

**Geotechnical Engineering  
Services, Off-Site Spring Water  
Quality Analyses, Proposed  
Sugarloaf Mountain  
Development, County Road 455,  
Lake County, Florida**

August 16, 2005  
Project No.: GPGT-05-0266

To: Farner, Barley and Associates  
350 North Sinclair Avenue  
Tavares, Florida 32778

Attention: Mr. Duane Booth, P.E.

Subject: Geotechnical Engineering Services  
Off-Site Spring Water Quality Analyses  
Proposed Sugarloaf Mountain Development  
County Road 455, Lake County, Florida

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Dear Mr. Booth:

As requested, Andreyev Engineering (AEI) has completed a geotechnical investigation and water quality analyses in connection with the off site springs located near the proposed Sugarloaf Mountain Development in Lake County, Florida. This report presents the results of our findings as well as our conclusions and recommendations. Our scope of services was performed in general accordance with the Task I portion of our proposal dated June 28, 2005.

### INTRODUCTION

There are two (2) off site springs located east (down-gradient) of the proposed Sugarloaf Mountain development in Lake County, Florida. These springs are named Bear Spring and Wolf Head Spring and are located within Sections 21 and 22, Township 21 South, and Range 26 East. For your reference, we have included a U.S.G.S. Topographic Map on the attached **Figure 1** which depicts the locations of these two springs.

Based on the topographic information shown on **Figure 1**, the ground surface elevations at the locations of Bear Spring and Wolf Head Spring are near 75 feet and 80 feet, respectively. The ground surface in the vicinity of the springs generally slopes to the east and north. Sugarloaf Mountain, located about 5,000 to 9,000 feet west of the springs has a peak elevation of approximately 310 feet. Immediately east and north of the springs the ground elevation is near 70 feet.

Apopka Spring, located in the Gourd Neck portion of Lake Apopka, was also included in our study for comparison to Bear Spring and Wolf Head Spring. This spring is located within Section 14, Township 22 South, and Range 26 East (see **Figure 1**).

## **PURPOSE AND SCOPE OF INVESTIGATION**

The purpose of this investigation was to obtain water quality data and review published information to try to determine the source(s) of the off-site spring water (i.e. surficial aquifer, Upper Floridan aquifer).

Our study included the following scope of services:

- Installed two (2) piezometers to depths of 30 feet below ground surface at locations upgradient of Bear Spring and Wolf's Head Spring. Auger borings were performed at each piezometer location prior to installation.
- Visually classified and stratified the soil samples recovered during the borings.
- Obtained water samples at each piezometer and spring location.
- Performed field and laboratory testing on the water samples to determine various water quality parameters.
- Evaluated the findings and prepared this report presenting the results of the field and laboratory testing programs together with our conclusions and recommendations.

## **REVIEW OF PUBLISHED DATA**

### **U.S. Geological Survey**

The topographic maps titled "Astatula, Florida" and "Clermont East" published in 1962 (photorevised 1970 and 1980, respectively) by the U.S. Geological Survey (USGS) were reviewed. Based on review of this information, the ground surface elevations at the locations of Bear Spring and Wolf Head Spring are near 75 feet and 80 feet, respectively. The ground surface in the vicinity of the springs generally slopes to the east and north. Sugarloaf Mountain, located about 5,000 to 9,000 feet west of the springs has a peak elevation of approximately 310 feet. Immediately east and north of the springs the ground elevation is near 70 feet. The water surface elevation of Lake Apopka is 66 feet. The water elevation in Lake Apopka is controlled by the Lake Apopka Lock and Dam located in the Apopka-Beauclair Canal.

### **Regional Geology**

The geology of Lake County, Florida has been described by numerous authors including Cook (1945), Vernon (1951), and Applin (1965). According to Stringfield (1936), the Lake City limestone formation of the middle Eocene age is the oldest formation of the Floridan aquifer. Overlying the Lake City limestone is the Avon Park Limestone formation of middle Eocene age, the oldest formation exposed at land surface in Florida. This formation is overlain by the Ocala Group limestone of Eocene age which consists of the Inglis, Williston, and Crystal River formations. The Ocala Group limestone supplies water for most of the domestic wells in Lake County. The Suwanee Limestone formation of Oligocene age overlies the Ocala limestone and marks the top of the Floridan aquifer (-120 feet MSL).

The Hawthorne Formation of middle Eocene age ranges from 0 to 100 feet thick and forms a confining unit separating the Floridan and surficial aquifers. Overlying the Hawthorn Formation is the Citronelle Formation of Pliocene age. The Citronelle Formation makes up the lower part of the

clastic aquifer, is fairly well sorted and, therefore, yields small quantities of water to wells for domestic supply. Overlying the Citronelle Formation are Pleistocene to recent age deposits that are commonly 100 to 200 feet thick in Lake County. The Pliocene sediments are included in the clastic aquifer and have the potential for greater yields than the Citronelle Formation.

## **Regional Hydrogeology**

The regional hydrogeologic units within the site vicinity are:

1. An unconfined aquifer that occurs in the surficial clastic deposits.
2. A semi-confined leaky aquifer which is located in the lower portions of the clastic deposits.
3. A highly permeable areally extensive confined aquifer known as the Floridan aquifer which is the major source of potable water for much of northern and central Florida.

The unconfined sand aquifer is comprised of saturated and permeable portions of the unconsolidated clastic deposits. It is hydraulically separated from the underlying semi-confined leaky aquifer by the less permeable silty and clayey sands of the Citronelle Formation within the lower portion of the aquifer. The upper sands, close to ground surface are the more permeable portion of the aquifer. The silt and clay content generally increases with depth, which produces a corresponding decrease in permeability.

Regionally, the lower portions of the clastic deposits are less permeable but are hydraulically connected to the upper portions. This secondary sand aquifer is semi-confined and leaky. The clastic deposits are underlain by thin leaky layers of the Hawthorn Formation.

The surficial unconfined aquifer is recharged primarily through direct rainfall infiltration and, to a certain extent, by lateral seepage from higher topographic areas. Groundwater losses are the result of evapotranspiration, vertical leakance to lower units and subsurface lateral seepage to lower topographic regions and lakes.

The Floridan aquifer is comprised of a series of limestones and dolostones extending several hundred feet below land surface in central Lake County. Overlying the Floridan aquifer, on a regional basis, is a confining unit known as the Hawthorn Formation. As a result of this confining layer, the water within the Floridan aquifer is under pressure. This pressure head is referred to as the potentiometric surface. The Floridan aquifer is recharged by slow vertical leakance through the confining unit, rapid leakance where the confining bed is breached or absent, and direct infiltration to the aquifer where the limestone outcrops at land surface. Based on the St. Johns River Water Management District 2003 data, the potentiometric surface elevation in the area of the subject site is in the range of 70 to 80 feet, NGVD. This information is illustrated on the attached **Figure 2**.

