Warm Mineral Springs Sediment Sample Analysis Report

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Statement of Purpose - Analyze sediment grab samples and push cores from Warm Mineral Springs to determine the following:

1) Can sand that occurs naturally in the spring be differentiated from any sand allegedly introduced from an outside source into the Springs?

2) Is there any evidence that foreign sand or plastic occurs within the soil located at the bottom of the Springs, around, or in the Springs' vents?

Methodology – Sediment samples were collected by the investigator and others from areas in and around the shallow bathing area of the spring basin at Warm Mineral Springs and from the deeper portions of the spring system as depicted in Figure 1. Samples were of two types. Grab samples (12), were collected by hand directly into plastic zip-seal storage bags. Push cores (16), were collected by pushing a clear, rigid plastic tube (1.25-inch diameter) by hand into the sediment, capping the tube to create a vacuum seal, then pulling the tube back and capping the bottom to retain the sample.

Samples were labeled and logged in the field immediately upon collection and retrieval, then stored in a secure climate-controlled facility at the Sarasota County History Center until such time as they were processed and analyzed. Each sample was processed in a similar fashion, according to the sample type. Grab samples were allowed to drain by gravity, then a random sample split was removed for standard geologic description of the lithologic properties of the sample. Push core samples were processed by first trimming the clear tube to the length of the retrieved sample. The samples were then either extruded by pushing the sample from the end of the tube or the tubes were split with a cutting tool to reveal the inner contents of the core; the process chosen was based upon

Figure 1 - sample collection locations (approximate)

the physical composition of the sample as observed by the investigator. The samples were then described using standard geologic terminology based on their lithologic composition. The use of standardized geologic descriptions allows for future comparison and contrast of the various types of sediments found in the samples without having to actually hold the samples in one's hands.

Sample Descriptions – Samples were of two basic types: grab samples, and push core samples. Within each type of sample, there were samples collected from specific areas within and around the spring basin. Tables 1 & 2 present the organization of the samples based on sample type and location. Photographic archival of the 12 grab samples is provided as Figure 2. Push cores were photodocumented for archival purposes as presented in Figures 3 - 19.

Table 1 – Grab Samples

Sample ID	Sample Location	Notes/Comments
D1	Upstream side of rock dam	Spring discharge area – surface of sediment inside spring basin area
D2	10m in from D1, halfway to rope	
D3	10m in from D2, at rope	
G1	Random ledge sediment	45-ft ledge area samples collected by research diver (S. Koski).
G2	Random ledge sediment	
G3	Synthetic fiber (green)	
SR1	Downstream side of rock dam	Spring run downstream of rock dam
SR2	Under footbridge	
SR3	15m downstream from bridge	
SR4	30m downstream from bridge, 3m upstream from septic station	
SR5	25m downstream from septic station	
SR6	@ County gaging station @ fenceline	

Table 2 – Push Cores

ID	Location	Notes/Comment
BB	Beach/bathing area	10ft out from seawall
CC	Discharge area	Halfway between rock dam & tall post
DD	Beach/bathing area	At rope
EE	Cyclorama side	At post/rope near east end of seawall
FF	Drop-off	Out from tall post in front of rock dam
K	Drop-off	Out from beach/bathing area
AA	Ledge	~36ft bls, top of sediment dune crest, east of deco stage rack (az=0deg)
B	Ledge	Grab/scoop of thin layer of sediment on top of plastic, left of barrel (az=85deg)
H	Ledge	~40ft bls behind dropzone/overhang @ back wall (az=20deg)
P	Ledge	Sediment accumulation no plastic present (az=180deg)
G	Cold vent	206ft bls, sediment accumulation in front of cold vent
I	Cold vent	208ft bls @ 3rd largest vent (to right of hot vent)
J	Debris mound	Top of debris mound
N	Cold vent	206ft bls @ 2nd largest vent (to left of hot vent)
O	Hot vent	210ft bls @ main spring vent - in flat area in front of hot vent (full current)
R	Hot vent	210ft bls main spring vent

