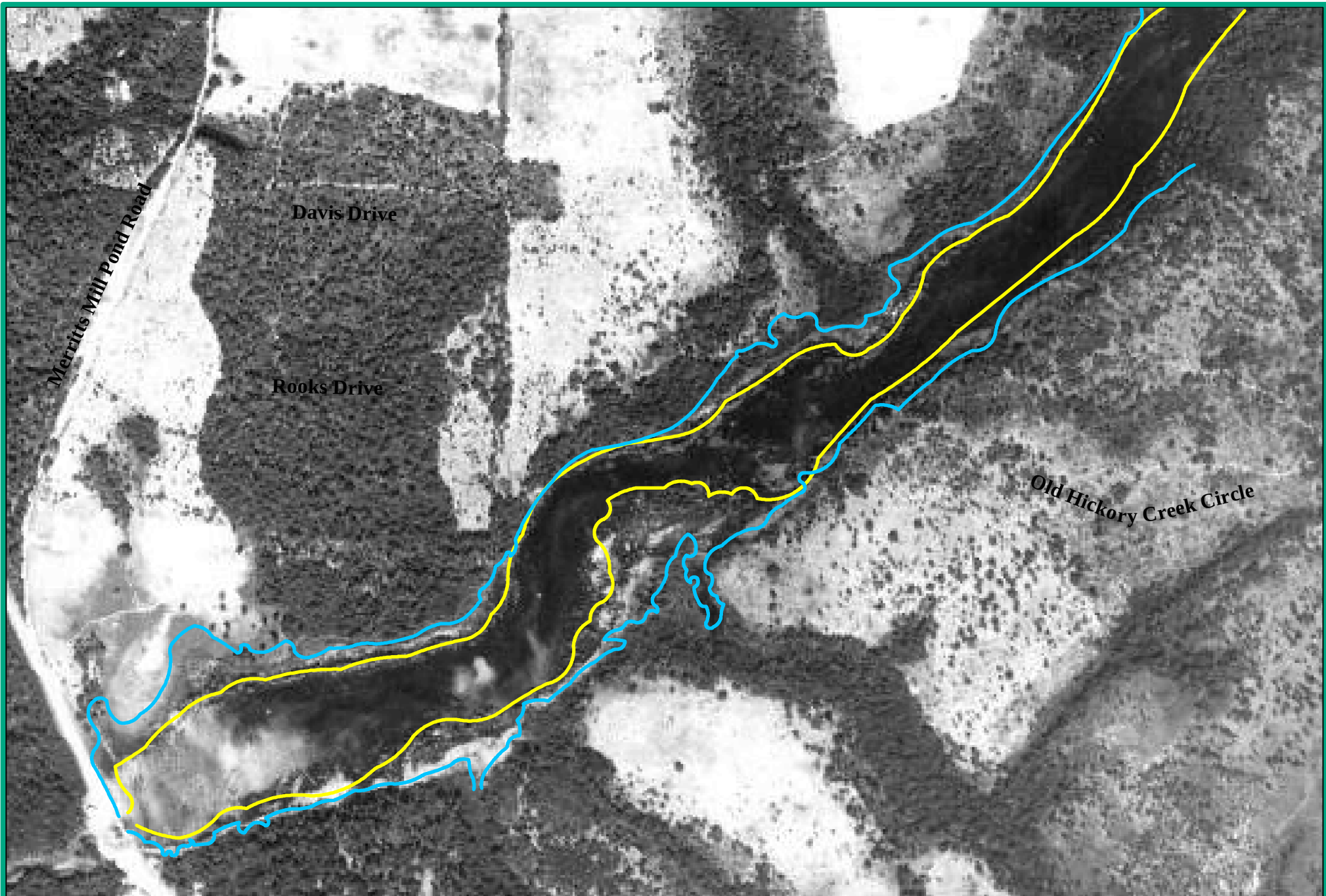
REQUEST SCHEDULING DATE: _____

PROJECT ASSIGNMENT

Site Investigation Team: _____
or
Assessment Contractor: _____
Scheduled Work Date: _____

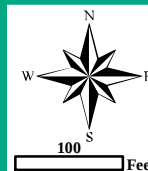
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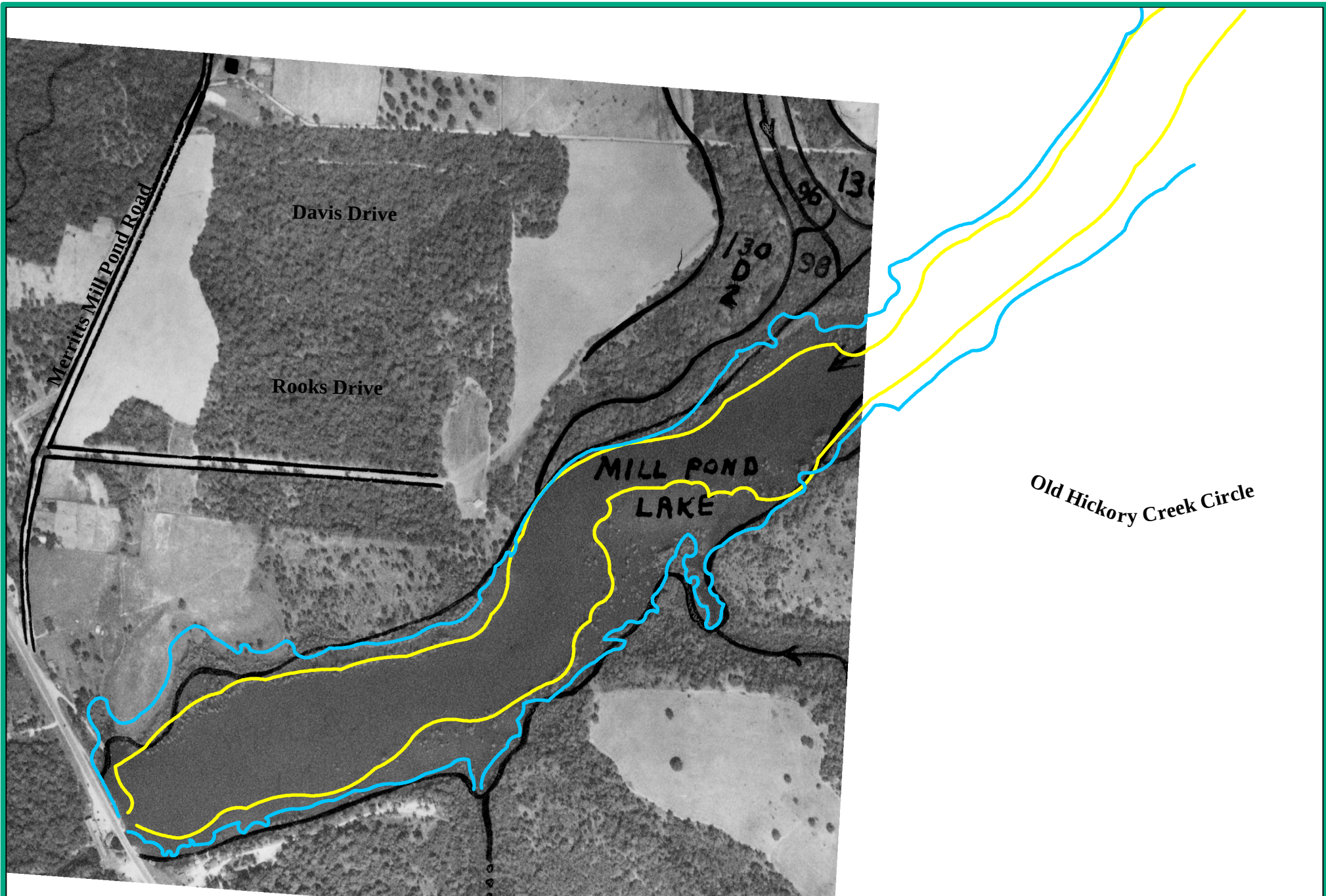
Appendix B
Historical Aerial Photographs