## **Florida Geological Survey**

Information posted on the Florida Geological Survey website pertaining to the subject springs was reviewed as part of this study. In summary, Bear Spring and Wolf Head Spring are both categorized as seep springs, whereas Apopka Spring is categorized as a spring which produces a boil.

The coordinates of the springs as presented by the FGS are as follows:

<u>Spring Name</u>	<u>Latitude</u>	<u>Longitude</u>
Bear Spring	28 39 06.14	81 43 00.78
Wolf Head Spring	28 38 41.87	81 42 23.74
Apopka Spring	28 33 59.77	81 40 50.41

Historical water quality data for Apopka Spring is included on the website. A description of Apopka Spring and the water quality data published by the FGS is included in **Attachment A**. Water quality data for Bear Spring and Wolf's Head Spring is not published by the FGS.

### FIELD INVESTIGATION

The field investigation included drilling two (2) auger borings to depths of 30 feet below the ground surface. Upon completion of drilling, two (2) inch diameter PVC piezometers were installed in each borehole. The boring/piezometer locations are situated upgradient of Bear Spring and Wolf Head Spring. The soil samples collected from the borings were returned to our laboratory where they were classified by a geotechnical engineer using the Unified Soil Classification System. The auger borings were performed in accordance with the procedures of ASTM D-1452.

The field investigation also included collecting water samples from the springs and piezometers. The water samples from the springs were obtained at/near the coordinates listed above. At the time of field sampling, water samples were tested for pH, temperature, conductivity, turbidity and dissolved oxygen. Samples were also collected and transported to a laboratory facility where they were tested for bicarbonate, carbonate, chloride, hydrogen sulfide, magnesium, potassium, sodium, sulfate, iron and calcium. The laboratory testing was performed by PC & B Environmental Laboratories, Inc.

The approximate water sample and boring/piezometer locations are shown on the attached **Figures 3 and 4**.

### SITE CONDITIONS

At the time of our field activities, the site of the springs and the surrounding areas consists of undeveloped land. A surface water body about 100 feet across exists at the Bear Spring location. A small stream was observed at the eastern side of this water body. At the Wolf's Head Spring location, the area is densely wooded. There were many pockets of shallow standing water observed in this area and a small stream was present at this location as well. We did not observe any spring boil at either location.

### SUBSURFACE CONDITIONS

The soils encountered at the boring/piezometer locations consisted of dark gray, light brown and orangish brown fine sand to slightly silty fine sand extending from the ground surface to the maximum depths explored (30 feet below grade).

The groundwater table was measured at a depth of approximately 1.8 feet below grade in boring PZ-1 and at a depth of about 18.9 feet in boring PZ-2.

## WATER QUALITY TESTING

The results of the field and laboratory water quality testing are summarized in the attached **Tables 1 and 2**. The laboratory testing reports from P C & B Environmental Laboratories, Inc. are provided in **Attachment B**. A piper tri-linear diagram was constructed using the collected data and this is included as **Plate 1**.

## EVALUATION AND CONCLUSIONS

Bear Spring and Wolf's Head Spring are categorized as seep springs by the FGS. We have evaluated both water quality test data and published information to try to determine whether the source of the seepage is from the surficial aquifer system or from the Floridan aquifer system.

Based on the results of the field and laboratory testing programs, the water quality parameters for the samples obtained at Bear Spring and Wolf's Head Spring are more indicative of the Surficial aquifer rather than water directly from the Floridan aquifer system. The Calcium, Bicarbonate and Magnesium concentrations as well as the pH of the water samples obtained at Bear Spring and Wolf's Head Spring locations are closer to the values obtained from the upgradient piezometers installed in to the Surficial aquifer, and are much lower than the levels measured from the sample obtained from the Apopka Spring location where the water propagates upward directly from the upper Floridan aquifer system.

Based on this data, it is our opinion that the source of water at the spring locations is from groundwater in the surficial aquifer. In general, the lateral groundwater flow in the Surficial aquifer follow the topography of the area. However, the steep slope of the terrain in the area of the two springs exceeds the slope of the groundwater surface, creating daylighting conditions (seeping out of groundwater). The Bear Spring and the Wolf Head Spring are the result of Surficial aquifer groundwater daylighting (seeping out) at the interception point of groundwater surface and ground surface.

The ground elevation at the locations of Bear Spring and Wolf's Head Spring are near the elevation of the potentiometric surface elevation of the upper Floridan aquifer (in the range of 70 to 80 feet, NGVD). The elevation of the groundwater table in the surficial aquifer is estimated to be near, or above, the potentiometric surface elevation of the upper Floridan aquifer. Therefore, it is our opinion that there is not a sufficient upward gradient at the spring locations to allow groundwater from the Floridan aquifer to discharge vertically. The observed slow seep conditions, without a defined spring boil, confirm the lack of adequate upward gradient at these locations.

In summary, based on the results of water quality testing, comparison of water quality from the springs to Surficial aquifer groundwater and Floridan aquifer (Apopka Springs) groundwater, and evaluation of potentiometric pressure of Floridan aquifer and Surficial aquifer groundwater levels, we conclude that the source of water at the two springs (Bear and Wolf Head) is groundwater from the Surficial aquifer.