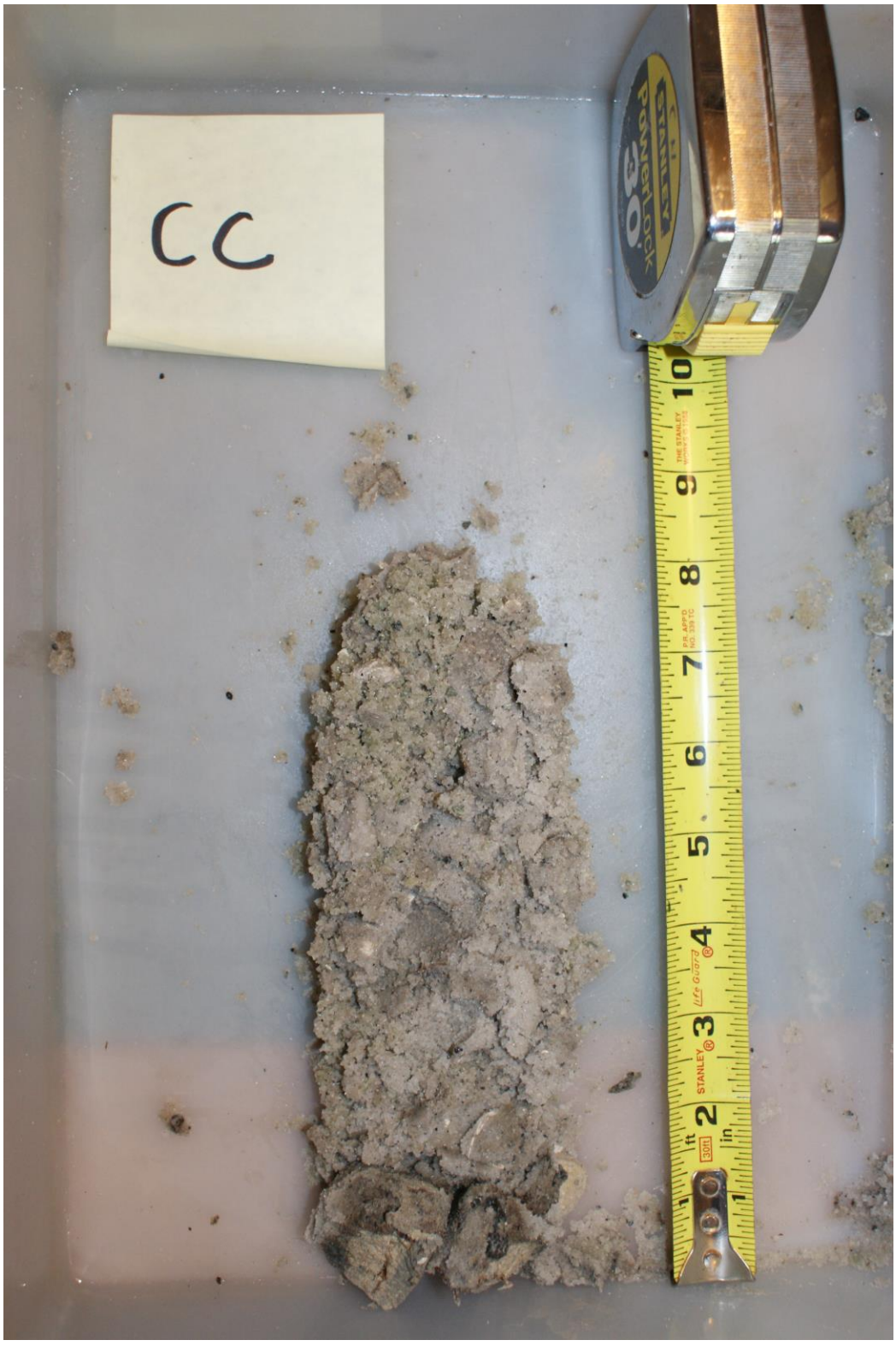
Figure 2 – Grab Samples

Beach/Bathing Area Push Cores

Figure 3 – Push Core BB

Beach/Bathing Area Push Cores

Figure 4 – Push Core CC



Beach/Bathing Area Push Cores

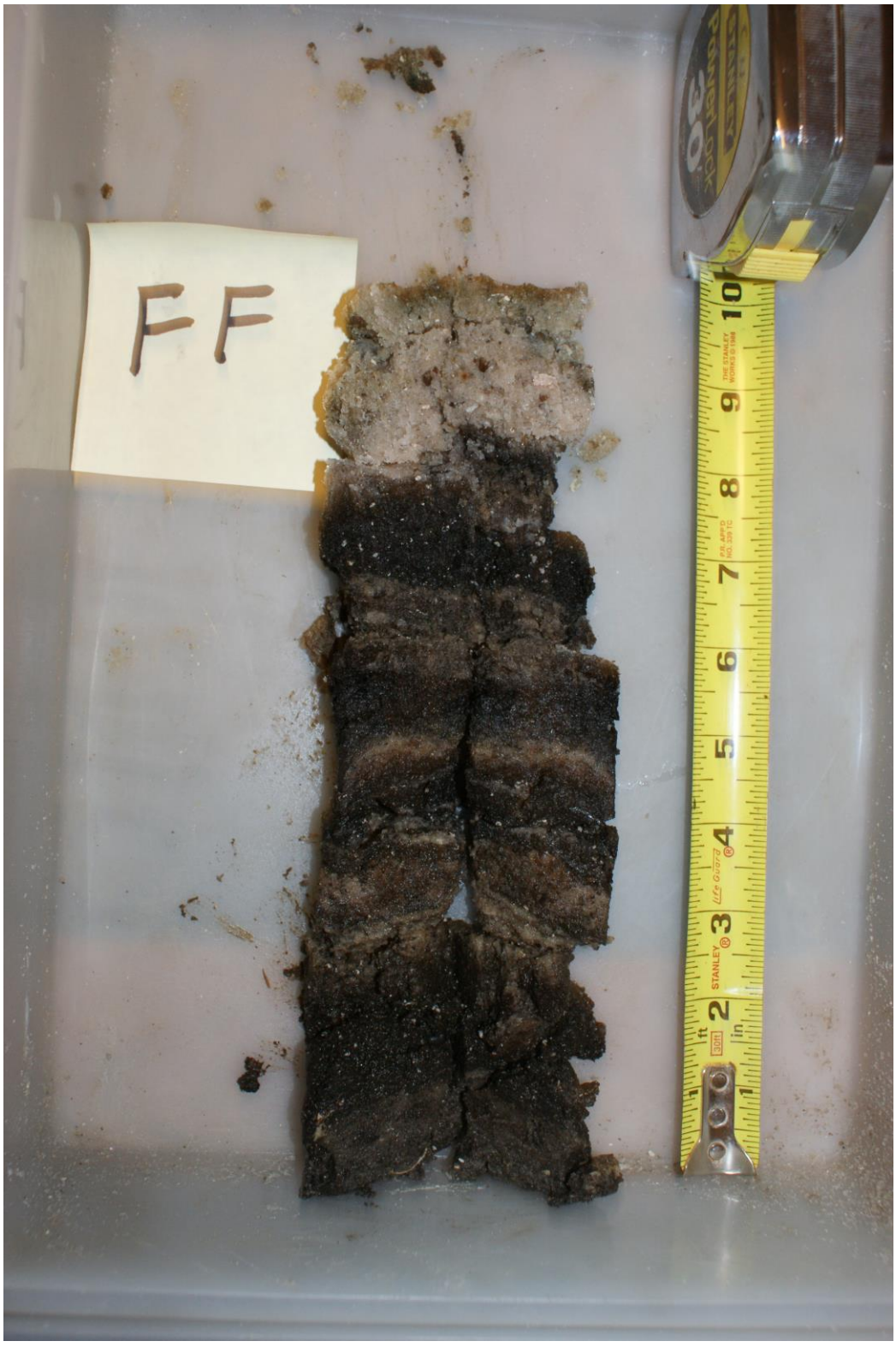
Figure 5 – Push Core DD

Beach/Bathing Area Push Cores

Figure 6 – Push Core EE

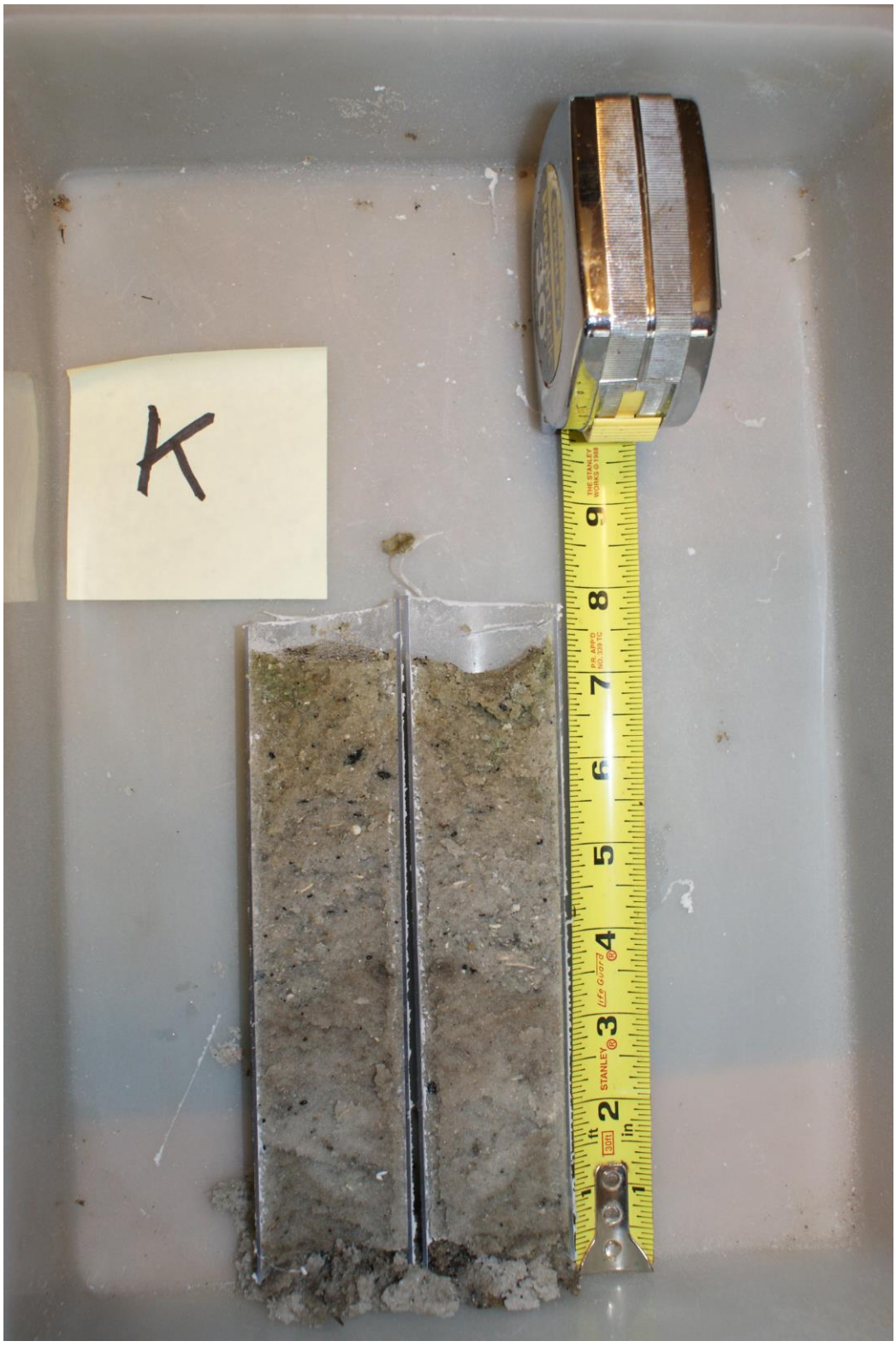
Beach/Bathing Area Push Cores

Figure 7 – Push Core FF



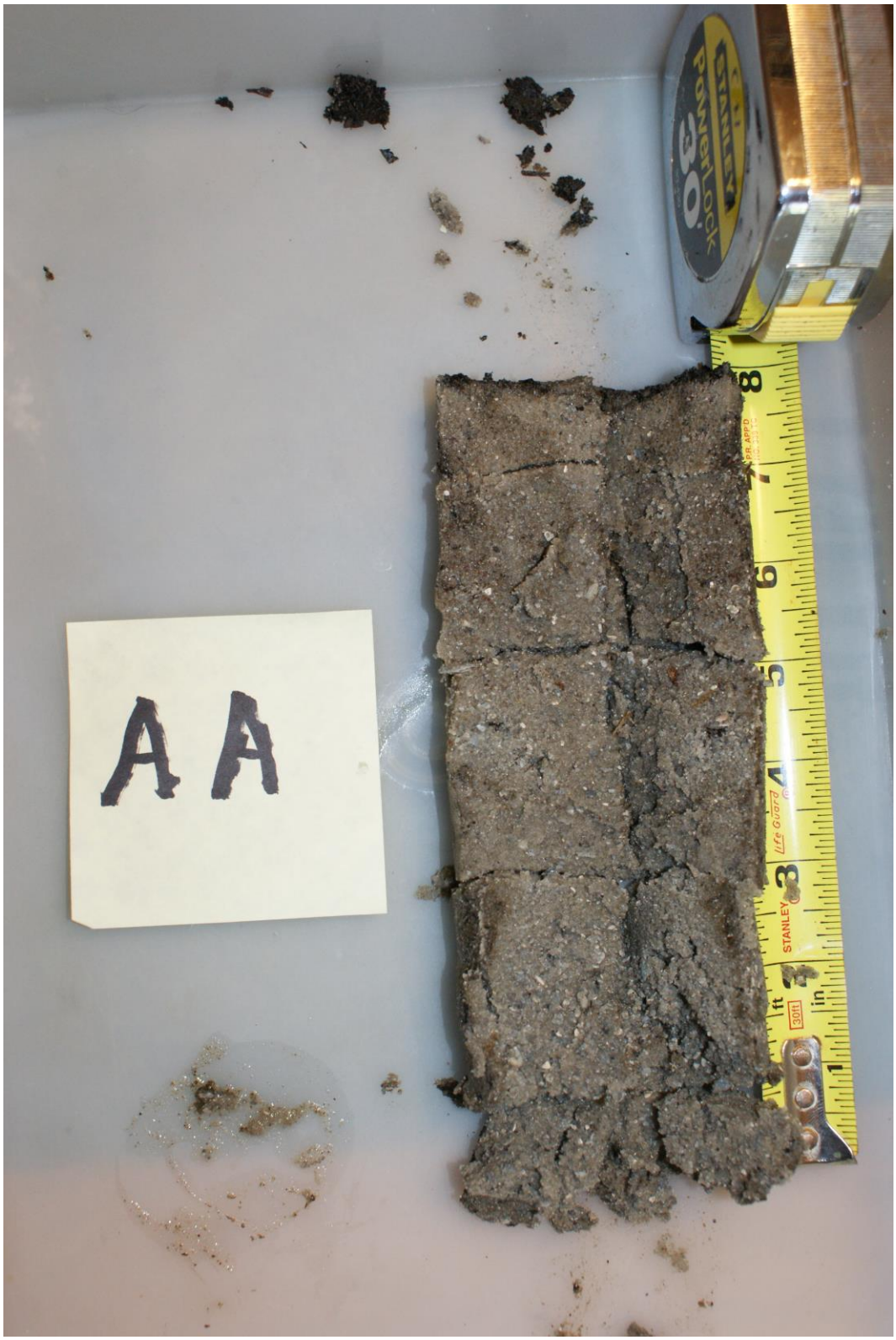
Beach/Bathing Area Push Cores

Figure 8 – Push Core K



Ledge Area Push Cores

Figure 9 – Push Core AA

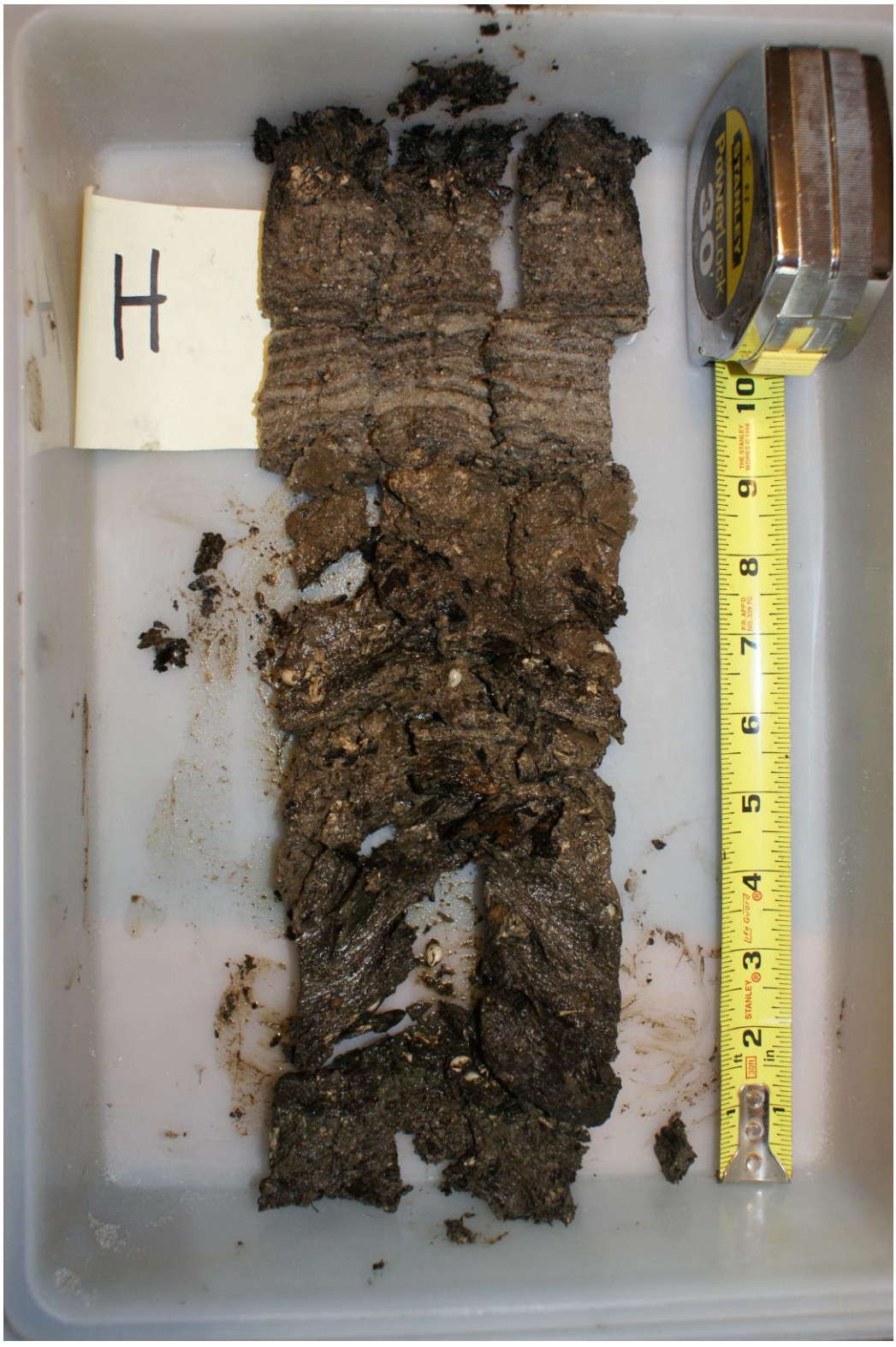


Ledge Area Push Cores

Figure 10 – Push Core B

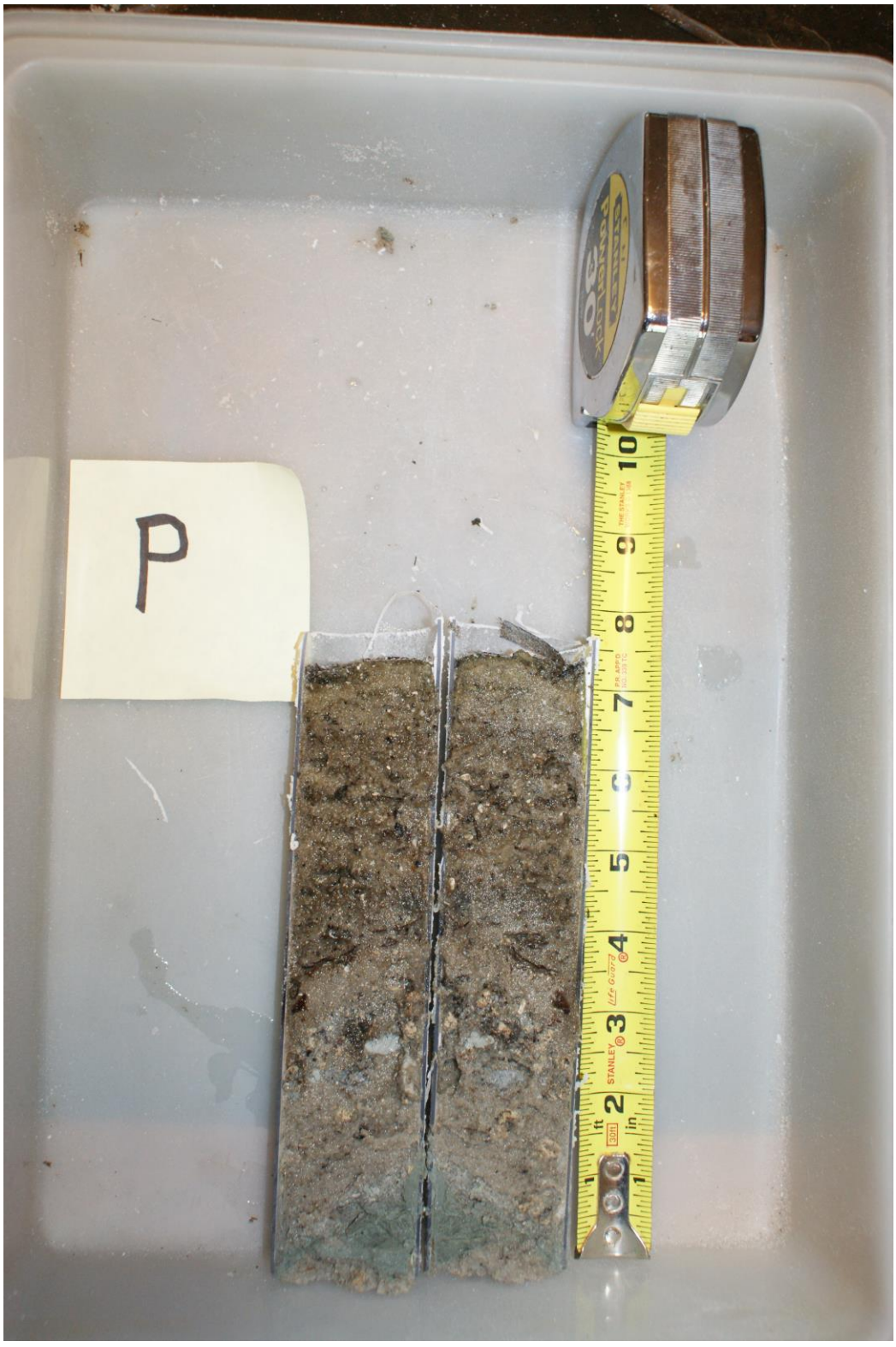
Ledge Area Push Cores

Figure 11 – Push Core H



Ledge Area Push Cores

Figure 12 – Push Core P



Deep Basin Area Push Cores

Figure 13 – Push Core G

Deep Basin Area Push Cores