Circa 1940
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

 Merritts Mill Pond High Water Level
 Merritts Mill Pond Low Water Level

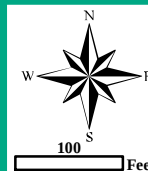


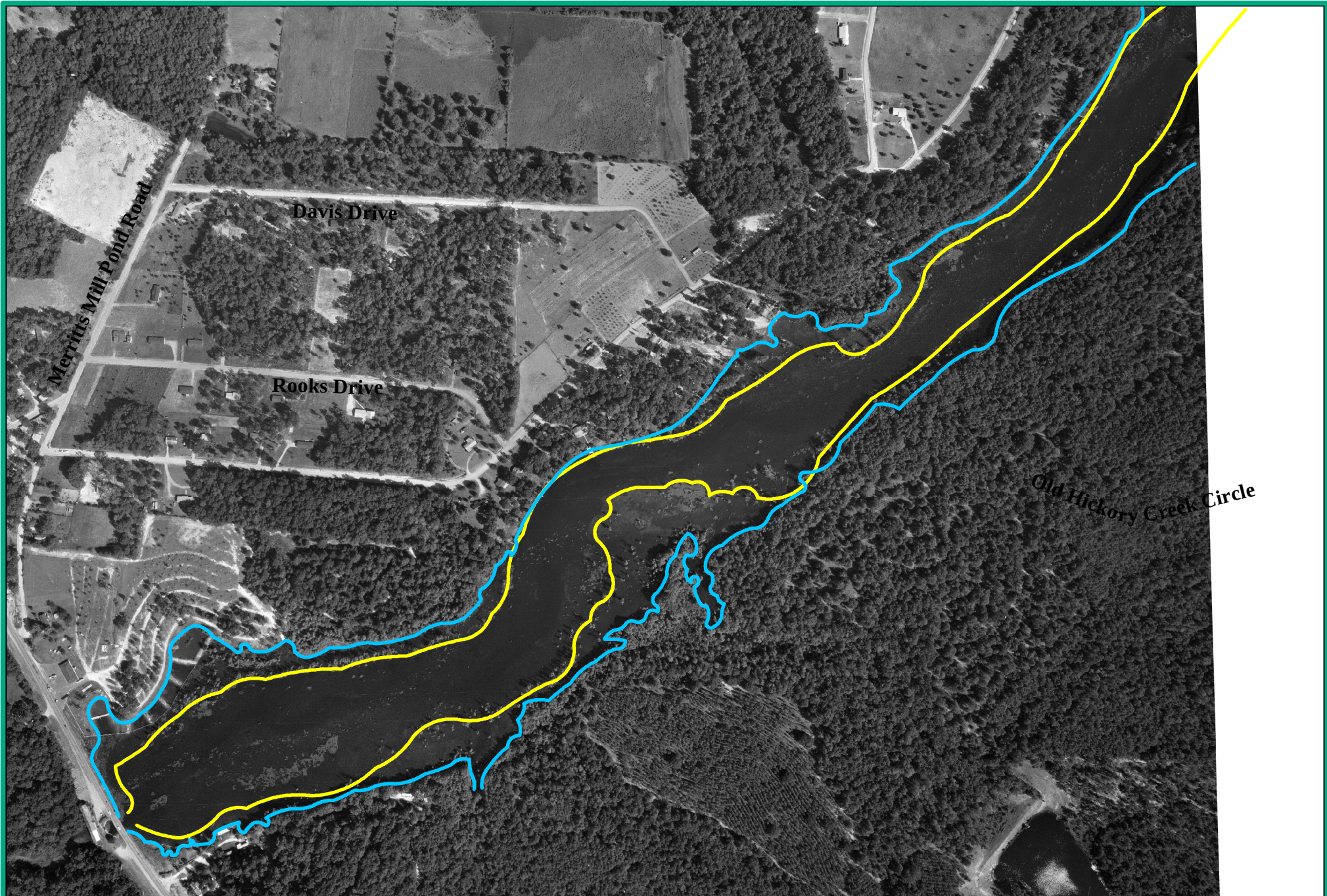


Circa 1955
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



Merritts Mill Pond High Water Level
Merritts Mill Pond Low Water Level

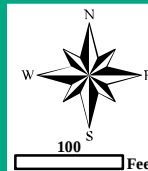


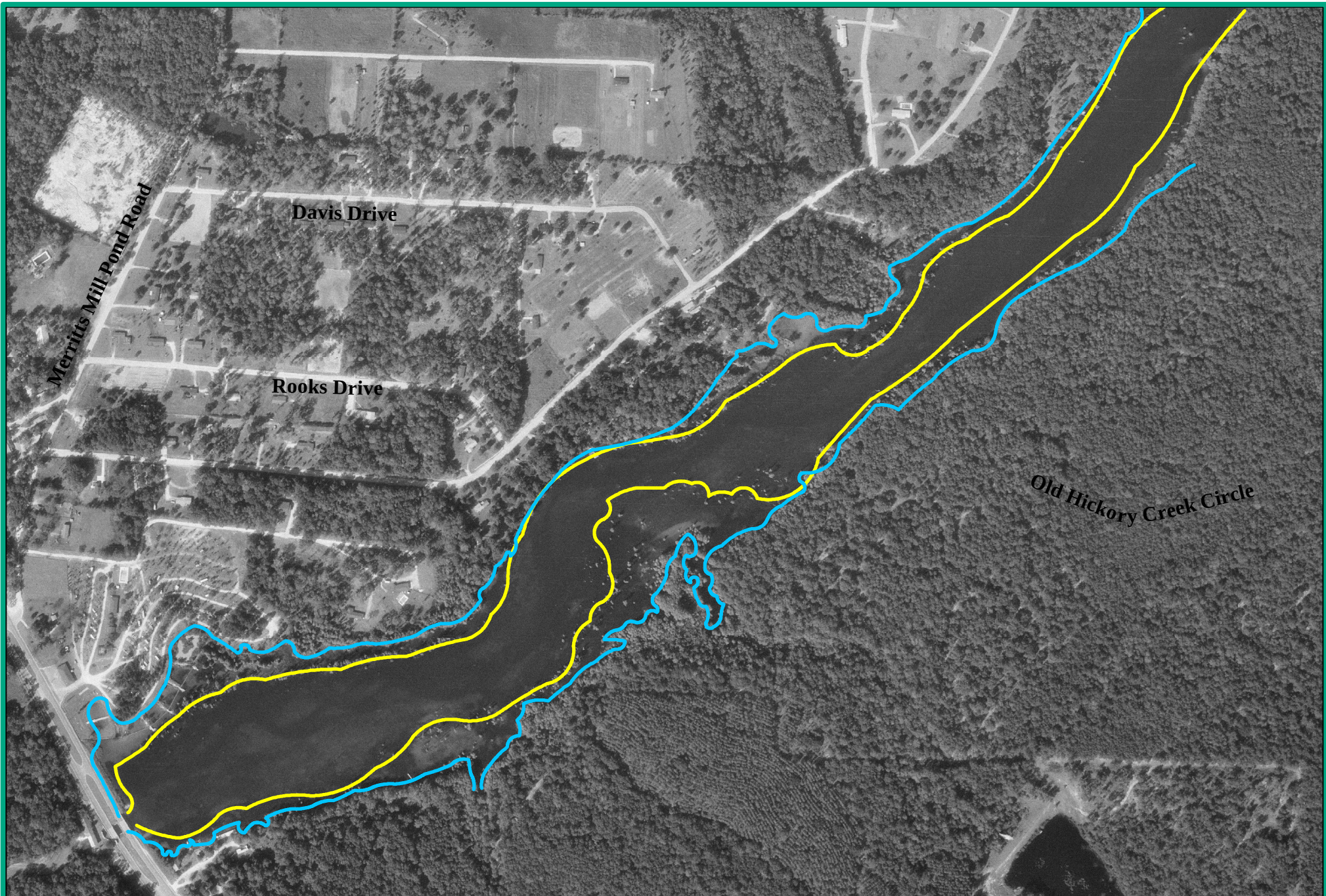


Circa 1970
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



Merritts Mill Pond High Water Level
Merritts Mill Pond Low Water Level

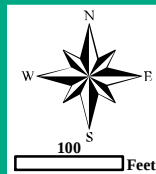


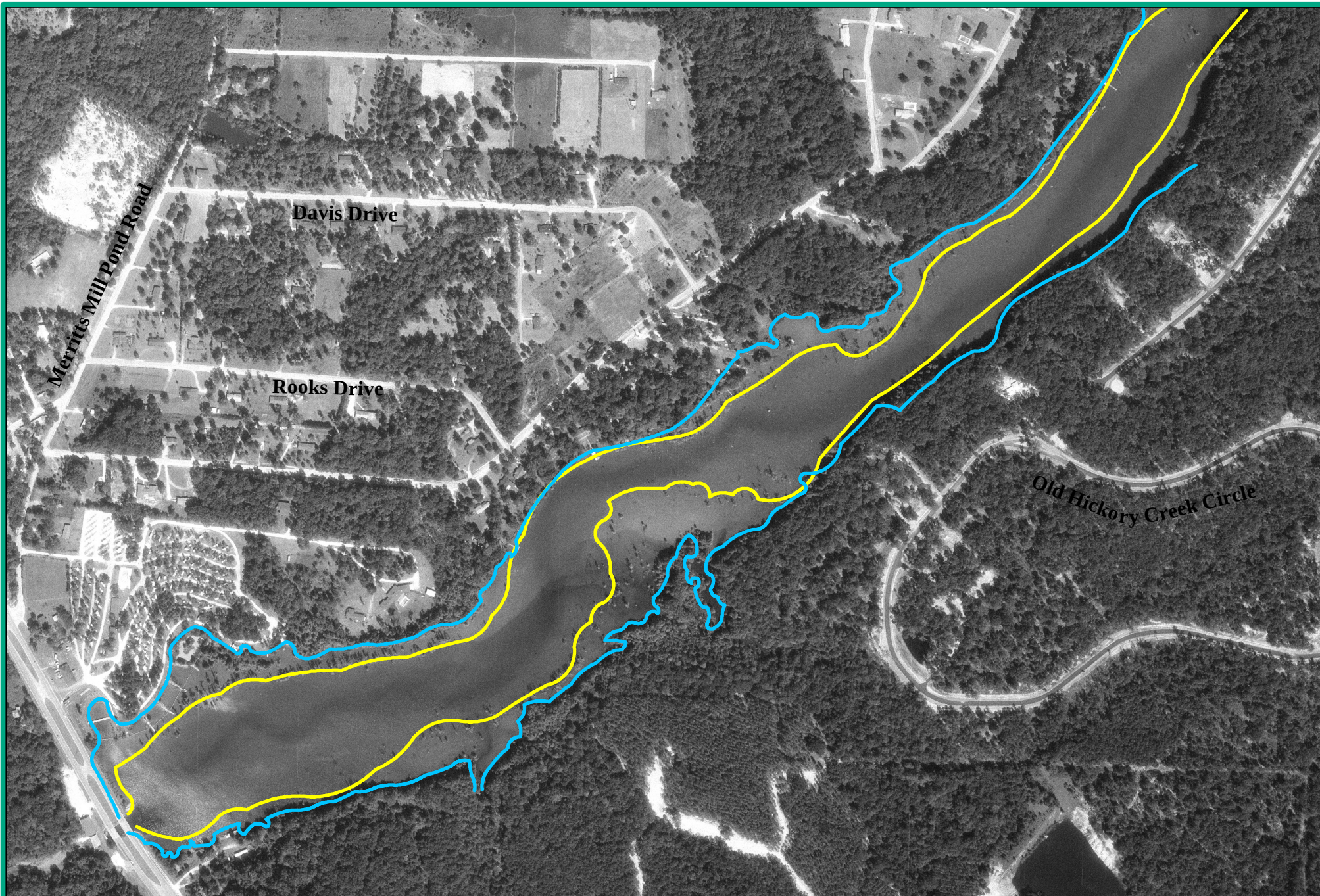


Circa 1975
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



Merritts Mill Pond High Water Level
Merritts Mill Pond Low Water Level

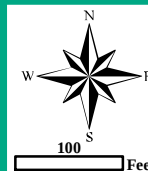


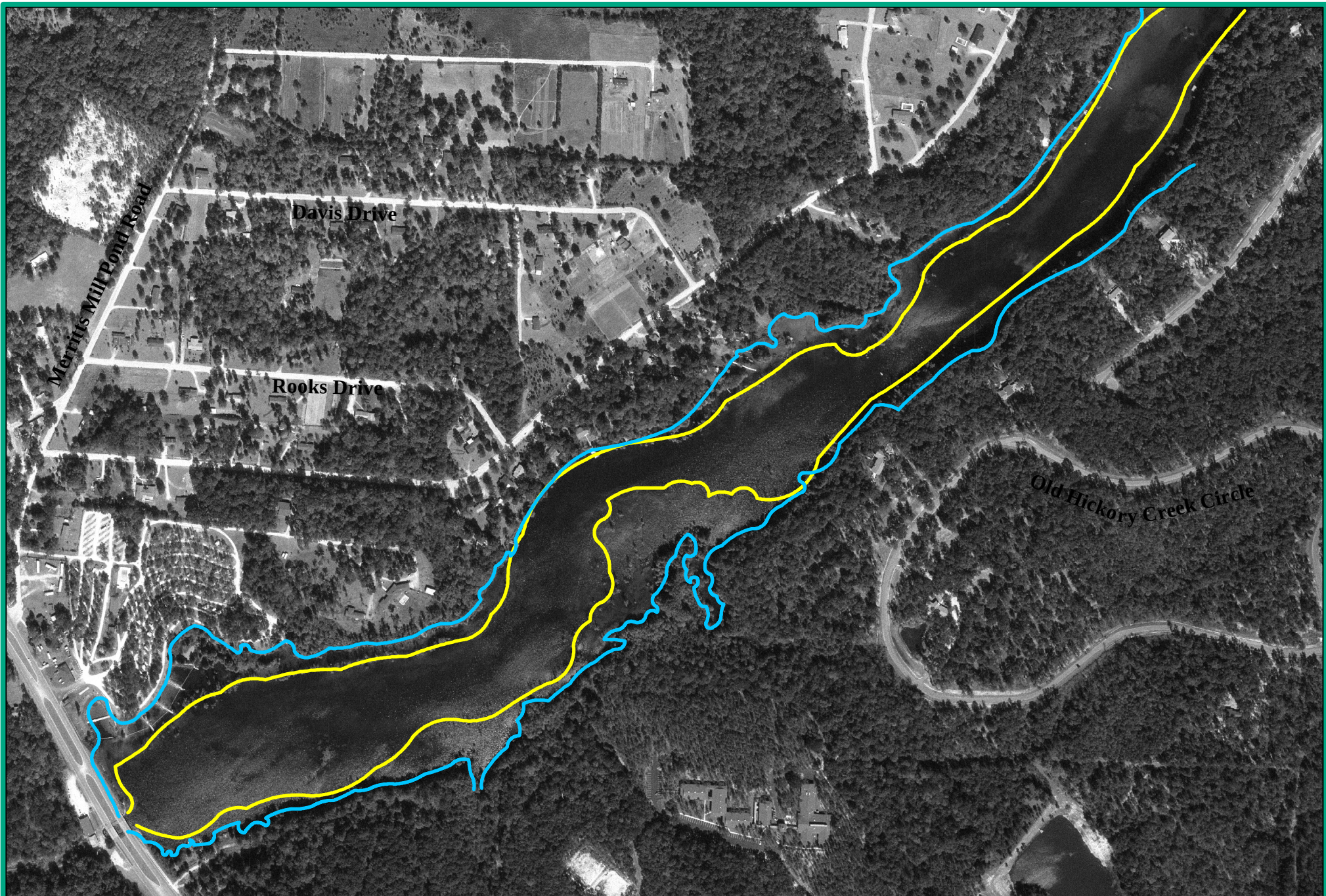


Circa 1979
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



Merritts Mill Pond High Water Level
Merritts Mill Pond Low Water Level

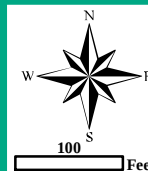


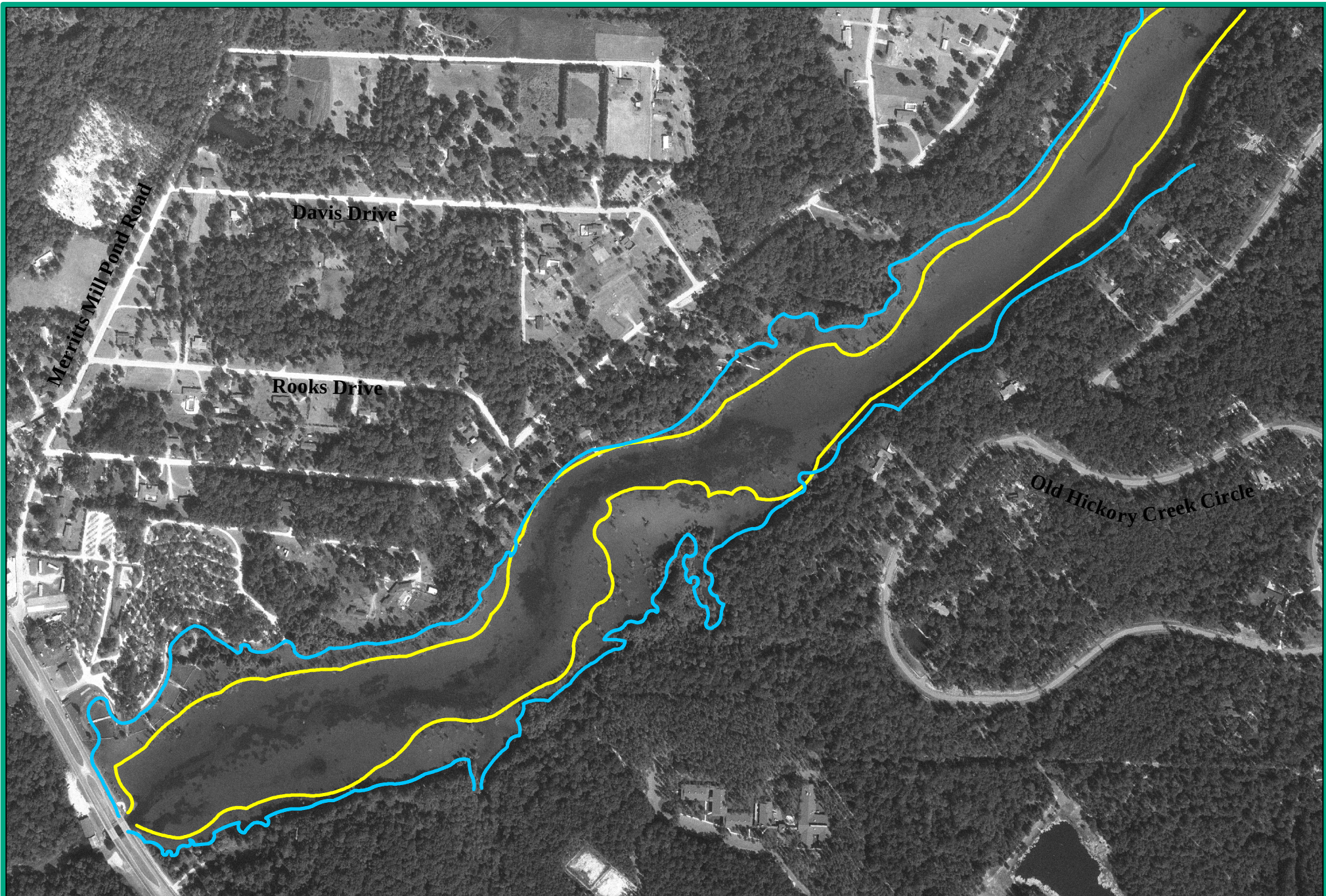


Circa 1981
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



Merritts Mill Pond High Water Level
Merritts Mill Pond Low Water Level

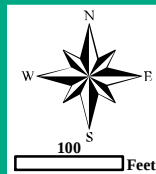


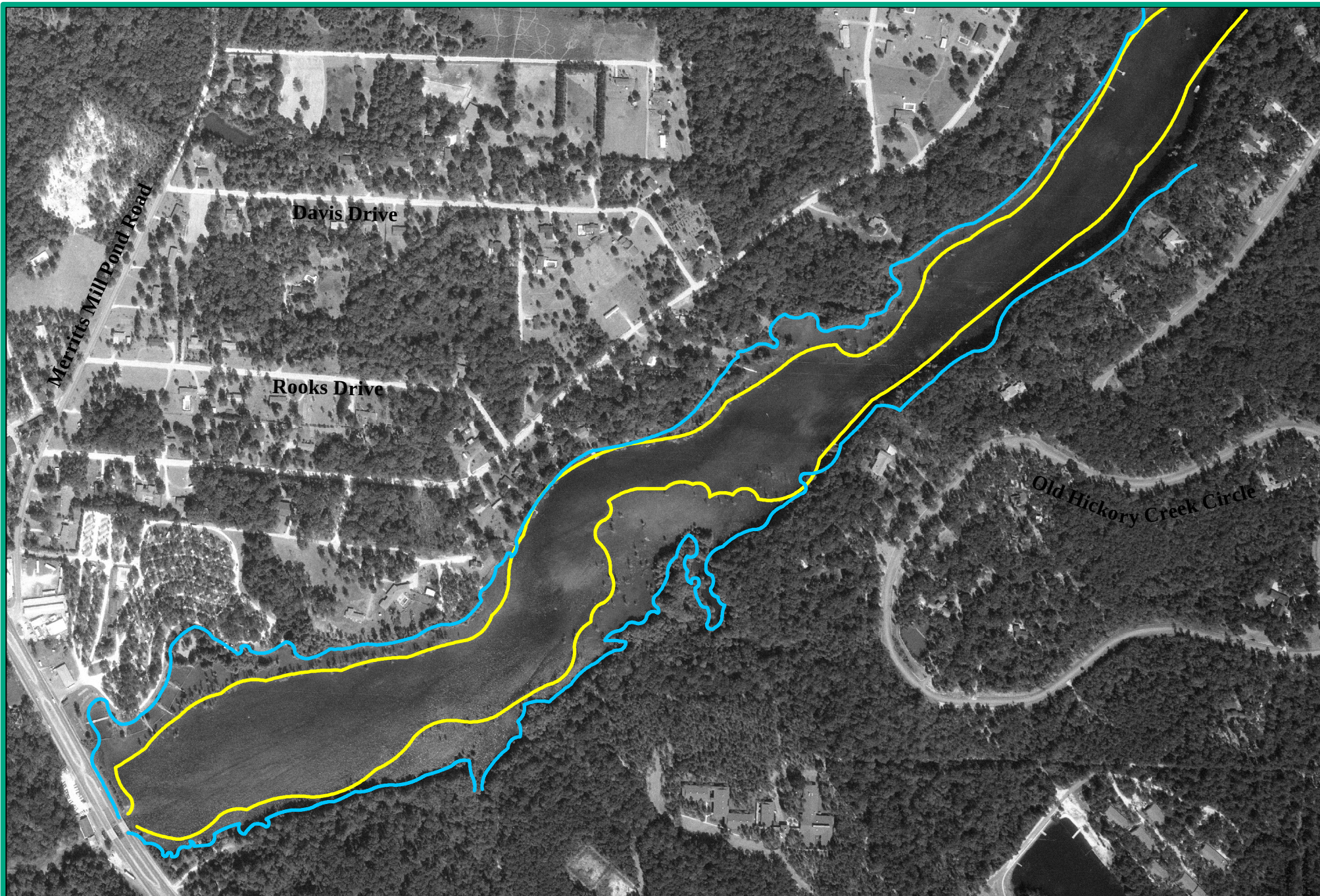


Circa 1984
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



Merritts Mill Pond High Water Level
Merritts Mill Pond Low Water Level

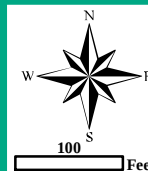




Circa 1987
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



Merritts Mill Pond High Water Level
Merritts Mill Pond Low Water Level

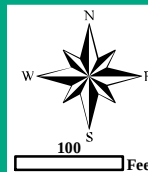




Circa 1990
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



Merritts Mill Pond High Water Level
Merritts Mill Pond Low Water Level

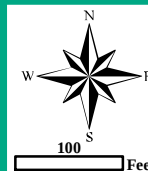


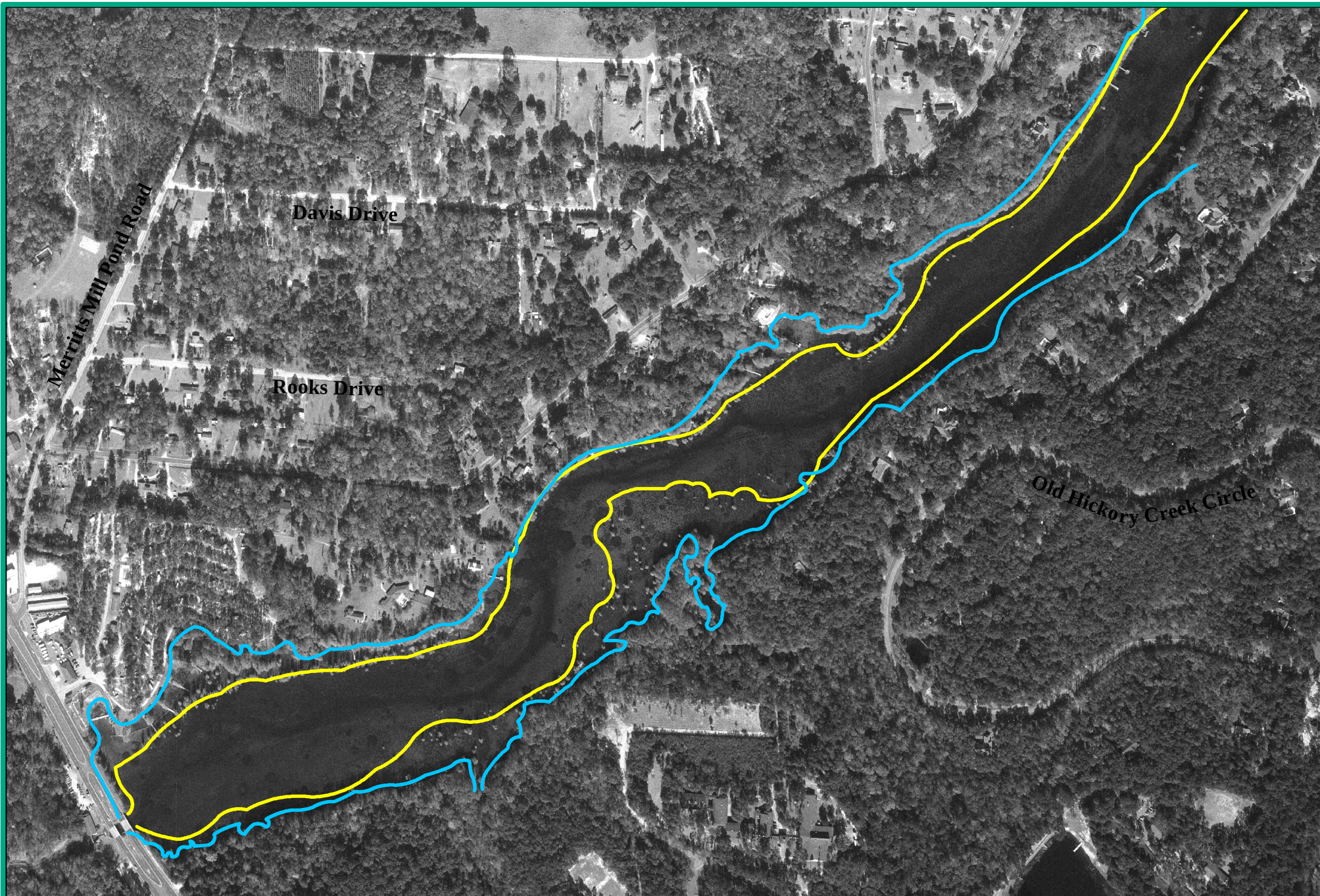


Circa 1994
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



Merritts Mill Pond High Water Level
Merritts Mill Pond Low Water Level

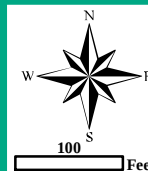




Circa 2000
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida



Merritts Mill Pond High Water Level
Merritts Mill Pond Low Water Level



Appendix C

SIS Environmental Assessment Timeline

SIS Environmental Assessment Timeline

Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

- 04/25/2003:** A Request for Assistance was received by the Site Investigation Section from the FDEP Northwest District Office.
- 05/13/2003:** SIS initiated fieldwork at the Merritts Mill Pond site. During the week, SIS collected surface water, ground water and sediment samples in proximity to a ravine that bisects the study area. Nine microwells were installed and a network consisting of 43 sediment sample locations was laid out and sampled for lead and arsenic. Sediment samples were collected from 12 to 18” below land surface
- 05/22/2003:** SIS performed an elevation survey linking the network of microwells to nearby impacted supply wells.
- 05/23/2003:** The FDEP Central Laboratory released its analytical results from the SIS 05/13/2003 sampling event.
- 05/28/2003:** SIS collected additional sediment samples from network locations 13 to 37. Samples were collected 36 to 42” below land surface. In addition, four hand installed monitor wells were positioned deep within the ravine and sampled.
- 06/03/2003:** Sampling event 05/28/2003 analytical results were received from the FDEP Central Laboratory.
- 06/08/2003:** Sediment samples were collected at three locations centered on location Soil 22A. Samples were collected 78 to 90 inches below land surface. Additional area supply wells were incorporated into the SIS survey network to determine ground water flow direction within the impacted aquifer.
- 06/16/2003:** The FDEP Central Laboratory released its analytical results from the SIS 06/08/2003 sampling event.
- 06/26/2003:** Additional deep sediment samples were collected from the SIS network at eight locations.
- 07/02/2003:** The FDEP Central Laboratory released its analytical results from the SIS 06/26/2003 sampling event.
- 07/07/2003:** Deep sediment samples were collected from the SIS network at fourteen additional locations.

SIS Environmental Assessment Timeline (Continued)

Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

- 07/15/2003:** The FDEP Central Laboratory released its analytical results from the SIS 07/07/2003 sampling event.
- 07/22/2003:** Ground water and soil samples were collected from a suspected fill area on and adjacent to Rooks Drive.
- 08/01/2003:** Sampling event 07/22/2003 analytical results were received from the FDEP Central Laboratory.
- 08/25/2003:** Additional soil and ground water samples were collected from the fill area.
- 09/05/2003:** The FDEP Central Laboratory released its analytical results from the SIS 08/25/2003 sampling event.
- 10/07/2003:** Nineteen sediment samples were collected from within a second ravine that extends from Flynt Circle to the pond.
- 10/28/2003:** The FDEP Central Laboratory released its analytical results from the SIS 10/07/2003 sampling event. Three deep wells were installed utilizing rotosonic technology to ascertain specific lithologic characteristics of the impacted aquifer. Information garnered was used to determine whether a former fruit orchard might be a possible source of arsenic.
