SUWANNEE RIVER WATER MANAGEMENT DISTRICT

COASTAL SALINITY NETWORK DATA QUALITY ASSURANCE AND ANALYSIS

Prepared for

Suwannee River Water Management District
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Geosyntec consultants

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1. INTRODUCTION

Geosyntec Consultants, Inc. (Geosyntec) has prepared *this Coastal Salinity Network Data Quality Assurance and Analysis Report* (Report) on behalf of the Suwannee River Water Management District (SRWMD). The purpose of this Report is to summarize the review of existing specific conductance (conductivity) data sets from the coastal salinity network as shown on **Figure 1** and summarized in **Table 1**, evaluation of sampling and measurement techniques, and provide guidance regarding statistical analysis and modeling of the data.

2. DATA COLLECTION

The SRWMD deployed OTT-PLS-C transducers at 10 groundwater monitoring well locations in the big bend area as shown on **Figure 1** to evaluate continuous conductivity data. The data included in this evaluation was collected between April 2019 and December 2021. In addition, manual field measurements of groundwater conductivity and continuous groundwater elevation data were also collected. The groundwater well locations and summary of collected data is shown in **Table 1**. Graphs of the data are provided in **Figures 2** through **11**. Well construction data is provided in **Appendix A** and available geophysical borehole data are provided in **Appendix B**.

3. DATA EVALUATION

Initial review of the transducer conductivity data revealed that there were two trends present. The first trend showed conductivity values fluctuation in response to groundwater elevation changes derived from rainfall events and seasonality (**Figures 2 through 5**). At these groundwater monitoring locations, the transducers were placed within the well screen or open borehole. The second trend revealed that conductivity appeared to vary at some wells in a step function manner. In these wells conductivity values experienced sudden increases or declines primarily during sampling and calibration efforts (**Figures 6 through 9**). At these groundwater monitoring locations, the transducers were not placed within the well screen or open borehole due to water pressure limitations of the transducers. Lastly, continuous conductivity values were not available from two transducers, but water elevation and field measured conductivity were available as shown in **Figures 10 and 11**.

3.1 WELLS WITH TRANSDUCER POSITIONED IN WELL SCREEN/OPEN BOREHOLE

Five of the wells in the coastal salinity network were outfitted with transducers that were placed within the well screen or open borehole section (Cabbage Grove Tower, Hampton Tower, Salem Tower, Levy Co Comm Fowlers Bluff Ridge, and Jonesboro Tower.) The conductivity data reported for each of these wells (where available) are discussed below.

3.1.1 Cabbage Grove Tower

Transducer conductivity generally tracked with the measured groundwater elevation with a slight lag at this location. However, during certain periods from 2019 to 2021 conductivity and groundwater elevation are negatively correlated, showing opposite trends depending most likely on rainfall occurrence and seasonality. A coincidental lowering of conductivity as the groundwater level increases would be expected to occur if the only source of groundwater is recharge from rainfall (i.e., low conductivity water). If the source of groundwater was relatively more saline groundwater, the conductivity may be coincidental with the water elevation fluctuations. At Cabbage Grove Tower, the observed lag may be a result of the distance between the well and the source of water recharging the well or may be a result of vertical placement of the transducer in the well (i.e., placement relative to fracture transmitting groundwater flow to the well). **Appendix B** provides borehole geophysical data showing the current transducer location and a possible alternate location where there is a change in fluid resistivity and an increase in core porosity. If flow in the well is entering at a greater elevation and not passing directly over the transducer, there may be a lag time due to relatively slow diffusion processes.

3.1.2 Hampton Tower

While the transducer is within the screened interval of this well, the conductivity data does not appear to track well with the groundwater elevation data. This may either be due to the source of groundwater and/or the placement of the transducer within the well screen. Review of the geophysical log in **Appendix B** suggests that there may be an alternate elevation at which the transducer could be paced such that it may more accurately measure a major component of flow into the well screen interval.

3.1.3 Salem Tower

The transducer is within the screened interval of the well and the conductivity generally tracks well with the groundwater elevation. Review of the available geophysical log indicates that the transducer is positioned in a location close to the vertical location with the greatest fluid flow.

3.1.4 Levy Co Comm Fowlers Bluff Refuge

The transducer is located within the screened portion of this well and the conductivity typically tracks in the opposite direction of the water elevation. This is likely due to the shallow placement of the well screen and consequent direct recharge of fresh groundwater during rain events. A geophysical log is not available for this well. It should be noted that during the month of August 2021, the transducer malfunctioned and was subsequently replaced.