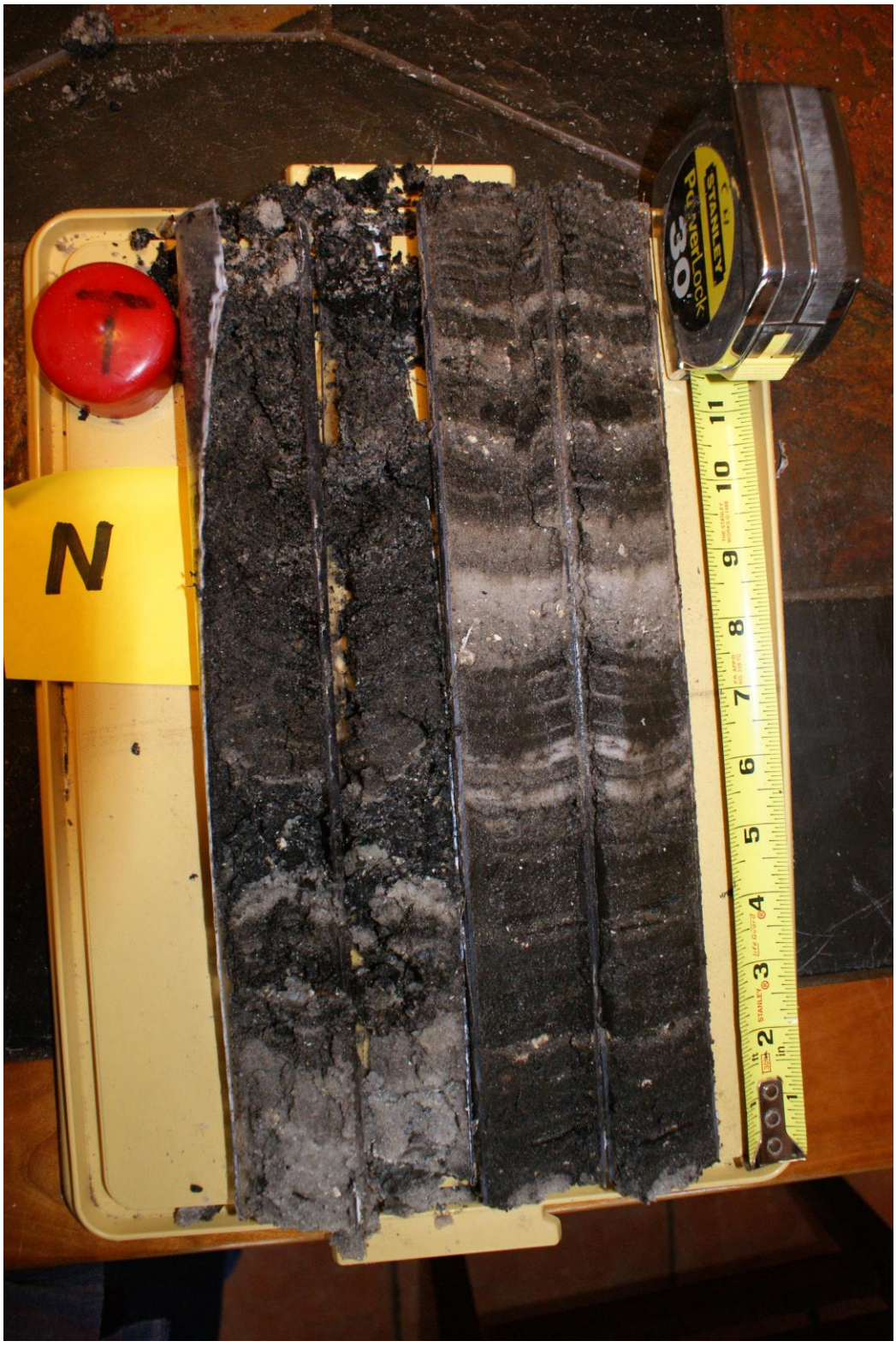
Figure 14 – Push Core I

Deep Basin Area Push Cores

Figure 15 – Push Core J

Deep Basin Area Push Cores

Figure 16 – Push Core N



Deep Basin Area Push Cores

Figure 17 – Push Core O

Deep Basin Area Push Cores

Figure 18 – Push Core R

Visual Comparison of Sediment Samples - Initial visual comparison of the sediment samples provided obvious similarities and differences among and between the samples. The following general observations were made:

1) the grab samples and push core samples from the discharge area and beach/bathing area of the shallow portion of the spring basin are primarily composed of relatively clean quartz sand with varying concentrations of phosphatic grains and shell fragments;

2) the samples collected from deeper areas within the spring basin are more likely to contain significant quantities of organic-laden silt;