**CLOSING**

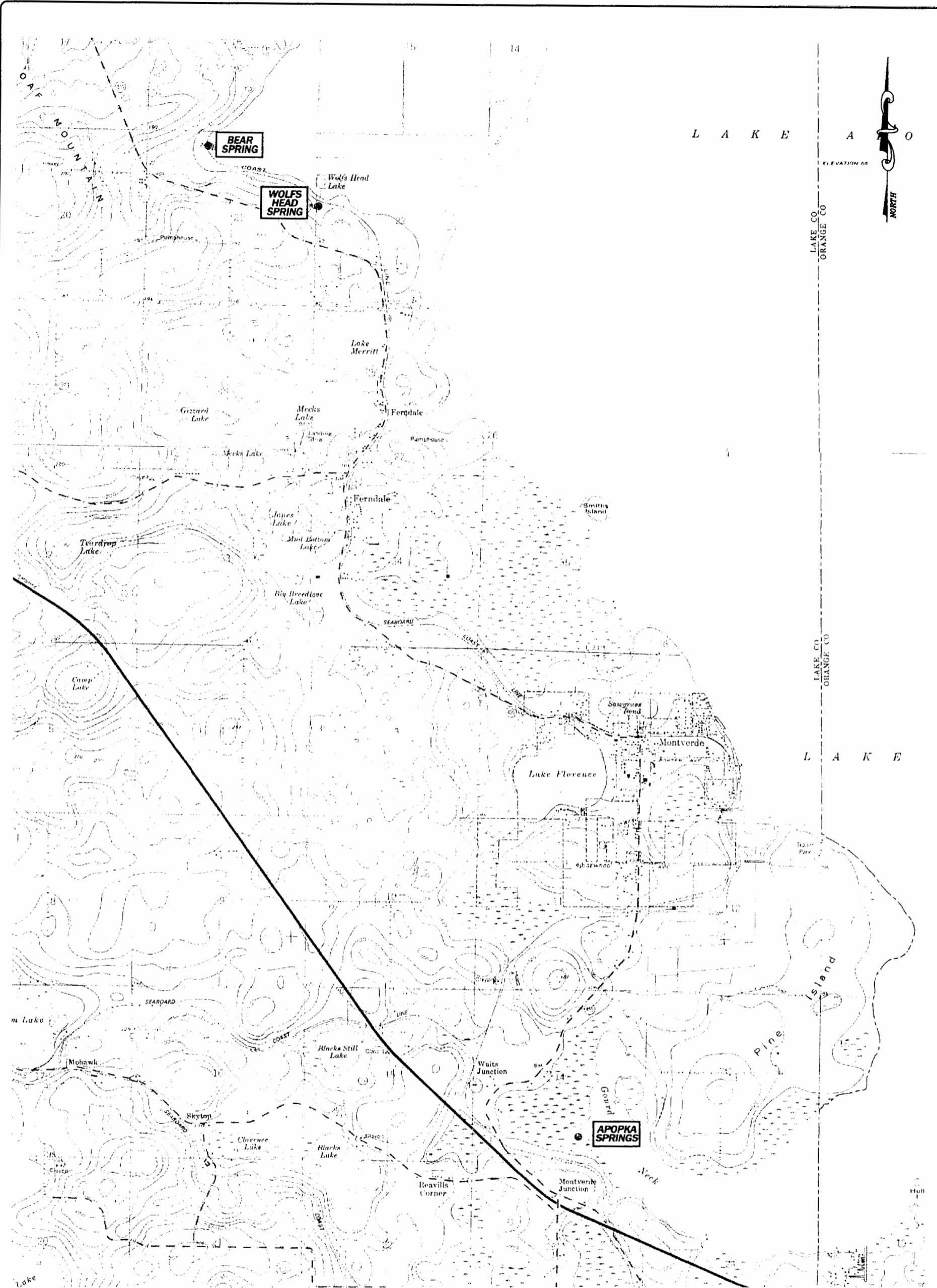
AEI appreciates the opportunity to participate in this project, and we trust that the information herein is sufficient for your needs at this time. Should you have any questions or comments concerning the contents of this report, please do not hesitate to contact our office.

Sincerely,


Ed Miguens, P.E.  
Senior Engineer  
Florida Registration No. 47535

Raymond Jones, P.E.  
Vice President  
Florida Registration No. 58079

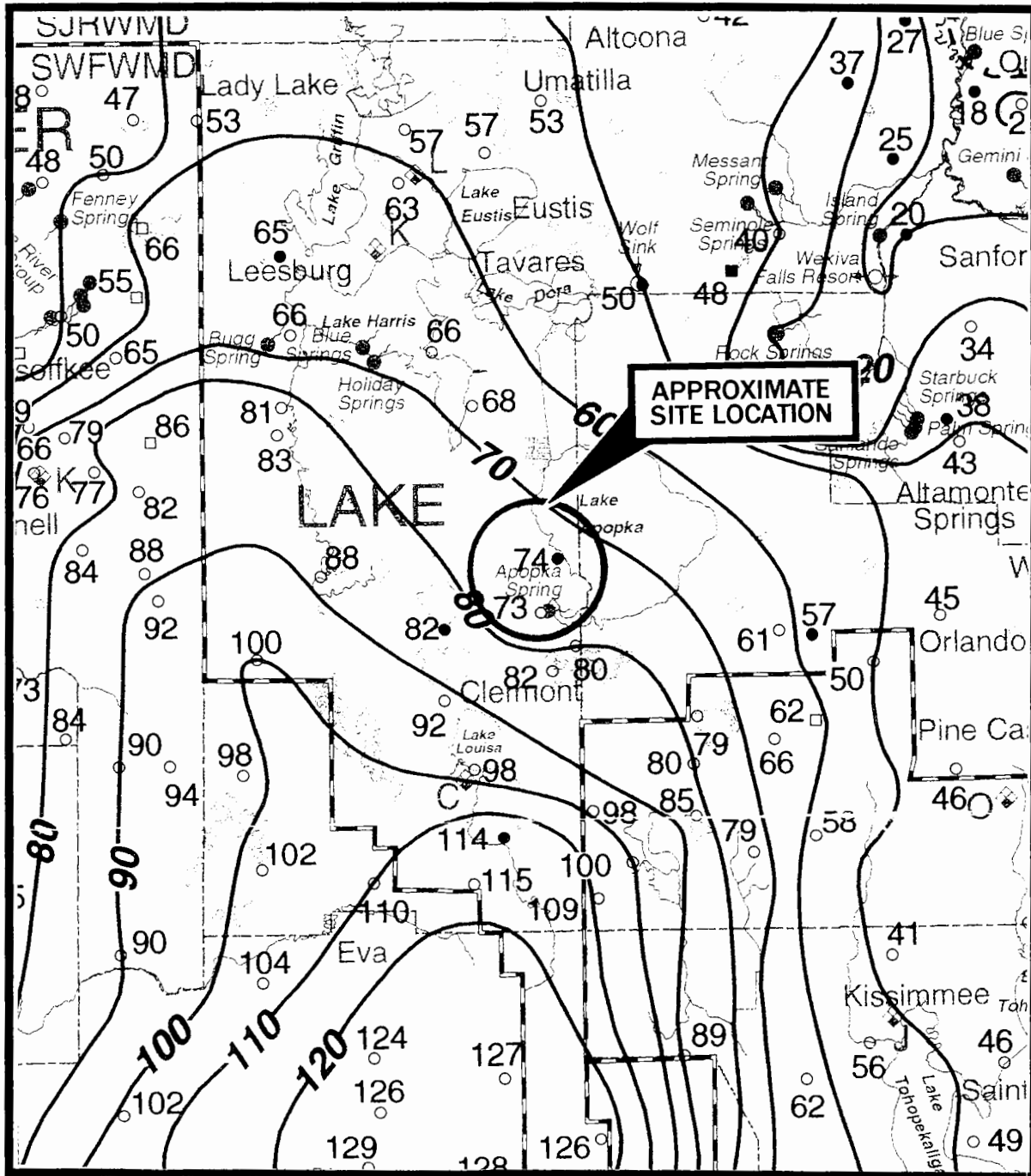
## FIGURES



**REFERENCE:** U.S.G.S. "ASTATULA, FLORIDA" QUADRANGLE MAP  
 SECTION: 21 AND 22 ISSUED: 1962  
 TOWNSHIP: 21 SOUTH PHOTOREVISED: 1970  
 RANGE: 26 EAST  
  