- 11/04/2003:** Deep Floridan monitor wells were sampled. Seven additional sediment samples were also collected from the waterfront.
- 12/09/2003:** SIS in conjunction with the SIS Academic Dive Team performed a reconnaissance of the pond's lower extent. Samples were collected from the former spring run channel at eight locations.
- 12/10/2003:** The FDEP Central Laboratory released its analytical results from the SIS 11/04/2003 sampling event.
- 12/31/2003:** The FDEP Central Laboratory released its analytical results from the SIS 12/10/2003 sampling event.
- 02/28/2004:** SIS installed four shallow monitor wells into the upper Floridan aquifer to screen an anomalous interval. A rich glauconitic unit was observed approximately 45 feet below land surface during the coring of monitor well FL-2 Deep. A sample from this interval contained the most elevated concentrations of arsenic in sediment reported to date.

SIS Environmental Assessment Timeline (Continued)

Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

- 03/02/2004:** SIS sampled the four newly installed monitor wells. An elevation survey was performed tying in the new wells and the pond's water surface with the previously established network of monitor and supply wells.
- 03/18/2004:** The FDEP Central Laboratory released its preliminary analytical results from the SIS 03/02/2004 sampling event.
- 04/08/2004:** After reacquiring access to a Flynt Circle property, SIS collected nine additional soil samples in an area adjacent to sample locations Soil 72, 73, and 74. These locations have the highest concentrations of arsenic reported thus far in shallow borings and are located hydraulically upgradient to the impacted aquifer. The installation of monitor wells with the direct push rig is thwarted by the presence of shallow competent limestone.
- 05/12/2004:** The FDEP Central Laboratory released its preliminary analytical results from the SIS 04/08/2004 sampling event. Results indicated the presence of arsenic at "background levels." Very low concentrations of organic compounds are also present. None of the results implicate the sample location as an arsenic source area.
- 05/25/2004:** SIS requested the Jackson County Department of Health (JDOH) to collect water samples from potable supply wells located on the eastern side of the Merritts Mill Pond directly east of the supply wells showing the greatest impact by arsenic.
- 08/12/2004:** JDOH reported that two of the supply wells sampled on the eastern side of the pond have arsenic at concentrations exceeding its primary standard.
- 08/17/2004:** SIS performed a reconnaissance of the pond's eastern shore and collected several sediment samples. Included in the sample set were samples gathered near an apparent karst feature located near the southern extent of Indian Springs Drive. This feature is positioned near the supply well reported by JDOH to contain arsenic at a level of 128 ug/L.
- 09/01/2004:** SIS returned to the karst feature location to install and sample three microwells to evaluate ground water quality in the vicinity. An ECL probe penetrated 107 feet into the collapsed sinkhole. In addition, several supply wells were surveyed in to expand the network of ground water elevation wells.

SIS Environmental Assessment Timeline (Continued)

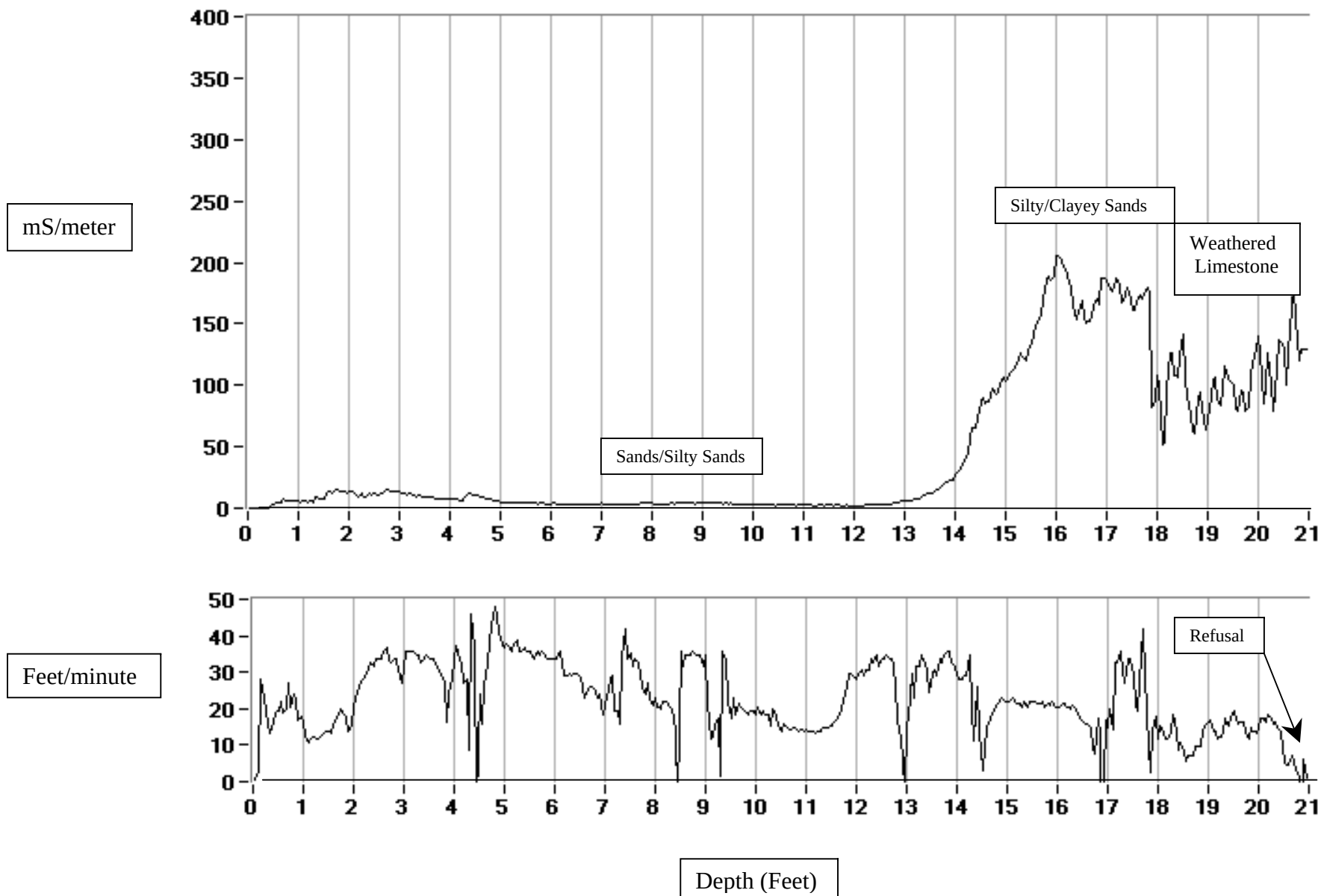
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

- 10/15/2004:** The FDEP Central Laboratory released its preliminary analytical results from the SIS 09/01/2004 sampling event.
- 10/26/2004:** Four additional temporary microwells were installed and sampled hydraulically upgradient to the 128 ug/L arsenic impacted supply well. These points were all located within the extended karst feature. An additional supply well located next door, which had been taken out of service, was also sampled.
- 11/10/2004:** The FDEP Central Laboratory released its preliminary analytical results from the SIS 10/26/2004 sampling event.
- 11/17/2004:** Access letters were sent out to property owners on Old Hickory Circle and Indian Springs Road so that ground water samples could be collected immediately adjacent to the supply wells impacted with elevated concentrations of arsenic. This information would allow SIS to determine what depth the contamination is emanating into the supply well's capture zone.
- 12/13/2004:** Direct push screen point samples were collected on private property on the eastern side of the pond.
- 01/18/2005:** The FDEP Central Laboratory released its preliminary analytical results from the SIS 12/13/2004 sampling event.
- 01/20/2005:** Sediment samples were collected along the pond's eastern shore where the stream located south of Old Hickory Circle enters the pond.
- 02/03/2005:** The FDEP Central Laboratory released its preliminary analytical results from the SIS 01/20/2005 sampling event.
- 03/08/2005:** Sediment samples were collected from within the pond at a location judged to be arable land circa 1940 and before based on historical aerial photographs.
- 04/09/2005:** The FDEP Central Laboratory released its preliminary analytical results from the SIS 03/08/2005 sampling event.
- 04/10/2005:** Field work phase concluded.