3) although the samples collected from deeper areas within the spring basin do contain layers of quartz sand, without exception these core samples all contain silt and organic deposits overlaying any layers of quartz sand.

Lithologic Description of Sediment Samples – The samples were all described using standard geologic terminology for hand sample description. No acid was used to digest mineral samples, and no graduated sieve equipment was used to quantify the sediment grain size distributions. The descriptions provided herein are based solely on hand sample descriptions using a low-power hand lens. Detailed lithologic descriptions may be found in Appendix A.

Observations –

Shallow samples - Grab samples and push core samples from within the beach/bathing and discharge areas of the shallow portion of the spring basin were compared and contrasted. The following samples were considered to be representative of the sediments currently occurring in these areas: D1, D2, D3, BB, CC, DD, EE, FF, and K. All of these samples exhibited similar sandy sediments either in the upper-most layers or completely through the sampled interval. These sandy sediments are present as a homogeneous or slightly

stratified well sorted quartz sand, containing varying quantities of phosphatic grains and broken shell fragments. Push cores BB, DD, and FF all showed interbedded layers of sand and organic silts towards the bottom of the samples; push cores CC and EE both appear to have terminated in undisturbed clayey sediments; push core K contains a consistent deposit of well sorted quartz sand, similar to the sediments found in grab samples D1, D2, and D3 and in the upper portions of all of the other core samples from this group.