 U.S.G.S. "CLERMONT EAST, FLORIDA" QUADRANGLE MAP  
 SECTION: 14 ISSUED: 1962  
 TOWNSHIP: 22 SOUTH PHOTOREVISED: 1980  
 RANGE: 26 EAST

 <b>Andreyev Engineering, Inc.</b>	GEOTECHNICAL ENGINEERING SERVICES <b>OFF-SITE SPRING WATER QUALITY ANALYSES</b> PROPOSED SUGARLOAF MOUNTAIN DEVELOPMENT COUNTY ROAD 455 LAKE COUNTY, FLORIDA	
	APPROXIMATE SCALE: 1" = 3000'	DATE: 8/15/05 PN: GPCT-05-0266

U.S.G.S. TOPOGRAPHIC MAP  
 FIGURE 1



REFERENCE: POTENTIOMETRIC SURFACE OF THE UPPER FLORIDAN AQUIFER IN THE ST. JOHNS RIVER WATER MANAGEMENT DISTRICT AND VICINITY, FLORIDA, MAY 2003

**LEGEND**

CONTOURS ARE AT 10 FOOT INTERVALS. VERTICAL DATUM IS NGVD OF 1929.



**Andreyev  
Engineering,  
Inc.**

GEOTECHNICAL ENGINEERING SERVICES  
**OFF-SITE SPRING WATER  
 QUALITY ANALYSES**  
 PROPOSED SUGARLOAF MOUNTAIN DEVELOPMENT  
 COUNTY ROAD 455  
 LAKE COUNTY, FLORIDA

APPROXIMATE SCALE:

1" = 41,600'

DATE: 8/12/05

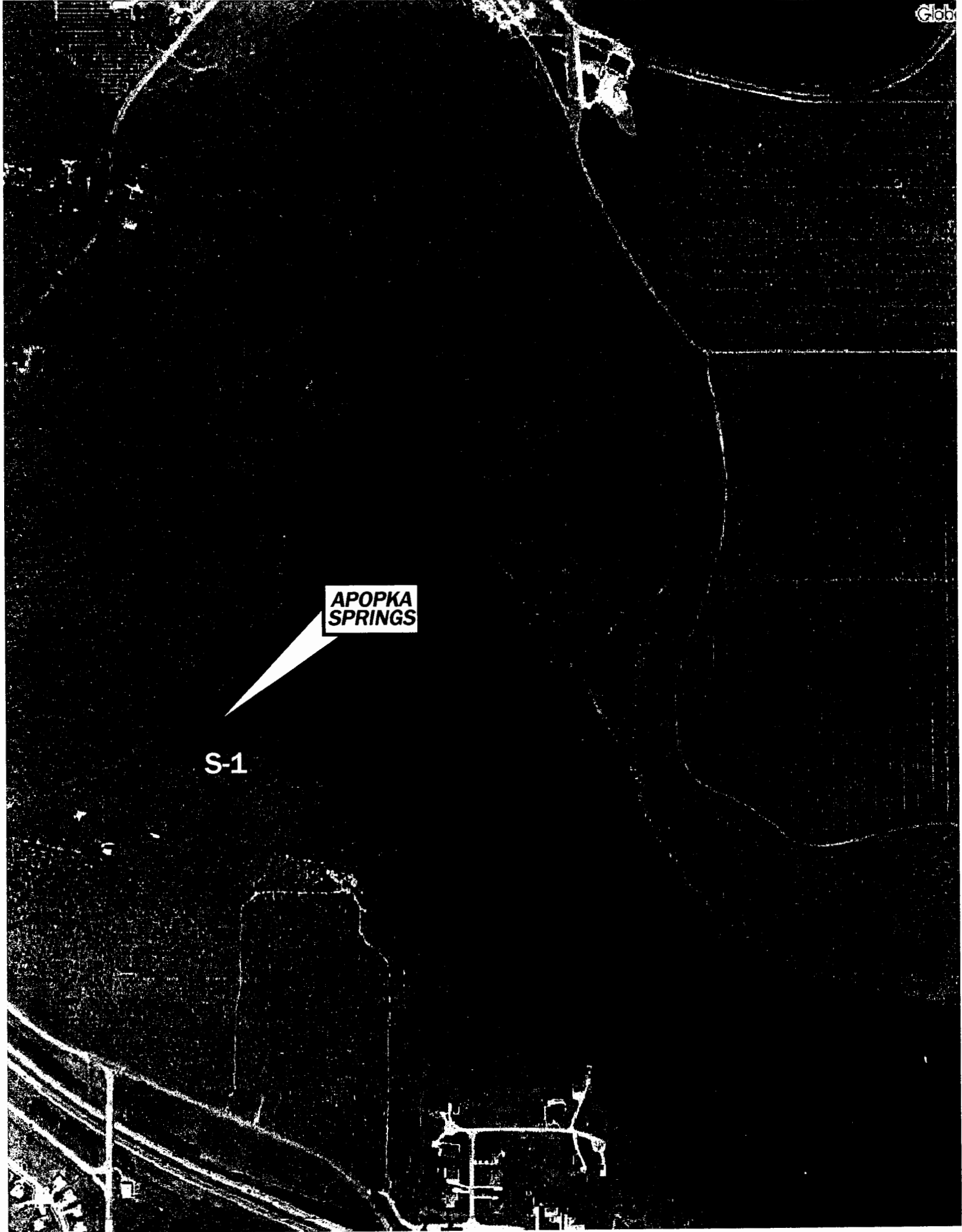
PN: GPGT-05-0266

ENGINEER: EM

DRAWN BY: TA

POTENTIOMETRIC SURFACE MAP

FIGURE 2



REFERENCE: 2003 "AIRPHOTO USA" AERIAL PHOTOGRAPH

LEGEND

● APPROXIMATE WATER SAMPLE LOCATION



**Andreyev  
Engineering,  
Inc.**

GEOTECHNICAL ENGINEERING SERVICES  
OFF-SITE SPRING WATER  
QUALITY ANALYSES  
PROPOSED SUGARLOAF MOUNTAIN DEVELOPMENT  
COUNTY ROAD 455  
LAKE COUNTY, FLORIDA

APPROXIMATE SCALE:

1"=600'

DATE: 8/15/05

ENGINEER: EM

PN:GPGT-05-0266

DRAWN BY: TA

LOCATION PLAN

FIGURE 3



REFERENCE: 2003 "AIRPHOTO USA" AERIAL PHOTOGRAPH

**LEGEND**

- APPROXIMATE WATER SAMPLE LOCATION
- ⊙ AUGER BORING, PIEZOMETER AND WATER SAMPLE LOCATION



**Andreyev  
Engineering,  
Inc.**

GEOTECHNICAL ENGINEERING SERVICES  
OFF-SITE SPRING WATER  
QUALITY ANALYSES  
PROPOSED SUGARLOAF MOUNTAIN DEVELOPMENT  
COUNTY ROAD 455  
LAKE COUNTY, FLORIDA

APPROXIMATE SCALE:

1" = 800'

DATE: 8/15/05

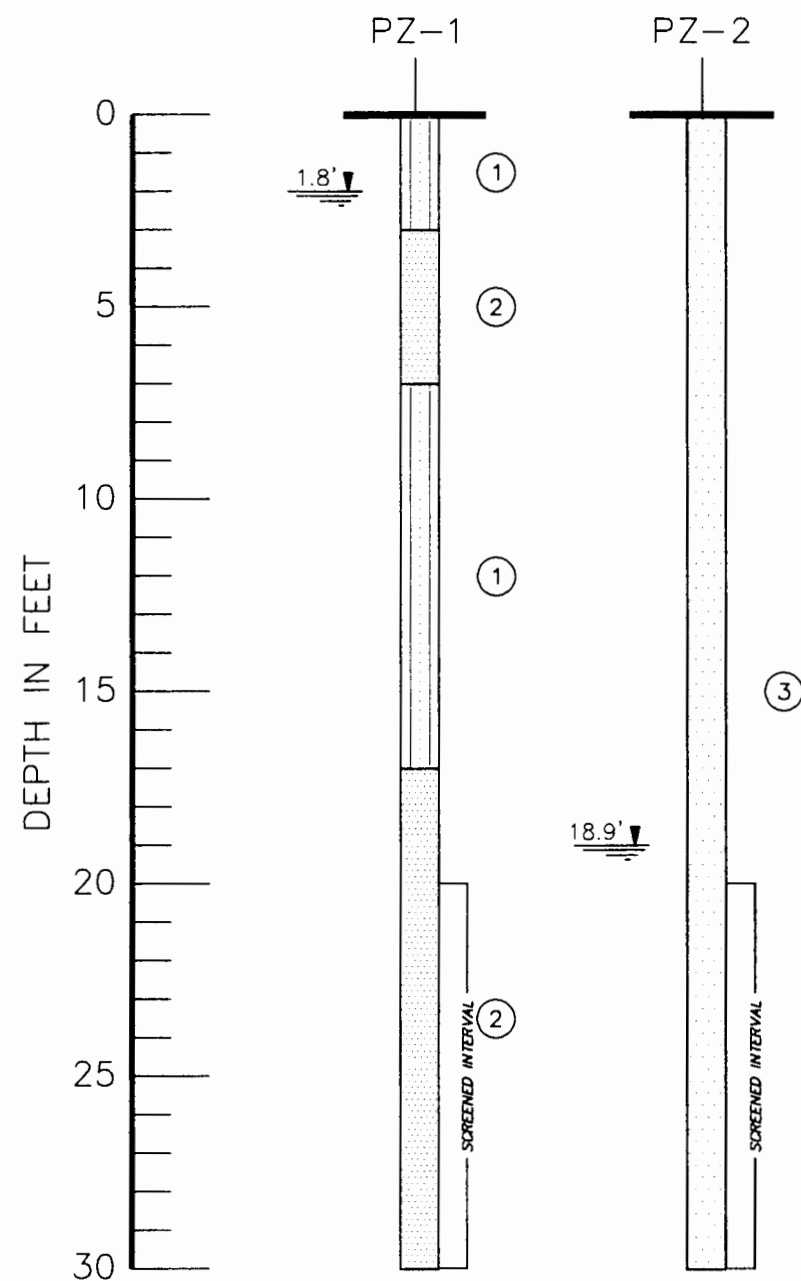
ENGINEER: EM

PN: GPGT-05-0266

DRAWN BY: TA


LOCATION PLAN

FIGURE 4



**LEGEND**

- ① DARK BROWN SLIGHTLY SILTY FINE SAND (SP-SM)
- ② LIGHT BROWN TO BROWN FINE SAND TO SLIGHTLY SILTY FINE SAND (SP)(SP-SM)
- ③ LIGHT BROWN TO ORANGISH-BROWN FINE SAND (SP)
- (SP) UNIFIED SOIL CLASSIFICATION GROUP SYMBOL AS DETERMINED BY VISUAL EXAMINATION
- 1.8'▼ DEPTH TO GROUNDWATER LEVEL IN FEET, JULY, 2005

 <b>Andreyev Engineering, Inc.</b>	GEOTECHNICAL ENGINEERING SERVICES <b>OFF-SITE SPRING WATER QUALITY ANALYSES</b> PROPOSED SUGARLOAF MOUNTAIN DEVELOPMENT COUNTY ROAD 455 LAKE COUNTY, FLORIDA	
	<b>SOIL BORING PROFILES</b>	
APPROXIMATE SCALE: 1"=5'	DATE: 8/15/05 PN: GPGT-D5-0266	ENGINEER: EM DRAWN BY: TA
		<b>FIGURE 5</b>

## **ATTACHMENT A**

## Apopka Spring



Figure 99. Apopka Spring (photo by R. Means).

**Location**—Lat. 28° 33' 59.77" N., Long. 81° 40' 50.41" W (NW  $\frac{1}{4}$ , SW  $\frac{1}{4}$ , SE  $\frac{1}{4}$ , sec. 14, T. 22 S., R. 26 E.). Apopka Spring is located on the southwest side of Lake Apopka in Gourd Neck, 2 miles (3.2 km) south of Monteverde and is accessible only by boat. From Clermont head east on SR 50 approximately 3.5 miles (5.6 km) to the intersection with CR 455. Turn north (left) onto CR 455 and travel approximately 4.2 miles (6.8 km) to the town of Monteverde. Turn east (right) once in Monteverde and follow signs to the boat landing approximately 0.5 mile (0.8 km).