Appendix D

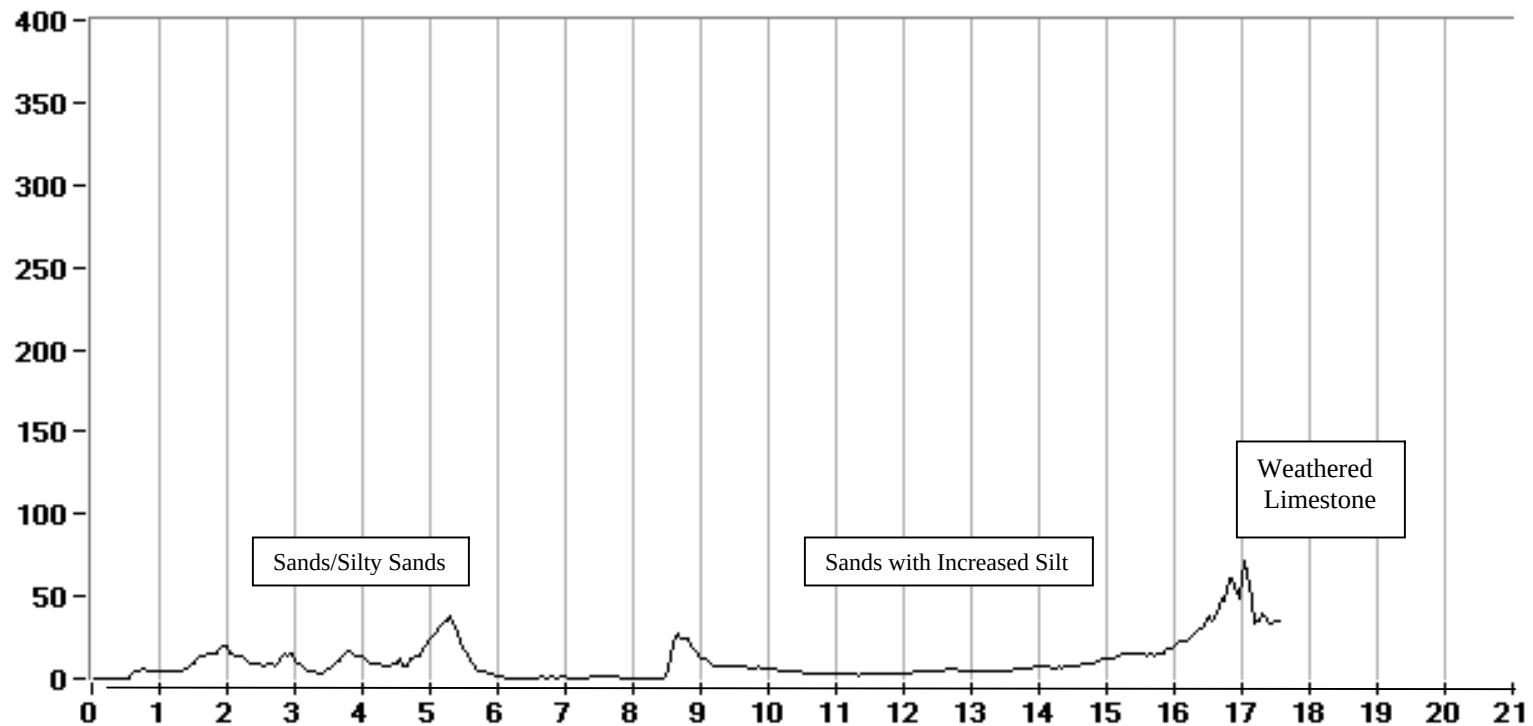
Electrical Conductivity and Rate of Penetration Logs

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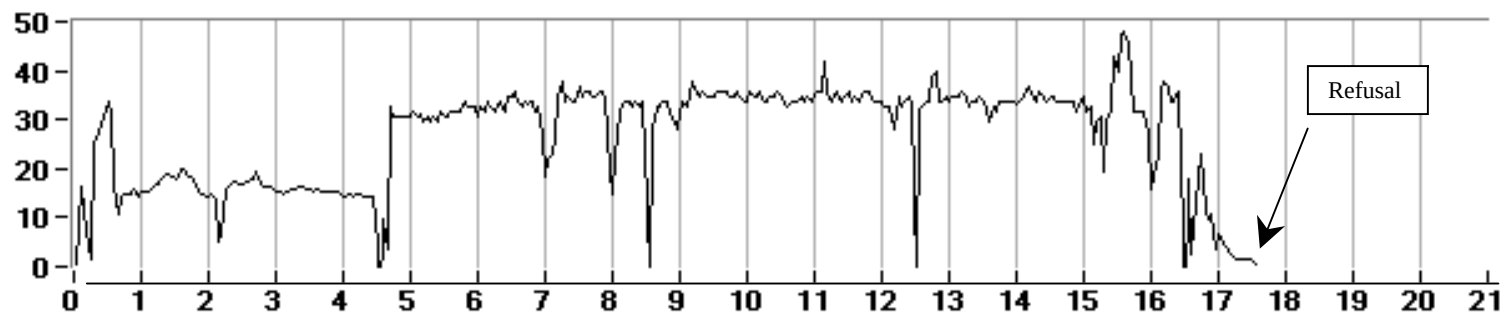


DEP2 Specific Conductivity

mS/meter

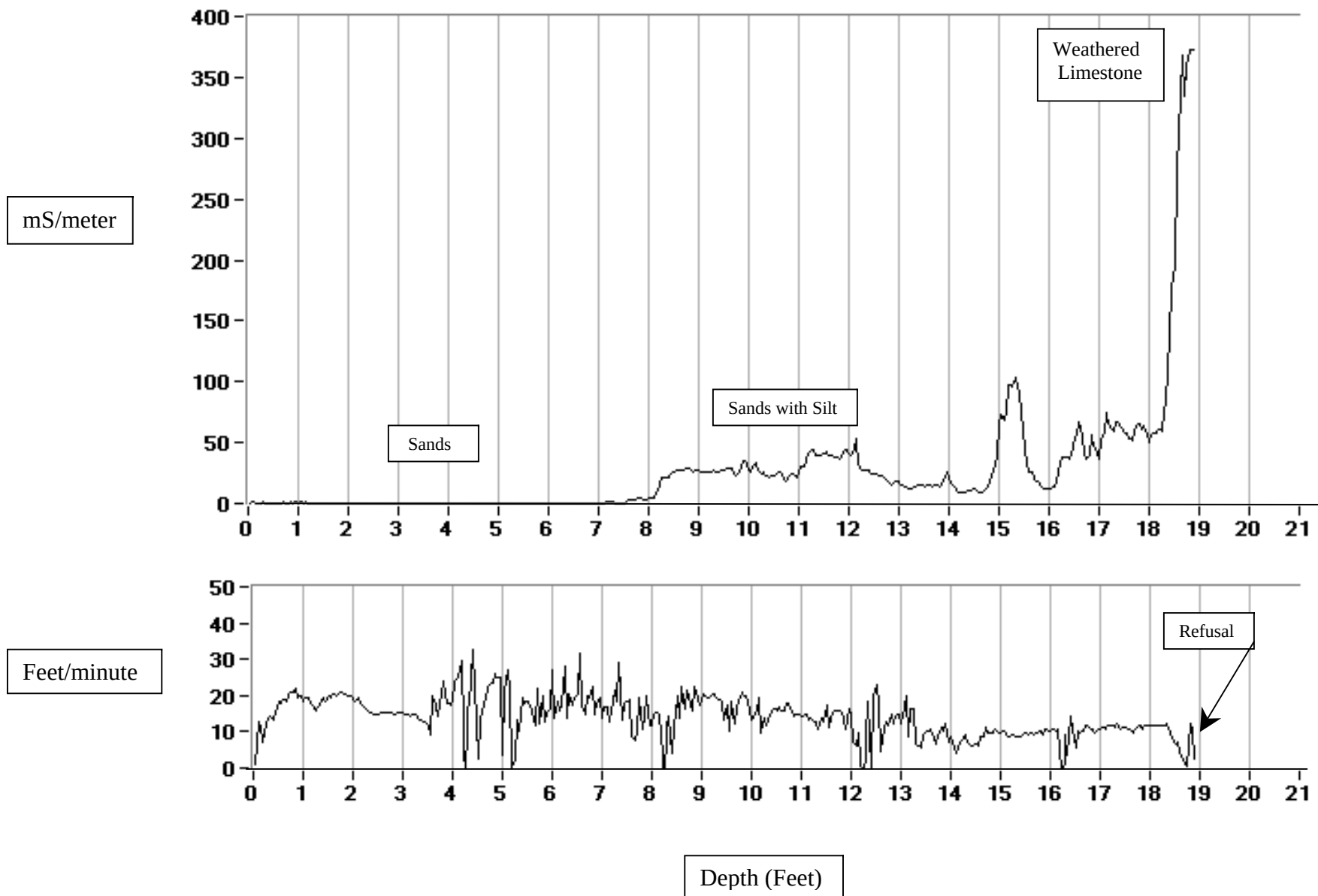


Feet/minute

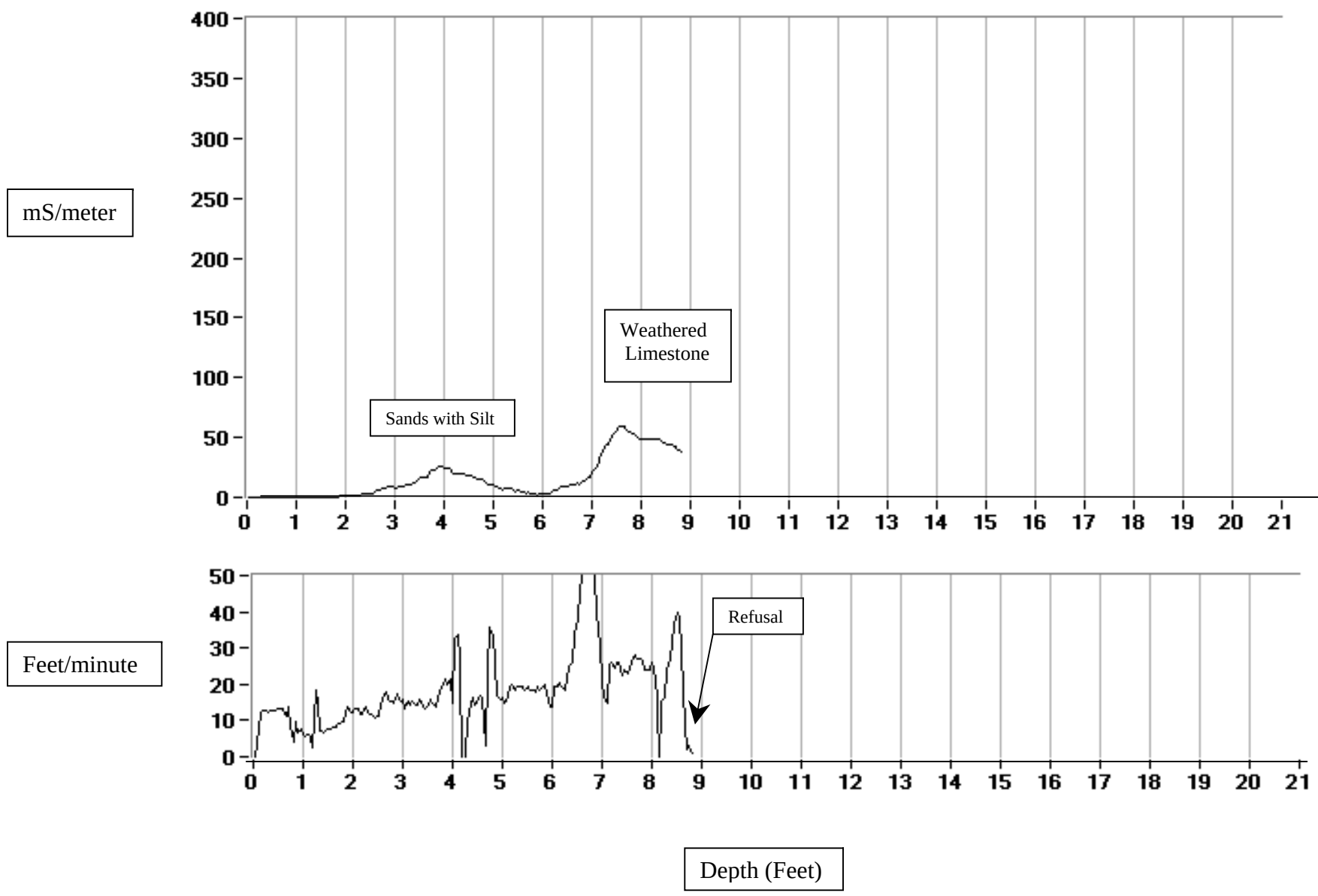


Depth (Feet)