Deep samples - Push core samples from the 45-ft ledge area and deeper areas of the spring basin were compared and contrasted. The following samples were considered to be representative of the sediments currently occurring in these areas: 45-ft ledge - AA, B, H, and P; deep – G, I, J, N, O, and R. All but one of the samples from the 45-ft ledge exhibit fairly homogenous deposits of moderately well sorted quartz sand, containing as great or greater concentrations of phosphatic grains and shell fragments than the shallow samples from the beach/bathing and spring discharge areas. Sample H was intentionally taken from an area back under the overhang of the 45-ft ledge with the intent of having a basis of comparison between Sample H, which is unlikely to have received direct deposition of sand migrating from the shallow areas of the spring, and Samples AA, B, and P, which were collected from areas where sediment (from whatever source) has clearly accumulated. Whereas Samples AA, B, and P exhibit fairly homogeneous deposits of moderately well sorted phosphatic shelly quartz sand, similar sand in Sample H is only found in thinly stratified layers overlying a thicker, more homogeneous deposit of organic detritus and silt.

All of the samples from the deep zones exhibited significantly increased amounts of organic silts and actual woody/leafy debris than were found in the samples from the shallower levels (beach/bathing area and ledge area). The organic silts were thick and homogenous in the sample from the top of the debris mound (Sample J), but in the other deep zone samples the organic silts were periodically interrupted by relatively thin layers of cleaner quartz sands, only to be

subsequently followed by additional organic silts. Well sorted quartz sand similar to that which was observed in the samples from the beach/bathing and discharge areas of the shallow portion of the spring basin did not occur at the top of any of the push core samples collected from the deeper portions of the spring basin. While such sand did occur near the top of the core in Sample G, there was still a layer of organic silt overlying the sand indicating that an additional input of organic silt had occurred since the deposition of the sand that was observed near the top of Sample G.

Discussion/Analysis - The questions put forth at the outset of this investigation are two-fold: 1) can sand that occurs naturally in the spring be differentiated from any sand allegedly introduced from an outside source into the Springs?; and 2) is there any evidence that foreign sand or plastic occurs within the soil located at the bottom of the Springs, around, or in the Springs' vents?

To address the issue of whether or not the sand that occurs naturally in the spring can be differentiated from imported sand, it is necessary to consider the general nature of all springs and the specific nature of the sediments surrounding Warm Mineral Springs. In general, all springs can be expected to contain naturally-occurring sediments, including silts, sands, gravels, etc.. The investigator is unaware of any springs in Florida that do not contain significant amounts of native sand and other sediments. Therefore, it can be expected that at least some of the sand that is found in Warm Mineral Springs today is of natural origin; such native sand is likely derived from the shallow surficial aquifer in the immediate vicinity of the springs. The surficial soils in the immediate vicinity of Warm Mineral Springs consist of Pomello Series soils, described in the *"Soil Survey of Sarasota County, Florida – USDA Soil Conservation Service"* as "moderately well drained soils that formed in thick beds of sandy marine sediments". The underlying sediments of the surficial aquifer in the vicinity of the springs contain fossil shells, phosphatic grains, and quartz sand, as described by the US Geological Survey:

> *"The SAS consists of permeable, unconsolidated, clastic sediments and some locally consolidated basal carbonates that range in age from Holocene to Pliocene. The sediments are composed of fine to medium quartz and phosphatic sand, clayey sand, clay, sandy clay, shells, limestone, and dolostone, and become increasingly phosphatic and clayey with depth. …the SAS ranges in thickness from a few feet to more than 60 ft."*.

Lithology of surficial aquifer in Sarasota County as described *in* Barr, G.L., (1996); Hydrogeology of the Surficial and Intermediate Aquifer Systems in Sarasota and Adjacent Counties, Florida. USGS Water Resources Investigations Report 96-4063).

When one walks away from the springs, following the discharge creek along its course towards the Myakka River, numerous opportunities exist to observe the natural sediments in the vicinity, as the creek has cut down into the surrounding soils and exposed the shallow sediments along its banks. Most noticeable are shelly sands, most likely of the late Pleio-Pleistocene Ft. Thompson/Bermont formations. Unlike the deeper shell beds that occur throughout the area containing hundreds of varieties of fossil shells, these shelly sands are notable for the predominance of a single type of fossil bivalved mollusk of the genus *Chione sp.*. The most common identifiable shell fragments found in the samples collected from Warm Mineral Springs during this investigation are identified as *Chione sp.*. The ubiquitous presence of quartz sands and marine shell fragments in the immediate vicinity of Warm Mineral Springs and in the surrounding areas makes it virtually impossible to tell whether or not the sands observed in the spring basin today are naturally-ocurring or if the sands were imported into the area by others in the past.

From the investigator's experience working with sand borrow pits, the likelihood is that any sand that was allegedly imported into the spring area in the past came from the nearest borrow pit supplying sand for construction purposes in the area. If this supposition were to hold true, then an applicable analogy would be as if one were to walk out on the beach and try to differentiate between the sand that had naturally occurred on the beach from sand that was pumped in from a mile

offshore in a beach renourishment project; it would be essentially impossible to tell the difference between sand from the two sources.

All evidence collected and analyzed indicates that is it impossible to differentiate sand that occurs naturally in the spring from any sand allegedly introduced from an outside source into the Springs.

The second questions posed to the investigator was whether there any evidence that foreign sand or plastic occurs within the soil located at the bottom of the Springs, around, or in the Springs' vents. To the part of the question regarding plastic, there was no plastic observed in any of the samples collected from the bottom of the springs or in the springs' vents. Cores were taken from the top of the central debris cone within the deep portion of the spring and from areas directly in front of the spring vents. No plastic was observed in any of the samples. Regarding evidence of foreign sand occurring within the soil located at the bottom of the springs, around, or in the springs' vents, the presence of organic silt layers on top of the shallowest layers of sand suggest that natural processes have deposited organic silt in the time period following the latest deposition of sand. From a geologic perspective, there is no evidence that foreign sand occurs at the bottom of the springs, around, or in the springs' vents.

Conclusion – this investigation was conducted with the express intent of addressing two specific questions: 1) can sand that occurs naturally in the spring be differentiated from any sand allegedly introduced from an outside source into the Springs?; and 2) is there any evidence that foreign sand or plastic occurs within the soil located at the bottom of the Springs, around, or in the Springs' vents? Based on the observations and analyses made by the investigator the following conclusions have been reached:

1) Sand that occurs naturally in the spring CANNOT be differentiated from any sand allegedly introduced from an outside source into the Springs; and,

2) There is NO EVIDENCE that foreign sand or plastic occurs within the soil located at the bottom of the Springs, around, or in the Spring's vents.