**Description**—Apopka Spring occupies an open cove on the northwest side of Gourd Neck of Lake Apopka. The circular spring pool measures 180 ft (54.9 m) in diameter, while the larger spring cove containing the spring measures 450 ft (137.2 m) north to south and 360 ft (109.7 m) east to west. The vent is in the center of the deep, bowl-shaped spring depression where the depth measures 45 ft (13.7 m). The spring bottom is a mixture of sand and dark organic matter. Cloudy lake water quickly turns to clear spring water as the spring is approached. There is some exotic aquatic vegetation along the sandy slopes of the spring depression. The spring produces a large boil, and suspended particles can be seen within the clear water column. The spring cove is shallow around the perimeter with an organic, mucky bottom and emergent vegetation. Gourd Neck is buffered by marsh and lowland swamp forest on its west side before giving way to sand hills with extensive agriculture. The east side of Gourd Neck is bordered by a sand hill peninsula with planted pines. An underwater cave system has been recognized in this spring.

**Utilization** - The spring is undeveloped and surrounded by private property.

**Discharge** - All discharge rates are measured in ft/s.

May 1, 1971	28.6
Annual Mean 1998	32.05 <sup>1</sup> (7 measurements)
Mean 1971-1999	35.0 <sup>2</sup> (22 measurements)
Annual Mean 2001	24.71 <sup>3</sup> (2 measurements)

Table 116. Apopka Spring water quality analysis.

Analytes	1972	2002		Analytes	1972	2002	
		Dissolved	Total			Dissolved	Total
<b>Field Measures</b>				<b>Metals</b>			
Temperature	24.5	24.15		Ca	20	30.6	29.3
DO	-	2.0 <sup>1</sup>		K	0.4	1.1	1.3
pH	7	7.90		Na	4.4	5.77	4.94 <sup>1</sup>
Sp. Cond	162	249.00		Mg	8	8	7.9 <sup>1</sup>
<b>Lab Analytes</b>				Al	-	-	10 <sup>1</sup>
BOD	-	-	0.21	As	-	3	3 <sup>1</sup>
Turbidity	-	-	0.2	B	-	-	14.0
Color	0	-	5 <sup>1</sup>	Cd	-	0.51	0.51
Alkalinity	65	-	80.0	Co	-	-	11
Sp. Cond	162	249.00	-	Cu	-	2	2 <sup>1</sup>
TDS	108	-	137.0	Cr	-	23	4 <sup>1</sup>
TSS	-	-	3 <sup>1</sup>	Fe	-	51	7 <sup>1</sup>
Cl <sup>-</sup>	-	-	12.0	Mn	-	0.751	1.51
SO <sub>4</sub> <sup>2-</sup>	3.6	-	19.0	Ni	-	11	2 <sup>1</sup>
F <sup>-</sup>	0.7	-	0.871	Pb	-	51	51
<b>Nutrients</b>				Ra226	-	-	0.9
TOC	-	-	11	Ra228	-	-	1.10
NO <sub>3</sub> <sup>-</sup> /NO <sub>2</sub> <sup>-</sup> /N	2.11	-	5.10	Se	-	31	7 <sup>1</sup>
NH <sub>4</sub> <sup>+</sup> /NH <sub>3</sub>	-	-	0.41	Sb	-	-	15 <sup>1</sup>
TKN	-	0.141	0.141	Si	100	-	55.6 <sup>1</sup>
P <sup>3+</sup>	-	0.034	0.033	Zn	-	21	6 <sup>1</sup>
PO <sub>4</sub> <sup>3-</sup>	-	0.03	-				
NO <sub>2</sub> <sup>-</sup>	0.2	-	-				

<sup>1</sup> Value is less than practical quantitation limit (PL) or value is Q (1 second method limit time limit)

<sup>2</sup> Value is less than practical quantitation limit (PL) or value is Q (1 second method limit time limit)

Table 117. Apopka Spring bacteriological analysis.

Bacteria Results (m = 100 ml)	
Analyte	Value
<i>Enterococci</i>	1KQ
Fecal Coliform	2Q

## **ATTACHMENT B**

PC&B Environmental Laboratories, Inc.  
210 Park Road  
Oviedo, FL 32765-8801  
PHONE: 407-359-7194

Report of Analysis

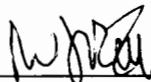
CLIENT NAME: Andreyev Engineering, Inc.  
PROJECT NAME: Sugarloaf MTN  
PROJECT NUMBER: GPGT 050266  
DATE RECEIVED: 07/28/2005

Lab Reference Number			205070256-1	205070256-2
Client Sample ID			S3	P1
Date/Time Sampled			07/27/2005 15:43	07/27/2005 16:25
Sample Matrix (as Received)			Water	Water
SM 2320-B	Bicarbonate	mg/l	16	3 U
SM 2320-B	Carbonate	mg/l	3 U	3 U
EPA 300.0	Chloride	mg/l	11	9
EPA 376.1	Hydrogen Sulfide	mg/l	0.06 U	0.06 U
EPA 6010/200.7	Magnesium, Total	mg/l	3.9	2.9
EPA 6010/200.7	Potassium, Total	mg/l	1.5 U	1.5 U
EPA 6010/200.7	Sodium, Total	mg/l	3.5	1.9
EPA 300.0	Sulfate	mg/l	6	3 U
EPA 6010/200.7	Iron, Total	ug/l	235	220

U = Undetected. The value preceding the 'U' is the RL for the analyte. Results reported on a Wet Weight basis.

NELAP- FDOH Certification # E83239

Reviewed by :



# Quality Control Report for Spike Analysis

## INORGANICS

Analyte		Spike Amount	Sample Result	Spike Result	Percent Recovery	Lower Control Limit	Upper Control Limit
Method EPA 325.3/300.0 Chloride	QC Batch 200507ICS168	Sample ID 205070260-2 20.0 mg/l	Date Prep 07/28/2005 3.2	Date Anal 07/28/2005 22.8	98	Analyst SH 85	109
Method EPA 376.1 Hydrogen Sulfide	QC Batch 200508S029	Sample ID 205080018-2 1.00 mg/l	Date Prep 08/03/2005 0.00	Date Anal 08/03/2005 1.00	100	Analyst SH 89	113
Method EPA 6010/200.7 Iron, Total	QC Batch 200507RC083	Sample ID 205070124-2 200 ug/l	Date Prep 07/18/2005 31	Date Anal 07/18/2005 222	96	Analyst GG 75	117
Method EPA 6010/200.7 Magnesium, Total	QC Batch 200507RC083	Sample ID 205070260-1 5 mg/l	Date Prep 07/29/2005 2	Date Anal 07/29/2005 6	95	Analyst GG 75	116
Method EPA 6010/200.7 Potassium, Total	QC Batch 200507RC083	Sample ID 205070260-1 5 mg/l	Date Prep 07/29/2005 1	Date Anal 07/29/2005 6	101	Analyst GG 71	130
Method EPA 6010/200.7 Sodium, Total	QC Batch 200507RC083	Sample ID 205070124-2 5 mg/l	Date Prep 07/18/2005 4	Date Anal 07/18/2005 9	90	Analyst GG 65	124
Method EPA 375.4/300.0 Sulfate	QC Batch 200507ICS168	Sample ID 205070260-2 50.0 mg/l	Date Prep 07/28/2005 49.4	Date Anal 07/28/2005 104.9	111	Analyst SH 83	113