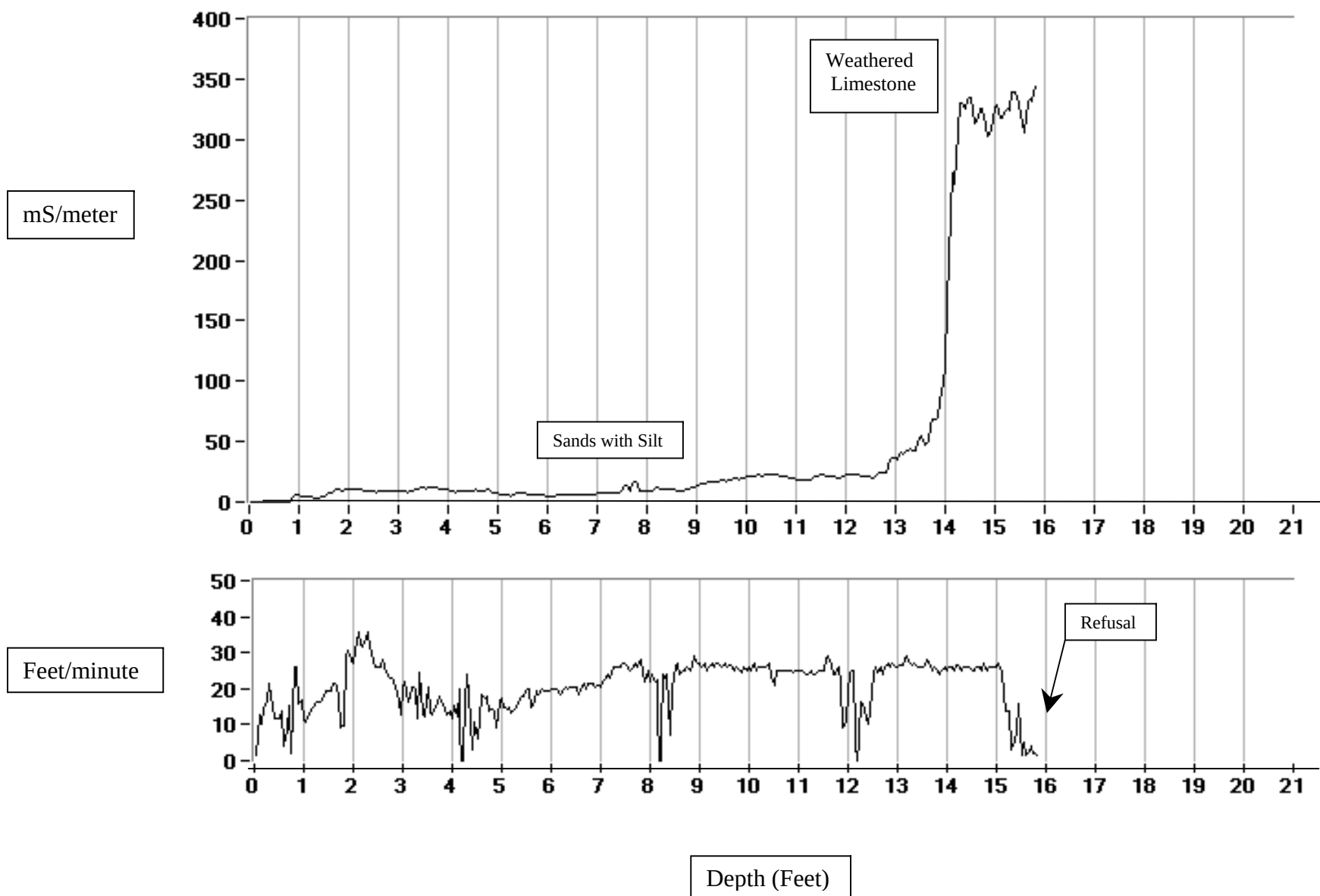
DEP3 Specific Conductivity



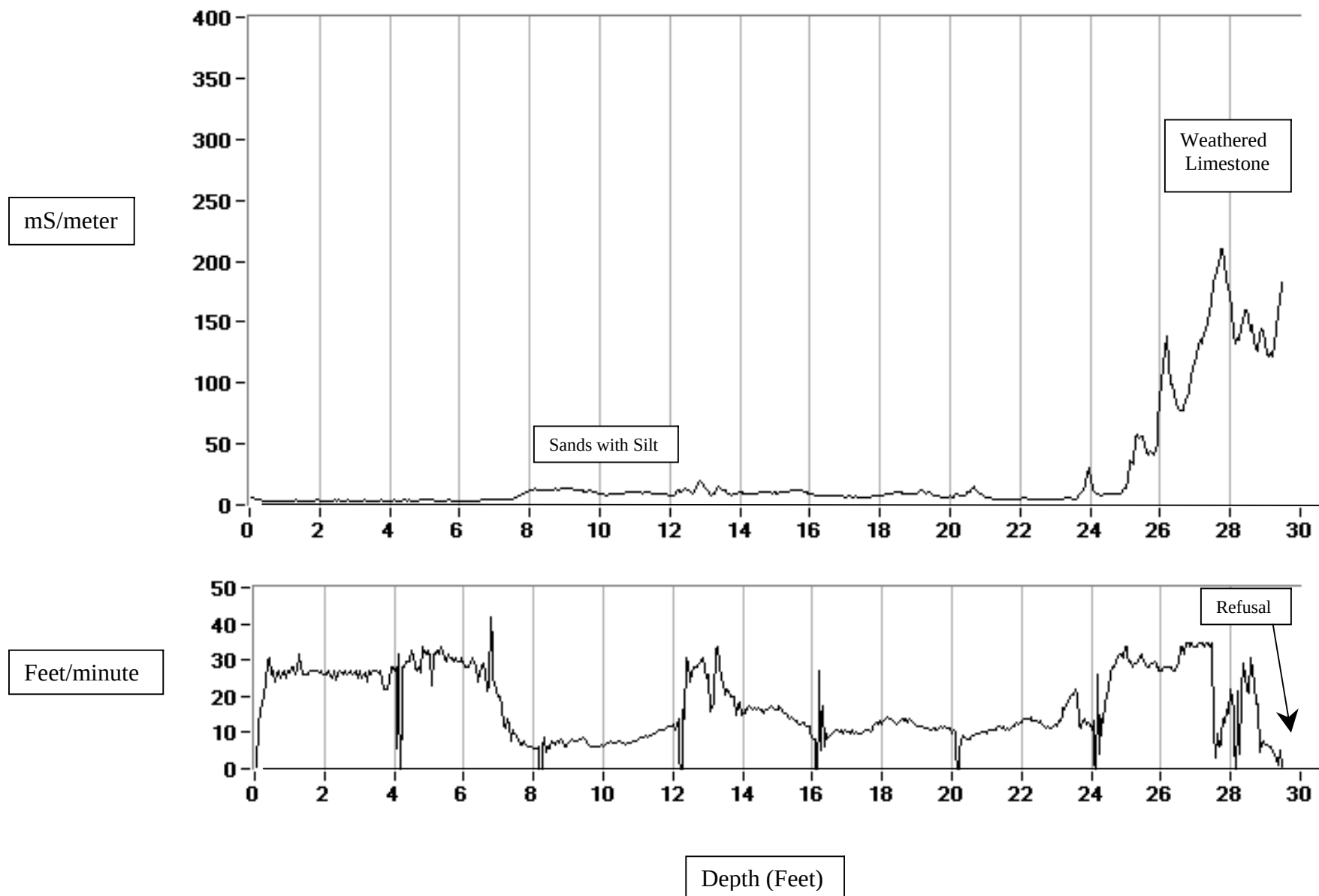
DEP4 Specific Conductivity



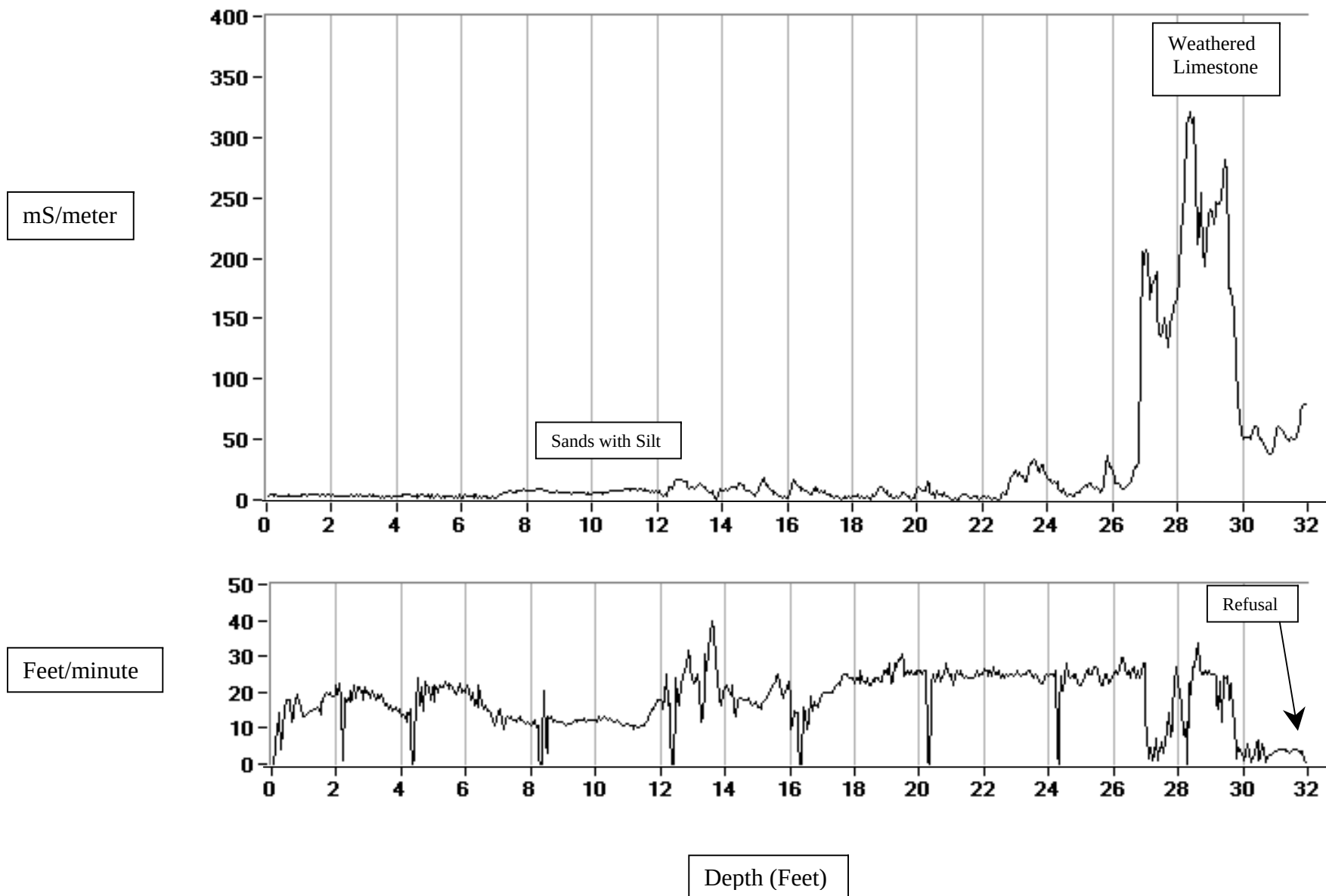
DEP5 Specific Conductivity



DEP6 Specific Conductivity

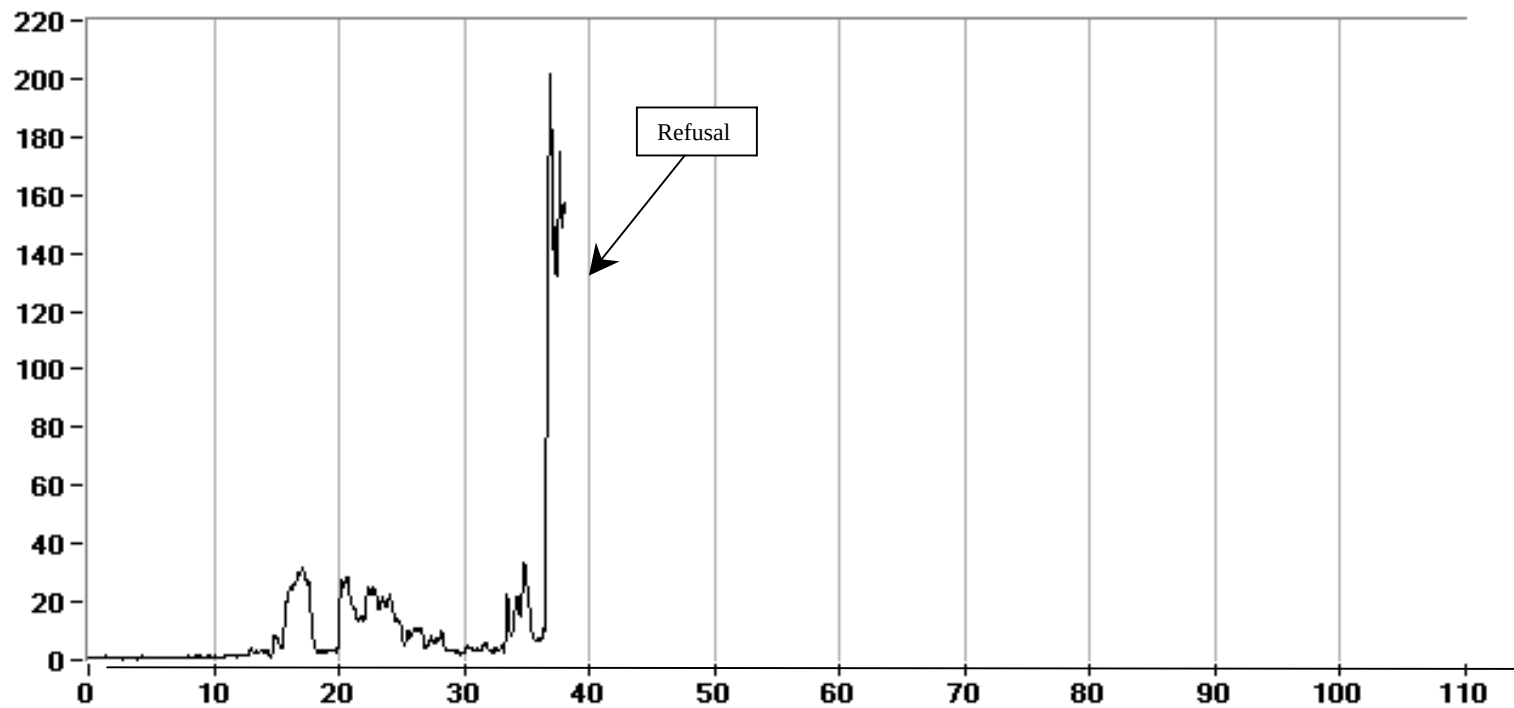


DEP10 Specific Conductivity

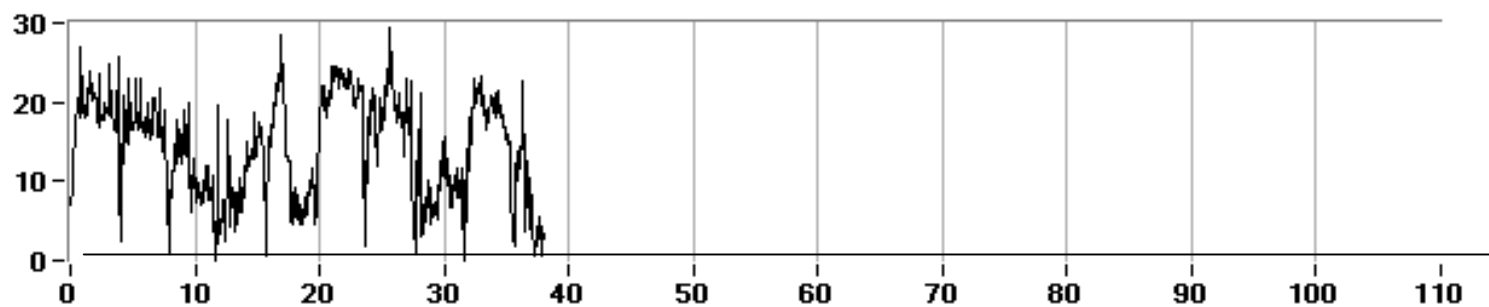


OHC Specific Conductivity

mS/meter

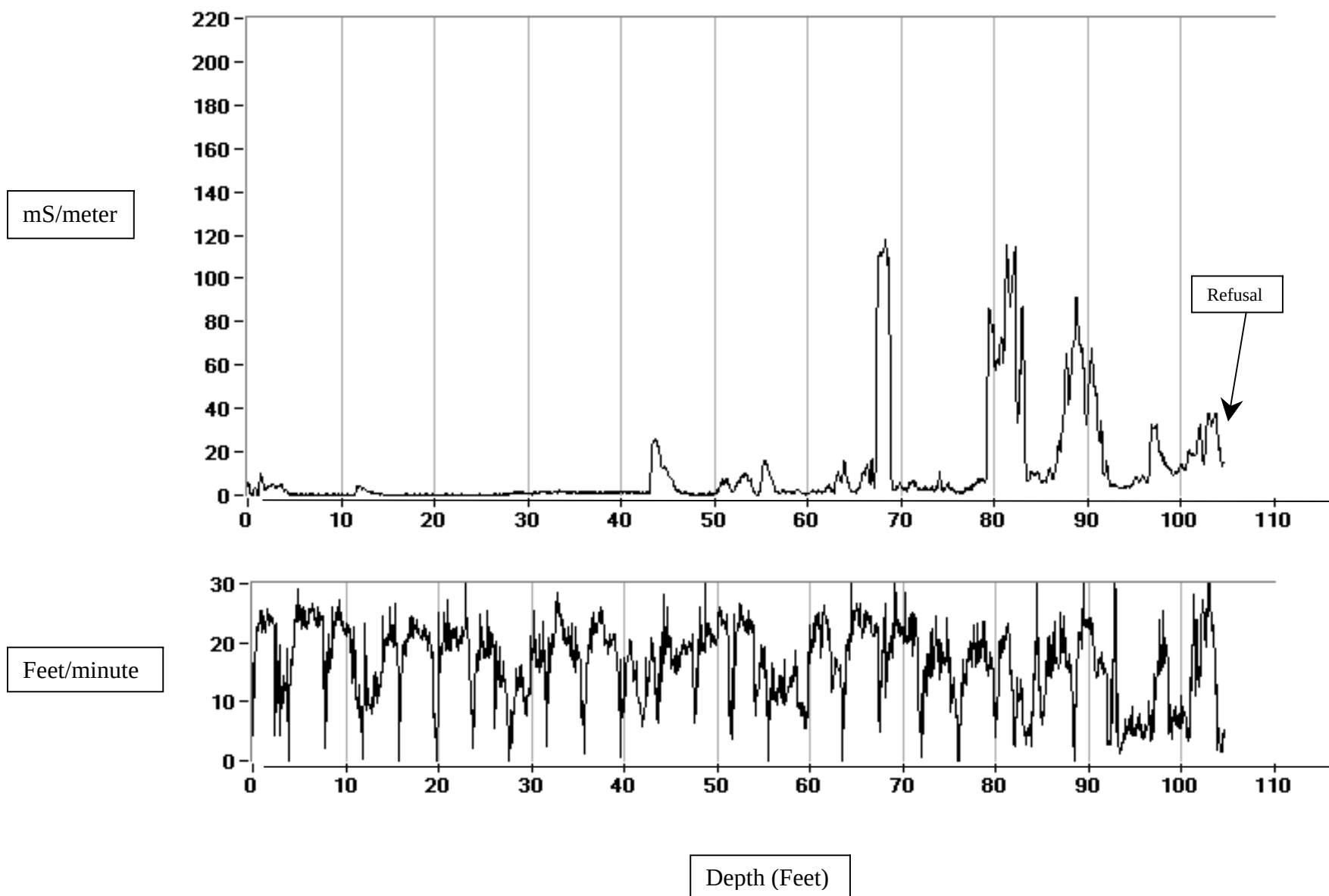


Feet/minute

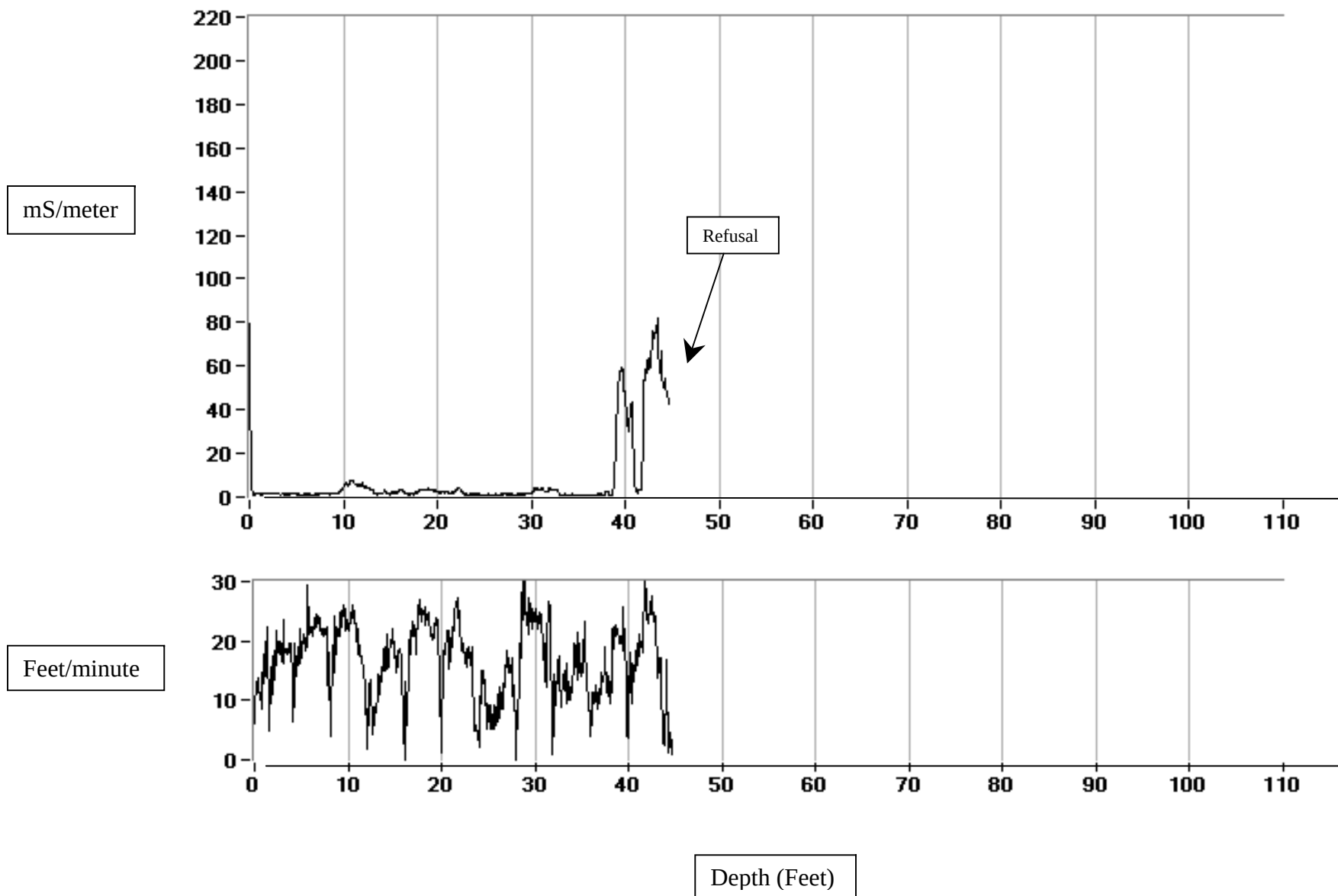


Depth (Feet)