Sincerely,

H. Cliff Harrison, P.G.

Florida Professional Geologist #1926

Warm Mineral Springs

1/30/15

Sediment Sample Analysis

Samples Collected - 11/4/14 + 11/5/14

Sample Types - Grab (ziploc) - 12

Push cores - 6 short
10 long

- Sample Inventory - Grab Samples:

	ID	Location	Notes/Comments
11/5/14 -	D 1	Upstream side of rock dam	(Spring Discharge Area) Surface of sand & mud inside spring basin area.
	D 2	10 m "in" from D1, ½ way to rope	
	D 3	10 m "in" from D2, at rope	
11/4/14 -	G 1	random ledge sediment	(Ledge area samples by SK)
	G 2	random ledge sediment	
	G 3	Synthetic fiber - green	
11/5/14 -	SR 1	Downstream side of rock dam	(Spring Run downstream of rock dam)
	SR 2	under foot bridge	
	SR 3	15 m downstream from bridge	
	SR 4	30 m downstream from bridge, 3 m upstream from septic station	
	SR 5	25 m downstream from septic station	
	SR 6	@ County gaging station @ fenceline	

1/30/15

Sample Descriptions - Grab Samples:

Sample ID	Lithologic Description
D1	SAND, quartz, very light gray, fine to medium fine grains, subangular to rounded, well sorted, clear to frosted; with minor to trace phosphatic grains, fine to coarse, sub rounded to rounded, black; and trace shell fragments (chione sp. + venericardia sp.), white to gray.
D2	SAND, quartz, very light gray, fine to medium fine grains, subangular to rounded, well sorted, clear to frosted; with minor to trace phosphatic grains, fine to coarse, and few phosphatic gravel fragments, sub rounded to rounded, black to rare medium brown; and trace shell fragments (chione sp. ~~+ venericardia sp.~~), white to gray.
D3	SAND, quartz, medium greenish-gray, fine to coarse grains, subangular to sub rounded, poorly sorted, clear to frosted; with common phosphatic grains, fine to coarse, ~~and common~~, sub rounded to rounded, black, ~~and granot~~ and occasional granules to gravel fragments sub rounded to rounded, black to dark brown; and occasional shell fragments (chione sp.), white to gray.

Sample Descriptions - Grab Samples: 1/30/15

Sample ID	Lithologic Description
G1	SAND, quartz, medium brownish-gray, fine to medium fine grains, subrounded, well sorted, clear to frosted; with common organic silt, dark to medium brown; and abundant phosphatic silt to grains to granules, black to dark brown; and trace shell fragments (chione sp.), gray to white; and rare organic (wood) fragments, soft, fibrous
G2	SAND, quartz, medium brownish-gray, fine to ~~gra~~ very fine grains, subrounded well sorted, clear to frosted; with common organic silt, dark to medium brown; and abundant phosphatic silt, black to dark brown; and ~~comm~~ occasional small shell fragments, white to gray.
G3	Synthetic fiber, bluish-green, coarse, matted

Sample Descriptions - Grab Samples: 1/30/15

Sample ID	Lithologic Description
SR 1	SAND, quartz, medium gray, fine grained, sub angular to ~~st~~ subrounded, well sorted, clear to frosted; with common organic detritus, brown to black, and common shell fragments, grayish-white.
SR2	SAND, quartz, light gray, fine grained, subangular to subrounded, well sorted, clear to frosted; with trace organic detritus, brown to black; and trace shell fragments, white to gray.
SR3	SAND, quartz, ~~##~~ light to medium gray, fine grained, subangular to subrounded, well sorted, clear to frosted. with common MUD, dark gray to brownish-black; and occasional organic detritus, brown to black, and trace shell fragments, white to gray.
SR4	SILTY SAND~~SILT~~, dark brownish-gray to grayish-brown, silty to very fine grained, sub-angular to sub-rounded, clear; with abundant MUD, dark brownish-gray to brownish-black; and common organic detritus, and common shell fragments, white to gray.
SR5	MUDDY SAND, dark grayish-brown silty to very fine grained, sub rounded, frosted. with abundant MUD, dark ~~g~~brownish-black; and abundant organic detritus; and trace shell fragments, white.

Sample Descriptions - Grab Samples: 1/30/15 (5)

Sample ID	Lithologic Description
SR 6	SANDY MUD, dark brownish-black, muddy to silty to very fine grained, with abundant organic detritus, and trace shell fragments, yellowish-gray.

- Sample Inventory - Push Cores (short)

(b)
1/30/15

	ID	Location	Notes/Comments
11/4/14	AA	Ledge	@ 36ft bls az +/- 0°; top of dune crest; east of deco stage rack
	BB	Beach/bathing area	10 ft out from seawall
	CC	Discharge area	1/2 way from dam to tall post
	DD	Beach/bathing area	at rope
11/5/14	EE	Cyclorama side	@ post/~~rope near~~ near east end of seawall
	FF	Drop-off	out from tall post in front of ~~o~~ rock dam

- Sample Inventory - Push Cores (long)

	ID	Location	Notes/Comments
11/5/14	B	Ledge	Grab/scoop of thin layer of sediment on top of plastic ~~5~~ az 85° Left of barrel
11/5/14	G	Cold Vent	20 6ft bls in front of cold vent sediment accumulation
11/5/14	H	Ledge	~40ft bls az 20° behind dropzone @ back wall of overhang
11/5/14	I	~~Spring~~ Cold Vent	208 ft bls @ 3rd largest vent (to right of hot vent)
11/4/14	J	Debris Moond	top of debris mound
11/5/14	K	Beach/Bathing Area	Dropoff out from beach/bathing area
11/4/14	N	Cold Vent	Secondary (cold) vent
11/5/14	O	Hot vent	210 ft bls in flat area (current) in front of hot vent
11/5/14	P	Ledge	Sediment accumulation no plastic az 180°
11/4/14	R	Hot Vent	Main Spring vent

Sample Descriptions - Push Cores

1/30/15

ID	Length (inches)	Lithologic Description
AA	8	Homogeneous (no stratification) SAND, quartz, medium gray, fine to medium grained subrounded to subangular, well sorted, clear to frosted; with common organic silt, black to brown, and occasional phosphatic silt grains, black; and common shell fragments, white and occasional organic fragments, soft.
BB	10 Ø = bottom	Stratified
	~~Ø - 1.25~~	~~SAND, fine grained qtz~~
	Ø - 1.25	SAND, quartz, light gray to dark gray, fine grained well sorted, with common black organic silt
	1.25 - 1.75	ORGANIC ~~SILT~~, layered
	1.75 - 3.00	SAND quartz fine grained, with abundant black organic silt
	3.00 - 4.00	ORGANIC SILT, layered
	4.00 - 5.50	SAND, quartz, medium to fine grained, trace black organic silt
	5.50 ~~5.00~~ - 6.00	ORGANIC SILT, layered and fibrous material (pine needles?)
	6.00 - 8.25	SAND, quartz medium to fine grained, clean, interlayered with black organic silt stringers
	8.25 - 10.00	SAND, quartz, medium to fine grained clean, minimal organic material
CC	8	Homogeneous (no stratification) SAND, quartz, light grayish-white, fine to medium fine grained, subrounded to sub angular, well sorted, clear to frosted, with ~~co~~ common phosphatic grains, fine to medium black; and occasional shell fragments, white to yellowish gray (chione sp.)