**PC&B Environmental**  
 210 Park Road, Oviedo, FL 32765  
 407-359-7194 (FAX) 407-359-7197

21338

**Chain of Custody**

Work Order: 205070256

Date: 7-27-05 Page 1 of 1

COMPANY: INDREYEV TENG INC  
 ADDRESS: 4055 ST. JOHNS PKWY  
DANFORD FL 32171  
 SAMPLED BY: RON ZIM SIGN: RZ  
 PHONE: 407 330 7763 FAX:

#	SAMPLE ID	DATE/TIME	MATRIX				DATE/TIME	RECEIVED BY	ANALYSIS REQUESTED							PRESERVATION	Number of Containers
			AIR	WATER	SLUDGE	SOIL SOL ID			ORG. LIQUID	6010/200.7	BICARB	CARBONATE	CHLORIDE	SULFATE			
1	S3	7-27-05 1543		X				X	X	X	X						
2	P1	7-27-05 1625		X				X	X	X	X						
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	

RELINQUISHED BY: <u>Ron Zim</u>	DATE/TIME: <u>7-28-05 9:17</u>	RECEIVED BY: <u>Ron Zim</u>	DATE/TIME: <u>7-28-05 9:20</u>
SPECIAL INSTRUCTIONS/COMMENTS:			
PROJECT NAME: <u>SUGARLOAF MTN</u>		PROJECT INFORMATION	
PROJECT #: <u>GPCT 050266</u>		Total # of Containers: <u>6</u>	
SITE ADDRESS: <u>MUN TV ERDE</u>		Chain of Custody Seals	
PROJECT MANAGER: <u>E. D. M.</u>		Recv'd in Good Condition	
INVOICE TO: <u>INDREYEV TENG INC</u>		PO #:	
QUOTE/CONTRACT #:			

PC&B Environmental Laboratories, Inc.  
210 Park Road  
Oviedo, FL 32765-8801  
PHONE: 407-359-7194

Report of Analysis

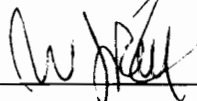
CLIENT NAME: Andreyev Engineering, Inc.  
PROJECT NAME: Sugarloaf MTN  
PROJECT NUMBER: GPGT 050266  
DATE RECEIVED: 07/27/2005

Lab Reference Number	205070236-1	205070236-2	205070236-3
Client Sample ID	S1	S2	P2
Date/Time Sampled	07/25/2005 15:15	07/26/2005 15:30	07/26/2005 17:03
Sample Matrix (as Received)	Water	Water	Water
SM 2320-B Bicarbonate	mg/l 72	17	3 U
SM 2320-B Carbonate	mg/l 3 U	3 U	3 U
EPA 300.0 Chloride	mg/l 12	11	3 U
EPA 376.1 Hydrogen Sulfide	mg/l 0.06 U	0.40	1.20
EPA 6010/200.7 Magnesium, Total	mg/l 9.6	5.4	0.7
EPA 6010/200.7 Potassium, Total	mg/l 2.7	3.0	1.5 U
EPA 6010/200.7 Sodium, Total	mg/l 7.2	3.2	1.5 U
EPA 300.0 Sulfate	mg/l 11	14	7
EPA 6010/200.7 Iron, Total	ug/l 35	23	120

U = Undetected. The value preceding the 'U' is the RL for the analyte. Results reported on a Wet Weight basis.

NELAP- FDOH Certification # E83239

Reviewed by :



# Quality Control Report for Spike Analysis

## INORGANICS

Analyte		Spike Amount	Sample Result	Spike Result	Percent Recovery	Lower Control Limit	Upper Control Limit
Method EPA 325 3/300 0 Chloride	QC Batch 200507ICS161	Sample ID 205070224-1 8.0 mg/l	Date Prep 07/27/2005 11.6	Date Anal 07/27/2005 20.5	112 *	Analyst SH 85	109
Method EPA 376 1 Hydrogen Sulfide	QC Batch 200507S160	Sample ID 205070236-1 1.00 mg/l	Date Prep 07/27/2005 0.00	Date Anal 07/27/2005 1.00	100	Analyst SH 89	113
Method EPA 6010/200 7 Iron, Total	QC Batch 200507RC169	Sample ID 205070236-3 200 ug/l	Date Prep 07/28/2005 118	Date Anal 07/28/2005 314	98	Analyst GG 75	117
Method EPA 6010/200 7 Magnesium, Total	QC Batch 200507RC169	Sample ID 205070236-3 5 mg/l	Date Prep 07/28/2005 1	Date Anal 07/28/2005 5	95	Analyst GG 75	116
Method EPA 6010/200 7 Potassium, Total	QC Batch 200507RC169	Sample ID 205070236-3 5 mg/l	Date Prep 07/28/2005 0	Date Anal 07/28/2005 5	92	Analyst GG 71	130
Method EPA 6010/200 7 Sodium, Total	QC Batch 200507RC169	Sample ID 205070236-3 5 mg/l	Date Prep 07/28/2005 1	Date Anal 07/28/2005 5	95	Analyst GG 65	124
Method EPA 375 4/300 0 Sulfate	QC Batch 200507ICS161	Sample ID 205070224-1 20.0 mg/l	Date Prep 07/27/2005 3.0	Date Anal 07/27/2005 22.6	98	Analyst SH 83	113

**PC&B Environmental**  
 210 Park Road, Oviedo, FL 32765  
 407-359-7194 (FAX) 407-359-7197

**Chain of Custody**

Work Order: 265170286

Date: 7-26-05 Page 1 of 1

COMPANY: ANDREYEV ENG INC		ANALYSIS REQUESTED										PROJECT INFORMATION		
ADDRESS: 4055 ST JOHNS PKWY		PRESERVATION										PROJECT NAME		
SAMPLED BY: RON ZIM		DATE/TIME										PROJECT #		
PHONE: 407 330 7763		SIGNATURE										SITE ADDRESS		
#	SAMPLE ID	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME	DATE/TIME
1	S1	7-25-05 1515	X	X	X	X	X	X	X	X	X	X	X	X
2	S2	7-26-05 1530	X	X	X	X	X	X	X	X	X	X	X	X
3	P2	7-26-05 1705	X	X	X	X	X	X	X	X	X	X	X	X
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														