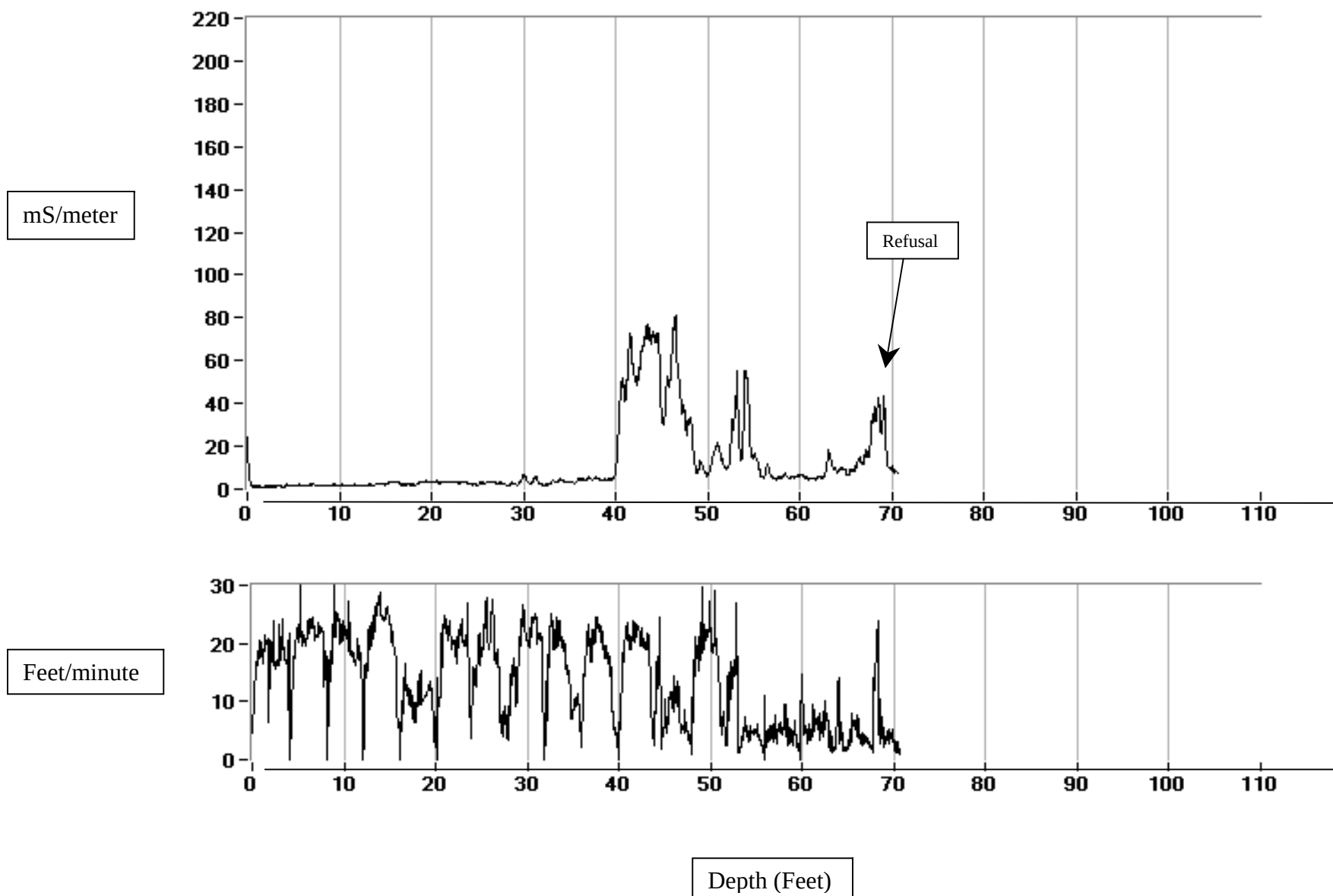
DEP 15D Specific Conductivity



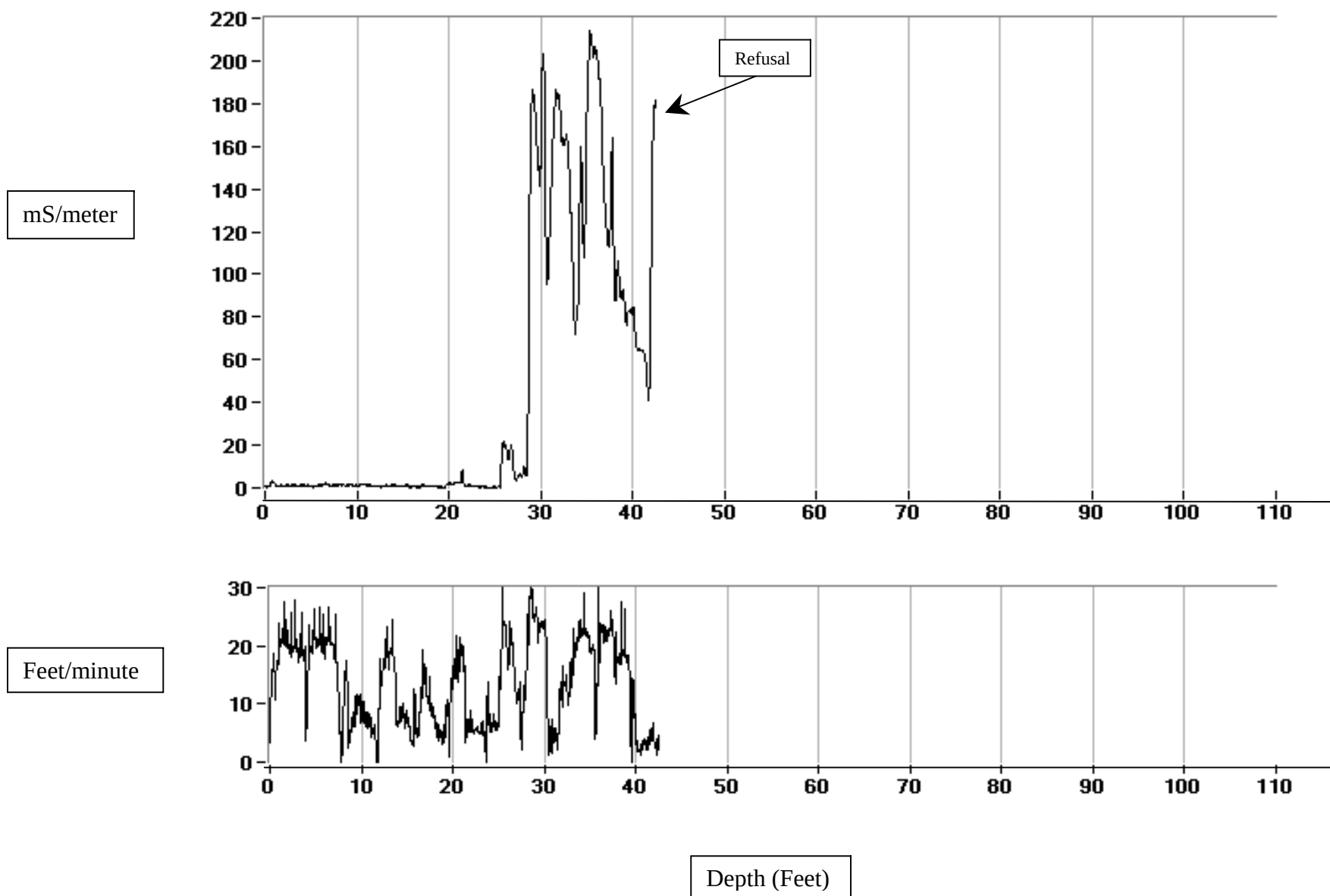
ISR 1 Specific Conductivity



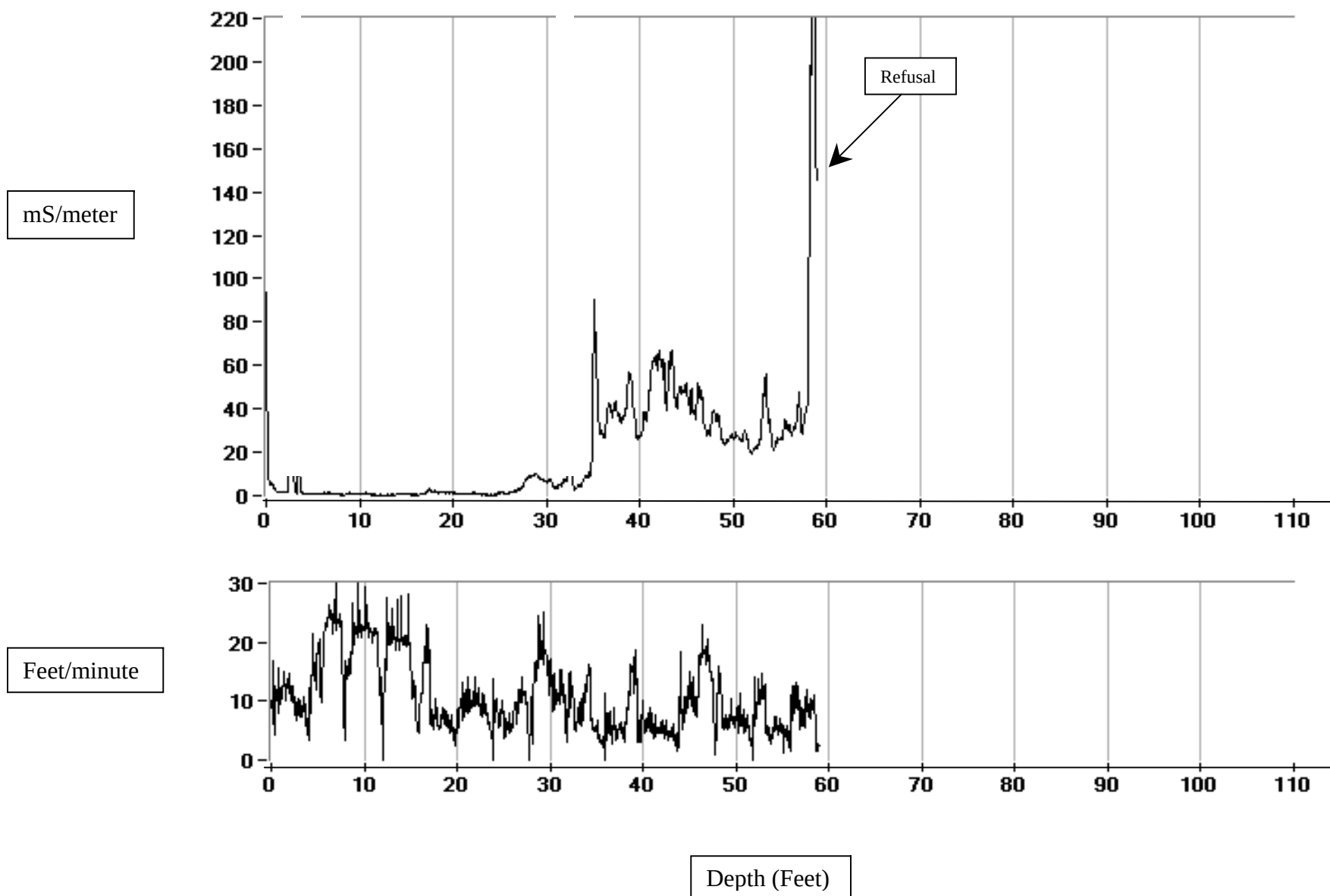
ISR 2 Specific Conductivity



ISR 3 Specific Conductivity



ISR 4 Specific Conductivity



Appendix E

FSU Academic Dive Team Report of Findings

**Report to The Florida Department of Environmental Protection, Site Investigation
Section, Bureau of Waste Cleanup, on Diver Survey of Merritt's Millpond**