1/30/15

ID	Length (inches)	Lithologic Description
DD	13 in. Ø = bottom	Stratified
	Ø - 1.5Ø	SAND, quartz, medium to dark gray, fine grained, subrounded, well sorted, mottled + layered with dark gray bands (gradational)
	1.5Ø - 6.5Ø	SAND, quartz light gray to medium gray, fine to medium grained, clear to frosted, subrounded to subangular moderately well sorted, with several well-defined thin dark gray bands and trace soft medium brown organic matter
	6.5Ø - 7.5Ø	SILTY SAND, quartz, dark gray to blackish gray, very fine grained to silty, very organic-rich.
	7.5Ø - 13.ØØ	SAND, quartz, light grayish-white, fine to medium fine grained, subrounded to subangular, well sorted, clear to frosted; with common phosphatic grains, fine to coarse, well rounded, brown to black; and common shell fragments, white to gray.
EE	5 inches	Stratified
	Ø - 2.Ø	CLAY silty, medium gray to light yellowish gray, fairly dry, crumbly, low to poor plasticity, poor cohesion,
	2.Ø - 5.Ø	SAND, quartz light gray fine to medium grained, subrounded to subangular, moderately well sorted, clear to frosted; with occasional phosphatic grains, fine to coarse, well rounded brown to black; and common shell fragments, white to gray.

ID	Length (inches)	Lithologic Description 1/30/15
FF	10 Ø = bottom	Stratified
	Ø - 8.Ø	SANDY SILT, dark gray to grayish-black, layered to mottled, very fine grained to silty, apparent repeating sequences as in: dark gray silt → black organic rich silt → Sandy layer → repeated semi-regularly note - high concentrations of recent small gastropods in black organic layers
	8.Ø - 10.Ø	SAND, quartz light gray, fine to medium grained, subrounded to subangular, moderately well sorted, clear to frosted; with occasional phosphatic grains, fine to coarse, well rounded, brown to black, and occasional shell fragments white to gray
B	15	Homogeneous (no stratification) SAND, quartz, medium to dark gray, fine to medium coarse grained subrounded to subangular, ~~we~~ moderately ~~poo~~ sorting clear to frosted; with occasional phosphatic grains, fine to coarse, well rounded, brown to black, and occasional organic detritus. Overall gradational mottling.
K	7	Homogeneous (no stratification) SAND, quartz, light gray to grayish white fine to medium grained, well sorted, ~~coarse~~ ~~gra~~ subangular to subrounded, clear to frosted; with occasional phosphatic grains, fine to coarse, well rounded to sub rounded, brown to black, and occasional shell fragments, white to gray.

1/30/15

ID	Length (inches)	Lithologic Description
P	7.5 ~~inches~~ Ø @ bottom	Gradational
	Ø - 4	CLAYEY to SILTY SAND, quartz, fine grained, well sorted, rounded to sub rounded, silty to clayey, with abundant clay clasts, bluish-green to grayish white to yellowish gray, varying consitency + plasticity
	4 - 7.5	SILTY SAND, quartz fine grained, well sorted, rounded to sub rounded, silty, with abundant organic silt, black, + detritus; and common shell fragments, white to gray
H	14	Stratified
	Ø - 9	SILTY ORGANIC DETRITUS, black, fibrous, muddy, layered, leaves, nuts, wood fragments, abundant fresh water gastropods.
	9 - 14	SAND, quartz, medium gray to dark gray, banded/layered, fine grained, well sorted, sub angular to sub rounded with interbedded layers of organic detritus and abundant shell fragments in single layer (fresh water gastropods)
G	26	Gradational to microstratified SILTY SAND to SAND to ORGANIC SILT, light gray to black, banded/layered, with dark layers containing increased organic silt + fine grained sand while light layers contain clean quartz sand and shell fragments

(11)

1/30/15

ID	Length (inches)	Lithologic Description
I	22	Gradational to microstratified SILTY SAND to SAND to ORGANIC SILT, light gray to black, banded/layered, dark layers contain increased organic silt + fine grained sand, light layers contain increased clean quartz sand and shell fragments.
J	20 0 - 13	Gradational ORGANIC SILT, soft, poorly consolidated, black, with significant organic detritus,
	13 - 20	SANDY SILT, dark gray, micro-banded, fine grained to silty, quartz, with significant organic silt content.
N	27	Gradational to microstratified SILTY SAND to SAND to ORGANIC SILT, light gray to black, banded/layered, dark layers contain increased organic silt + fine grained sand, light layers contain increased clean quartz sand and shell fragments

ID	Length (inches)	Lithologic Description 1/30/15
C	21	Stratified
	Ø @ bottom	
	Ø – 9	ORGANIC SILT, soft, poorly consolidated, black, with ~~significant~~ minor organic detritus; one pea-sized woody clast, dark brown. ~~one sponge~~
	9.Ø – 9.5	One finger-sized spongy woody clast, medium reddish brown to orange brown,
	9.5 – 11.Ø	ORGANIC SILT ~~SAND with~~ black, with minor shell fragments, white.
	11.Ø – 18.Ø	SILTY SAND ~~to S~~ to SAND to ORGANIC SILT, light gray to black, banded/layered, dark layers contain increased organic silt & fine grained sand, light layers contain increased clean quartz sand and shell fragments.
	18.Ø – 21.Ø	ORGANIC RICH SILT soft, moderately consolidated, black, mottled, with minor band including SANDY SILT
R	18	STRATIFIED
	Ø – 9	ORGANIC SILT, soft, poorly consolidated, black, with occasional organic detritus, and thin (<Ø.25") layer of medium gray silt/clay with organic detritus @ 4"
	9 – 18	ORGANIC SILT to SILTY SAND to SAND, light gray to black, mottled to vaguely stratified, dark layers contain increased organic silt + fine grained silt, light layers contain increased clean fine quartz sand with trace shell fragments (white to gray).