RELINQUISHED BY: <u>Ron Zim</u>	DATE/TIME: <u>7-27-05 8:55</u>	RECEIVED BY: <u>Deanna Hwang</u>	DATE/TIME: <u>7-27-05 9:55</u>
SPECIAL INSTRUCTIONS/COMMENTS:		PROJECT # <u>GPGT 050266</u>	
		SITE ADDRESS <u>MONTVERDE</u>	
		PROJECT MANAGER <u>ED M.</u>	
		INVOICE TO:	
		PROJECT #	
		CHAM OF CUSTODY SEALS	
		TOTAL # OF CONTAINERS	
		RECV'D IN GOOD CONDITION	
		PO #:	

QUOTE/CONTRACT #:

PC&B Environmental Laboratories, Inc.  
210 Park Road  
Oviedo, FL 32765-8801  
PHONE: 407-359-7194

Report of Analysis

CLIENT NAME: Andreyev Engineering, Inc.  
PROJECT NAME: Sugarloaf MTN  
PROJECT NUMBER: GPGT 050266  
DATE RECEIVED: 07/27/2005

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Lab Reference Number	205070236-1	205070236-2	205070236-3
Client Sample ID	S1	S2	P2
Date/Time Sampled	07/25/2005 15:15	07/26/2005 15:30	07/26/2005 17:03
Sample Matrix (as Received)	Water	Water	Water

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EPA 6010/200.7	Calcium, Total	mg/l	34	6	1
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NR = Analysis not Requested.

U = Undetected. The value preceding the 'U' is the RL for the analyte. Results reported on a Wet Weight basis.

NELAP- FDOH Certification # E83239

Reviewed by :



# Quality Control Report for Spike Analysis

## INORGANICS

Analyte		Spike Amount	Sample Result	Spike Result	Percent Recovery	Lower Control Limit	Upper Control Limit
Method: EPA 6010/200.7	QC Batch: 200507RC169	Sample ID: 205070236.3	Date Prep: 07/28/2005	Date Anal: 07/28/2005	Analyst: GG		
Calcium, Total		5 mg/l	1	6	98	67	124

PC&B Environmental Laboratories, Inc.  
210 Park Road  
Oviedo, FL 32765-8801  
PHONE: 407-359-7194

Report of Analysis

CLIENT NAME: Andreyev Engineering, Inc.  
PROJECT NAME: Sugarloaf MTN  
PROJECT NUMBER: GPGT 050266  
DATE RECEIVED: 07/28/2005

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Lab Reference Number	205070256-1	205070256-2
Client Sample ID	S3	P1
Date/Time Sampled	07/27/2005 15:43	07/27/2005 16:25
Sample Matrix (as Received)	Water	Water

---

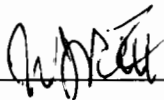
EPA 6010/200.7	Calcium, Total	mg/l	8	3
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NR = Analysis not Requested.

U = Undetected. The value preceding the 'U' is the RL for the analyte. Results reported on a Wet Weight basis.

NELAP- FDOH Certification # E83239

Reviewed by : \_\_\_\_\_



# Quality Control Report for Spike Analysis

## INORGANICS

Analyte		Spike Amount	Sample Result	Spike Result	Percent Recovery	Lower Control Limit	Upper Control Limit
Method EPA 325.3/500.0 Chloride	QC Batch 200507ICS168	Sample ID 205070260-2 20.0 mg/l	Date Prep 07/28/2005 3.2	Date Anal 07/28/2005 22.8	98	Analyst SH 85	109
Method EPA 376.1 Hydrogen Sulfide	QC Batch 200508S029	Sample ID 205080018-2 1.00 mg/l	Date Prep 08/03/2005 0.00	Date Anal 08/03/2005 1.00	100	Analyst SH 89	113

## **TABLES**

**TABLE 1**  
**Summary of Field Testing**  
**Off-Site Spring Water Quality Analyses**  
**Proposed Sugarloaf Mountain Development**  
**County Road 455, Lake County, Florida**  
**AEI Project No: GPGT-05-0266**

Sample No.	pH	Temperature (degrees, C.)	Conductivity (ms/cm)	Turbidity (NTU's)	Dissolved Oxygen (mg/L)
S-1	6.24	NR	0.20	2	2.43
S-2	3.99	27.3	4.43	<1	8.05
S-3	5.48	27.7	0.07	20	2.97
P-1	4.53	26.3	0.05	77	5.89
P-2	4.66	26.4	0.02	12	5.19

S-1: Apopka Spring

S-2: Bear Spring

S-3: Wolf's Head Spring

P-1: Piezometer Up-gradient of Wolf's Head Spring

P-2: Piezometer Up-gradient of Bear Spring

NR: Not Recorded

**TABLE 2**  
**Summary of Laboratory Testing**  
**Off-Site Spring Water Quality Analyses**  
**Proposed Sugarloaf Mountain Development**  
**County Road 455, Lake County, Florida**  
**AEI Project No: GPGT-05-0266**

Sample No.	Bicarbonate (mg/l)	Carbonate (mg/l)	Chloride (mg/l)	Hydrogen Sulfide (mg/l)	Magnesium Total (mg/l)	Potassium Total (mg/l)	Sodium Total (mg/l)	Sulfate (mg/l)	Iron Total (ug/l)	Calcium Total (mg/l)
S-1	72	3 U	12	0.06 U	9.6	2.7	7.2	11	35	34
S-2	17	3 U	11	0.40	5.4	3.0	3.2	14	23	6
S-3	16	3 U	11	0.06 U	3.9	1.5 U	3.5	6	235	8
P-1	3 U	3 U	9	0.06 U	2.9	1.5 U	1.9	3 U	220	3
P-2	3 U	3 U	3 U	1.20	0.7	1.5 U	1.5 U	7	120	1

S-1: Apopka Spring

S-2: Bear Spring

S-3: Wolf's Head Spring

P-1: Piezometer Up-gradient of Wolf's Head Spring

P-2: Piezometer Up-gradient of Bear Spring

U: Undetected. The value preceding the "U" is the RL for the analyte

Bicarbonate: SM 2320-B

Carbonate: SM 2320-B

Chloride: EPA 300.0

Hydrogen Sulfide: EPA 376.1

Magnesium, Total: EPA 6010/200.7

Potassium, Total: EPA 6010/200.7

Sodium, Total: EPA 6010/200.7

Sulfate: EPA 300.0

Iron, Total: EPA 6010/200.7

Calcium, Total: EPA 6010/200.7

**PLATE**

Legend:

- S-1
- ▲ S-2
- + S-3
- × P-1
- ▼ P-2

### Off-Site Spring Water Quality Analyses For Sugarloaf Mountain