**Dan C. Marelli, Ph.D.
The Florida State University
Academic Diving Program**

The Florida State University Academic Diving Program assisted in a subsurface survey of Merritt's Millpond, Jackson County, on Tuesday 7 December 2003. One pair of divers conducted a qualitative survey of an area along the west bank of the pond, approximately 7 miles down stream from Jackson Blue Spring. This area had been designated as potentially important by the DEP staff using available charts, GPS and a fathometer. The divers spent approximately 45 minutes surveying the area but reported no obvious karst features such as recharge vents or holes. In fact, only on the very north end of the identified area did the divers see any limestone bedrock.

A second pair of divers then entered the same area and began to take sediment samples at approximately 50-foot intervals. The dive team noted the following characteristics of the bottom: Sediment seemed to be fine light colored clay or silt and clay and very soft. At a depth of 8-10 inches into the bottom sediments one diver noticed a layer of what felt like gravel. Below the "gravel" layer was another 8-16 inches of clay or silt-clay and then the sediments became noticeably sandy. All sediment samples were taken from the "sandy" sediments underlying the surficial softer layer at a depth of approximately 18-24 inches. On closer inspection, the "gravel" was observed to be shells of the corbiculid clam *Corbicula fluminea*, a non-indigenous species widespread throughout many Floridian drainages. At some time in the past a large population of *C. fluminea* was present in the millpond. The reasons for decline and current status are unknown. The divers also observed a population of native unionacean mussels living in densities of perhaps as many as 1 per m² at the surface of the sediment. A small collection for identification purposes was collected and identified by Dr. William Heard of FSU. Dr. Heard identified the mussels as members of a species of *Elliptio* that is poorly known and was reluctant to put a specific name on the mussels despite his 40 plus years of experience as a specialist in unionacean taxonomy. It is possible that the mussel is *E. chipolaensis*, a species restricted to the Chipola drainage.

Rooted vegetation included large and healthy patches of *Vallisneria americana* and occasional specimens of *Potamogeton* sp. Small stands of the non-indigenous *Hydrilla verticillata* were observed surrounding stumps of bald cypress but were mostly absent elsewhere in the pond. Some areas of the millpond had significant patches of filamentous algae. Local citizens stated that the algae seem to come and go in seasonal cycles, but it is doubtful that these citizens recognize any distinction between algae and rooted vascular plants, and it is likely that algal biomass has increased recently.

Appendix F

Geologic Presentations

Lithologic Descriptions and Photographs
Geologic Cross Section of Indian Springs Road Karst Feature
Lineament Map

State of Florida
Department of Environmental Protection
SITE INVESTIGATION SECTION
Coring Information

LOCATION: Section 12, Township 4 North, Range 10 West
BORING/WELL# FL-1
START DRILLING: 10/28/2003
COMPLETED: 10/28/2003
TOTAL DEPTH: 130'
WELL DEPTH: 130'
HOLE SIZE: 6.0"
DRILLED BY: Prosonic
SCREEN SIZE, AMOUNT: .01 x 20' (30-40 sieve)
DRILLING METHOD - SPLG: Rotosonic
DRILLING FLUID: Water, Bentonite slurry
ELEVATION (TOC): 100' NGVD (approximate)

DEPTH	SPL	SAMPLE DESCRIPTION	COMMENTS
0 – 5'		Silty sand: fine grain unconsolidated quartz with trace of clay, orange, damp, tacky to touch.	
5 – 18'		As above except some medium to coarse grain quartz grains present, color more tan with mottling evident, less damp.	
18 – 21'		Silt with clay: dry pale yellow-orange, hard.	Very slow to core.
21 – 25'		Clay: pale gray, calcareous, dry.	Very slow to core.
25 – 37'		Clay: green/gray, waxy at times, slightly calcareous with silt, dry.	
37 – 42'		Clay with silt: dry, calcareous, light gray green clay, with imbedded layers of shell fragments lying horizontal.	
42 – 45'		Clay with silt: tan to gray, calcareous, slightly damp.	
45 – 50'		Limestone: chalky, buff tan to gray, beds are approximately 1 – 2" thick, interbedded with marly clay (fat and lean), entire section is damp to moist, foraminifera present.	
50 – 67'		Limestone: off white to light gray, very friable, fossiliferous (foraminifera) with abundant glauconite, trace silt, moist to slightly wet. Blue/green glauconite nodules encountered in FL-2 deep core.	

State of Florida
Department of Environmental Protection
SITE INVESTIGATION SECTION
Coring Information

DEPTH	SPL	SAMPLE DESCRIPTION	COMMENTS
67 – 70'		Limestone: chalky, buff tan, interspersed intervals of damp, marly clay.	
70 – 78'		Limestone: off white to pale orange, friable, fossiliferous (abundant foraminifera) trace silt, moist.	
78 – 82'		Clay: light gray, dry with thin intervals of chalky limestone.	
82 – 108'		Limestone: off white to pale orange, damp, friable, fossiliferous (foraminifera), with occasional intervals of indurated limestone exhibiting better cementing.	
108 – 112'		Clay: calcareous, dry, slightly plastic, off white to light gray with thin intervals of chalky limestone, intervals of limestone less than 1 inch thick.	
112 – 119'		Limestone: pale orange, very damp, friable with thin intervals exhibiting cementation, rust colored specks in samples.	
119 – 122'		Clay: calcareous, dry, slightly plastic, off white to light gray with thin intervals of chalky limestone, intervals of limestone less than 1 inch thick.	
122 – 130'		Limestone: light orange to pale gray, indurated, fossiliferous (foraminifera and brachiopods), trace of secondary porosity evident, some silica cementation evident.	



Depth: 0 - 5' BLS.



Depth: 5 -18' BLS.



Depth: 18-21' BLS.



Depth: 21-25' BLS.



Depth: 25-37' BLS.



Depth: 37-42' BLS.



Depth: 42-45' BLS.



Depth: 45-50' BLS.



Depth: 50-67' BLS.

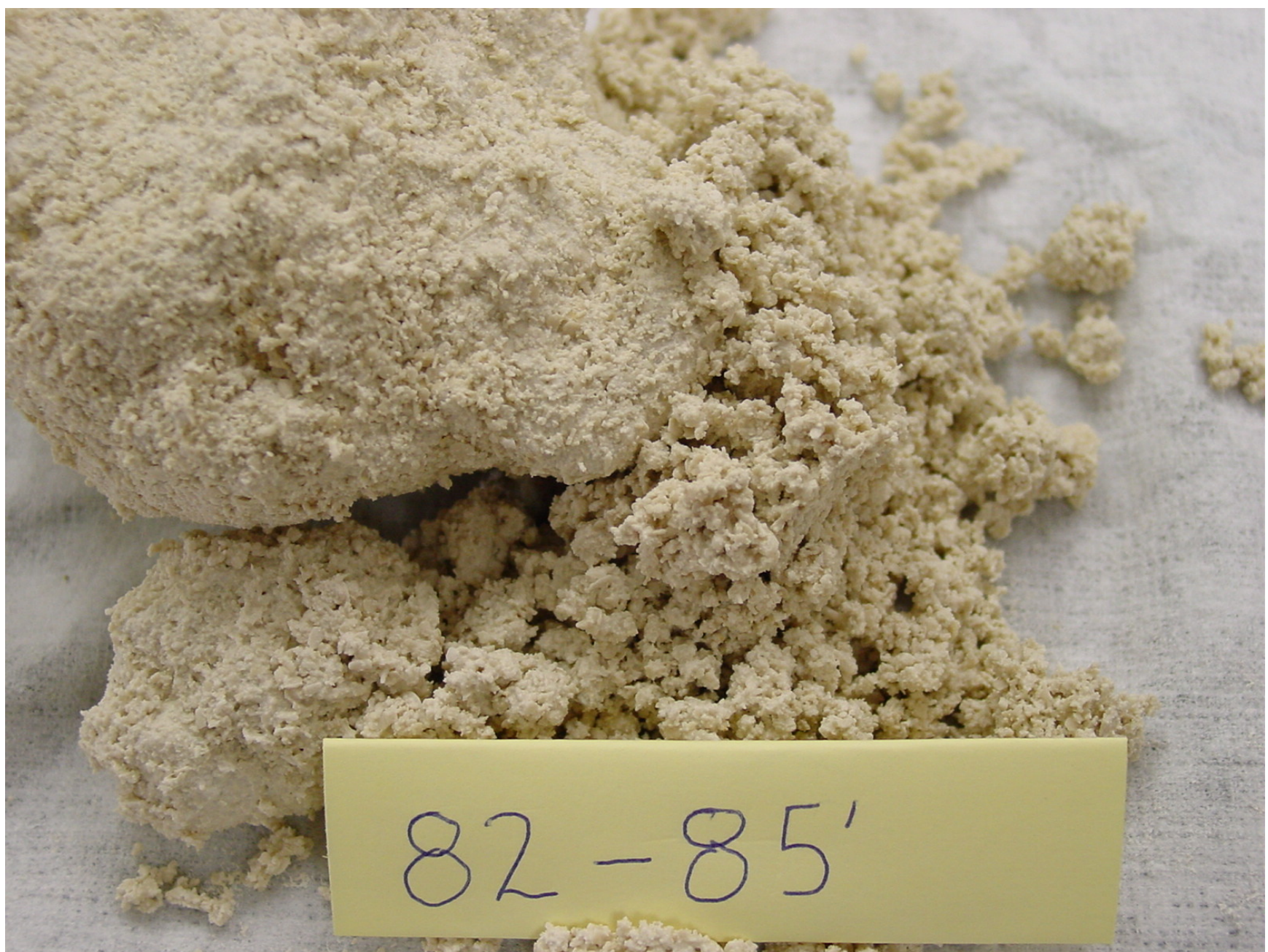


Depth: 50-67' BLS (closer view).

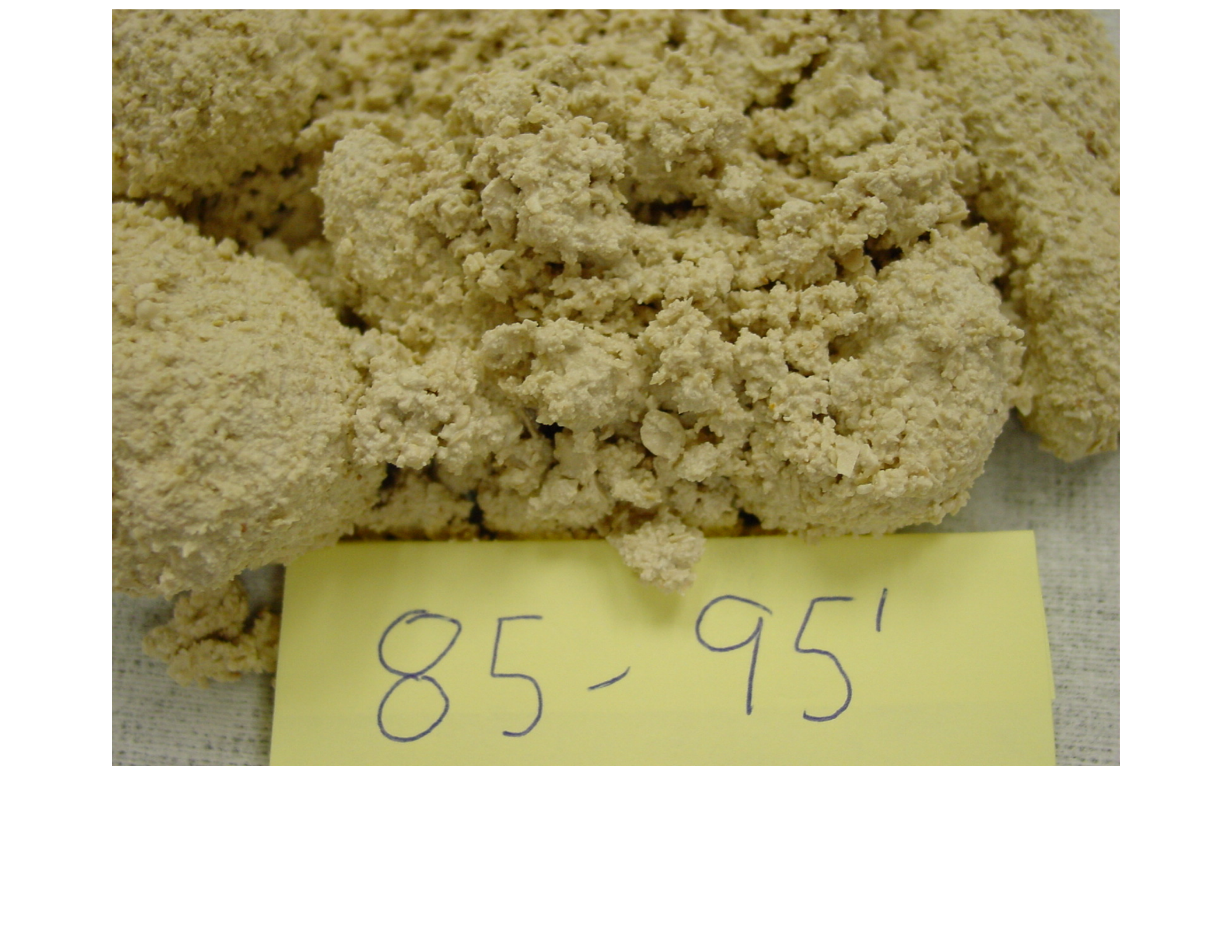




Depth: 70-78' BLS.



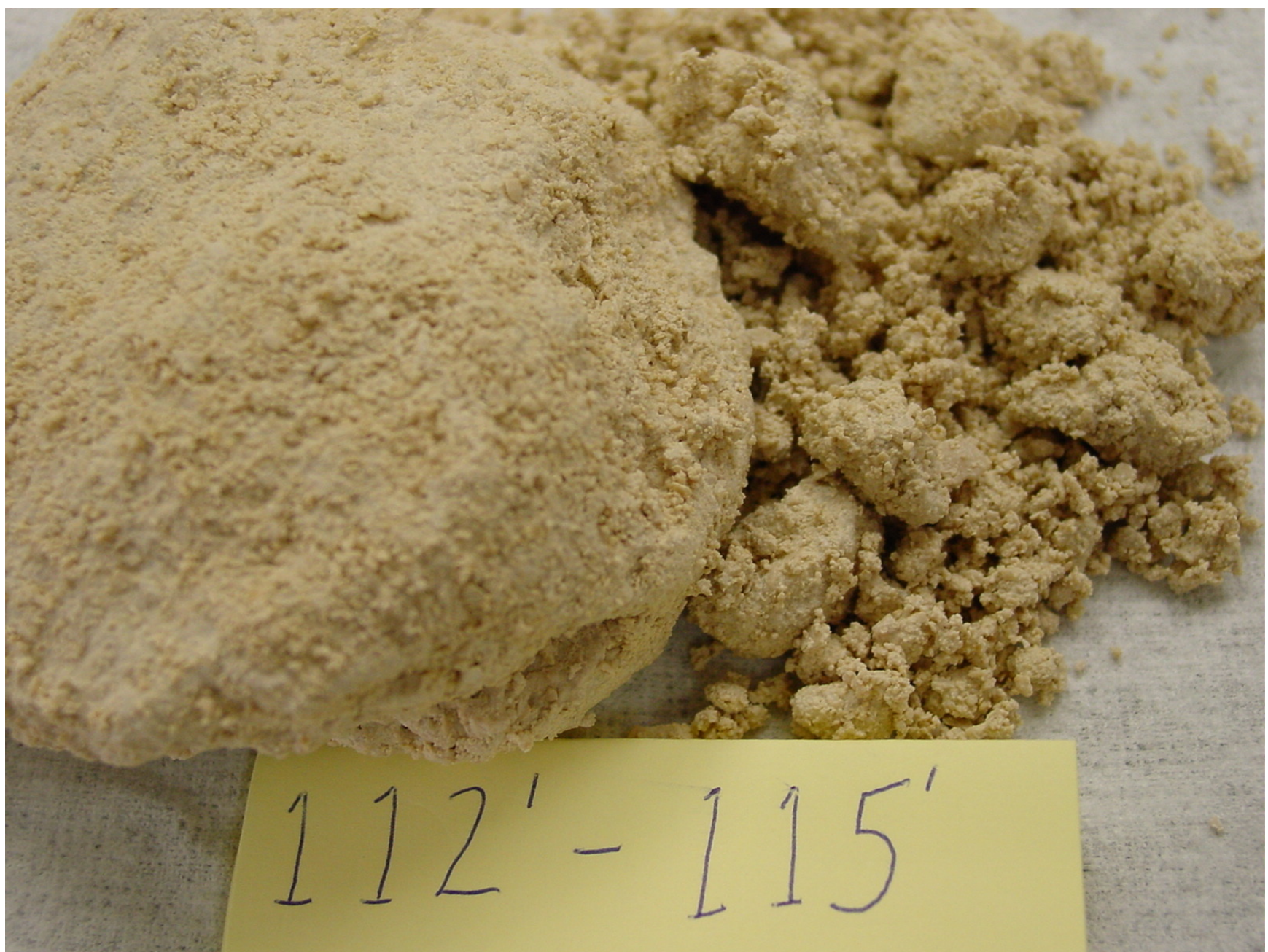
Depth: 82-108' BLS.



85-95'



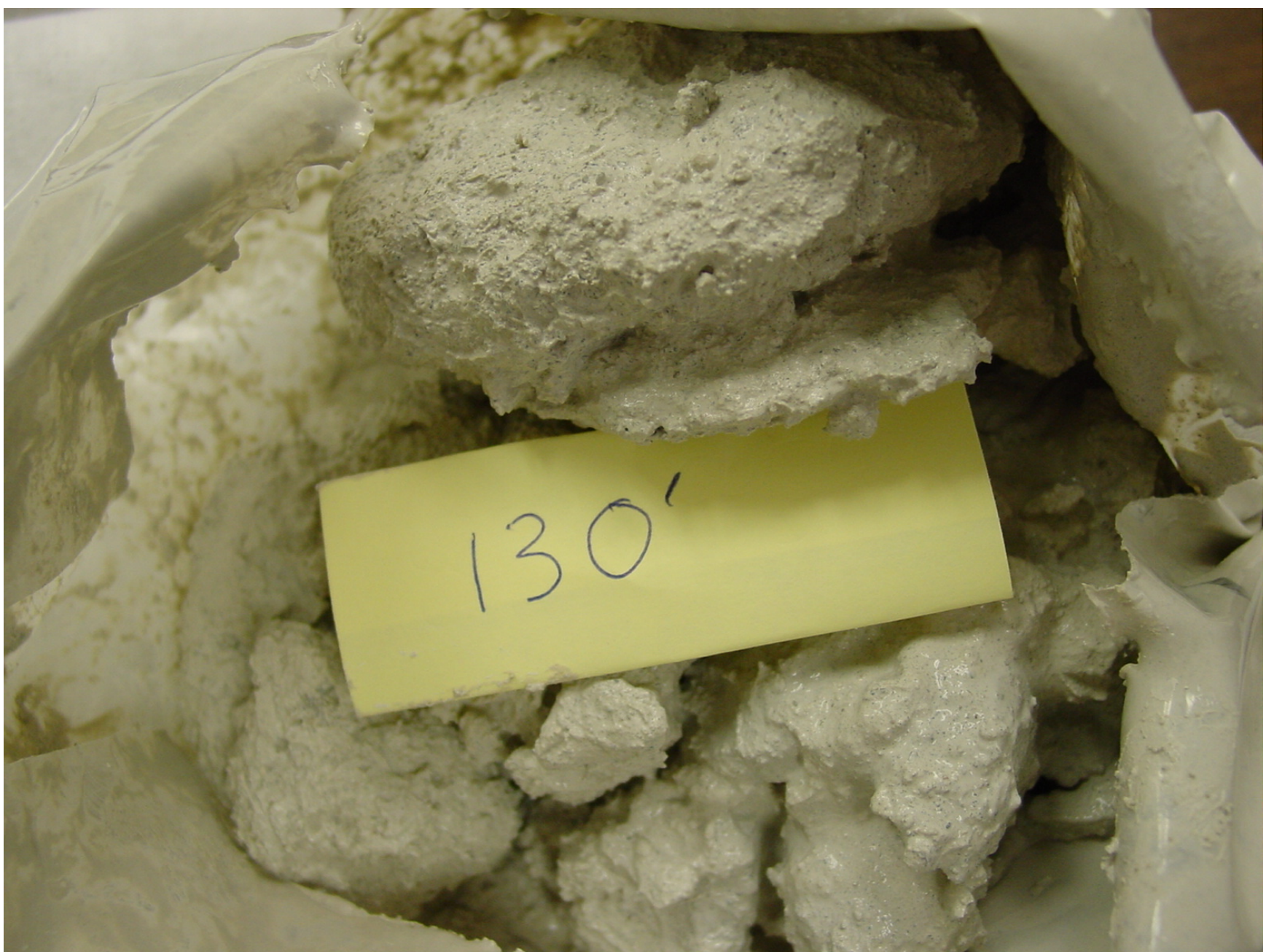
Depth: 108-112' BLS.



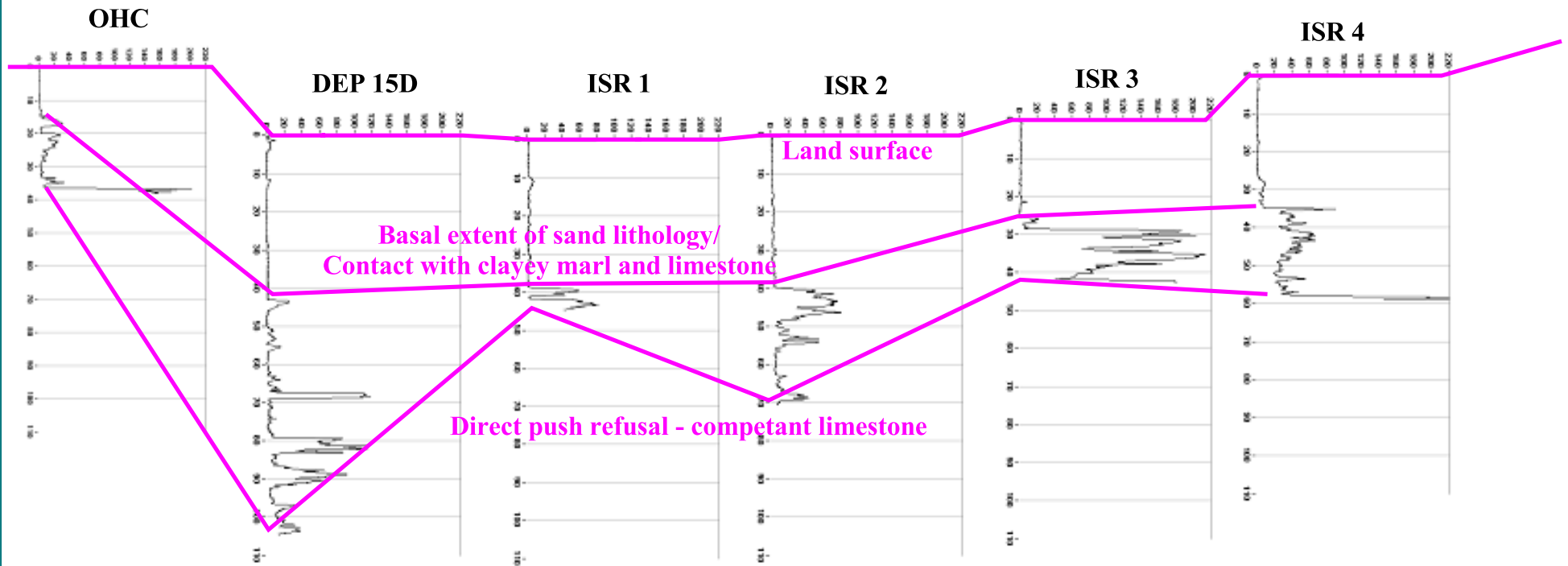
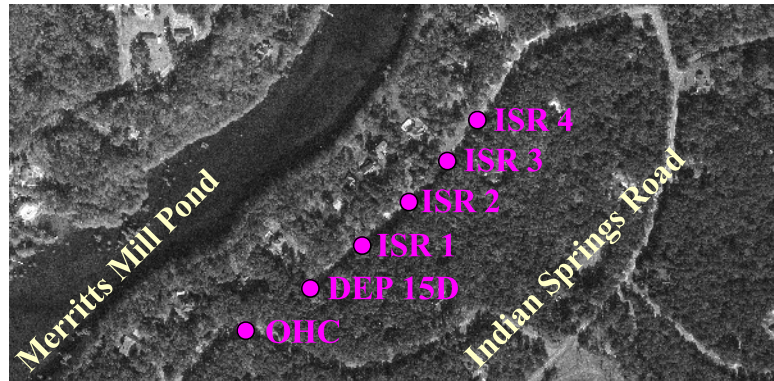
Depth: 112-119' BLS.



Depth: 119-122' BLS.

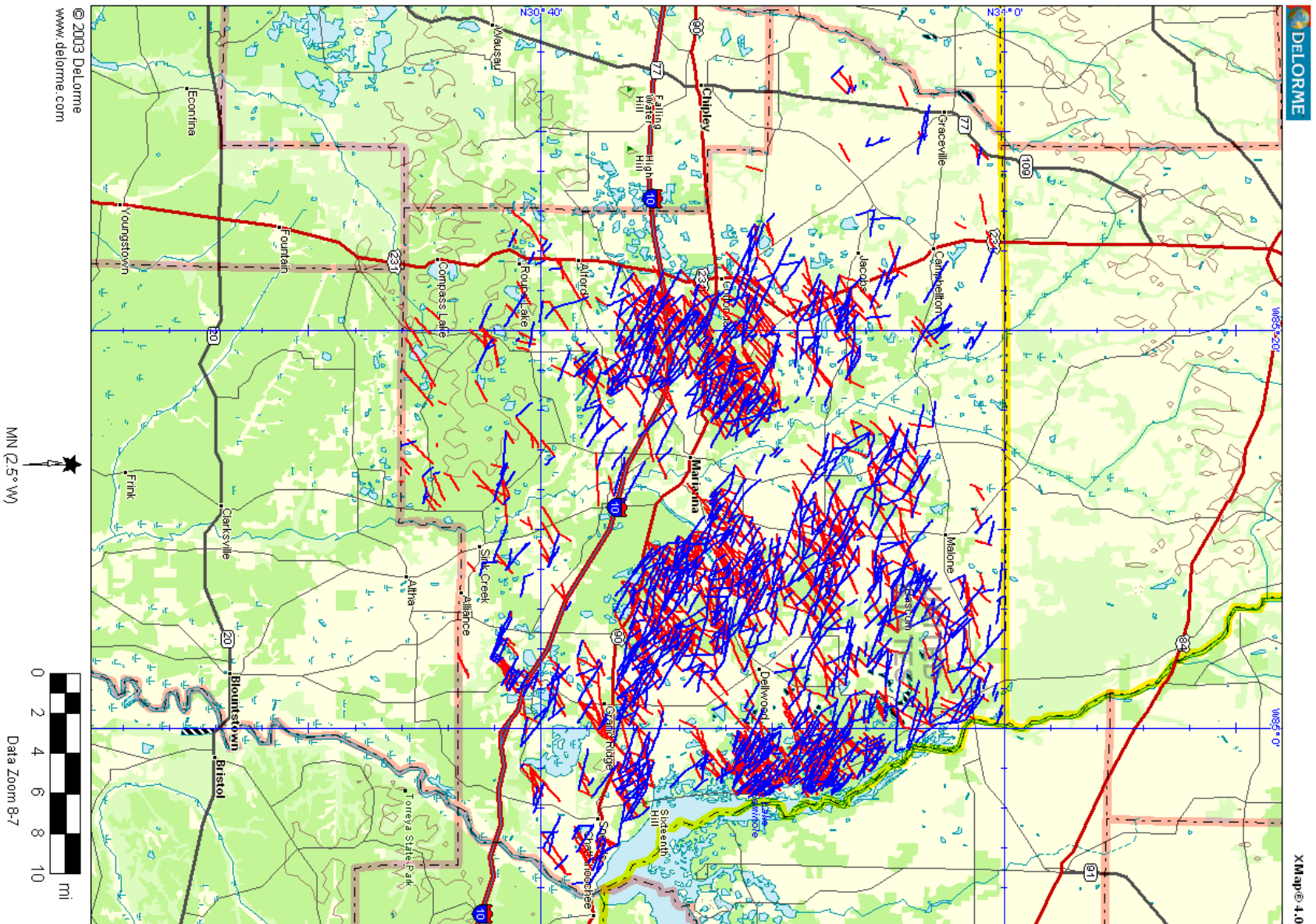


Depth: 122-130' BLS.



Cross Section of Karst Feature
Located at Indian Springs Road Cul-de-Sac
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida





Jackson County Interpreted Lineament Map
Merritts Mill Pond Arsenic Study
Marianna, Jackson County, Florida