3.1.5 Jonesboro Tower

Jonesboro tower had a transducer installed within the screened portion of the well, but the transducer did not record conductivity data. A geophysical log is not available for this well location.

3.2 WELLS WITH TRANSDUCER POSITIONED IN THE WELL CASING

As described in the **Section 3.0**, four of the wells in the coastal salinity network were outfitted with transducers that were placed in the well casing due to transducer limitations (Foley Steinhatchee, GP6 UFA near Weeks, Rosewood Tower, and Lebanon Tower). The conductivity data reported for each of these wells are shown in **Figures 6 through 9**. The conductivity in these wells behave in a similar manner whereby the conductivity value tends to hold relatively steady for a period of time and then either suddenly increases or decreases followed by a period of consistent conductivity. This is likely attributed to the vertical placement of the transducer being within the well casing and the change in conductivity is attributable to either diffusion of solutes in the water column or due to a volume of water entering or leaving the casing due an increase or decrease in groundwater level. In this case, groundwater sampling at the well will also induce a rapid change in the water quality observed by the conductivity sensor located within the well casing.

Geophysical logs were available for the Foley Steinhatchee and Rosewood Tower wells. The Foley Steinhatchee geophysical well log was difficult to read and does not provide guidance for transducer placement. The available geophysical data for the Rosewood Tower well shows that the caliper log indicates fractures around 420 feet (ft) below ground surface (ft bgs), and resistance is low at this interval indicating higher conductivity water entering the boring.

The transducer at Three Spot Wayside Park did not record conductivity during the monitoring period. Additionally, there is no geophysical log available for this monitoring well location.

4. WELL CONDUCTIVITY PROFILES

4.1 DATA SUMMARY

Conductivity profiles with depth in each well were performed in December 2020 and March, June, September, and December 2021. The profiles are shown in **Appendix C.** A summary of trends noted within the profiles is provided in **Table 1**. Generally, conductivity decreased with depth at Cabbage Grove Tower and Foley. Conductivity generally increased with depth at Rosewood. No consistent trend over time was noted with depth at Salem, Weeks, Levy, Hampton, Lebanon, Jonesboro, and Three Spot. At Lebanon Tower the first depth interval typically had a lower conductivity than the remaining three measurements which had no discernable trend. As noted in **Table 1** and shown in **Appendix C**, the conductivity profile was partially or fully conducted above the well screen at Foley, Lebanon, Three Spot, Rosewood, and Weeks. The water in the solid casing is not representative of water flowing through the aquifer within the screened interval.

It should be noted that the maximum reported conductivity was 11,226 microsiemens per centimeter (µS/cm). This measurement was reported during the profiling of Salem Tower during June 2021 at the shallowest depth interval (11.2 ft bgs). The conductivity of sea water is the area is approximately 55,000 µS/cm. This suggests that the saltwater-fresh groundwater interface is not present within the well screens used in this study.

The above evaluation must; however, be caveated. The values of conductivity measured during the profiling were about an order of magnitude greater than those measured via the transducer, lab measurement, or field measurement. For example, the conductivity measured during profiling at Salem Tower in June 2021 was 9,638 µS/cm within the well screen while the transducer measured, lab reported, and field reported values were 210 µS/cm, 175.8 µS/cm, and 189 µS/cm, respectively. The profiling protocol was reviewed and does not appear to be the source of the difference between well profiling and well sampling reported conductivity values. The source of the discrepancy remains unclear.

4.2 METHODOLOGY AND DATA EVALUATION

Geosyntec understands that the original intent of establishing conductivity profiles in the coastal salinity network wells was to identify the depths at which the transition zone and the saltwater wedge are encountered in the Upper Floridan Aquifer (UFA) at each well location. However, the sampling strategy and methodology may not be adequate to meet the intended goal of locating and monitoring the saltwater-fresh groundwater interface including the transition zone and the saltwater wedge.

Studies performed in coastal areas of Florida show that given the hydrogeologic heterogeneity of the UFA, the position of the saltwater wedge can vary significantly both horizontally and vertically.

The fresh groundwater, transition zone, and saltwater wedge along the Gulf coast of Florida have been defined in terms of conductivity as the 0-2,000 µS/cm, 2,000-15,000 µS/cm, and 15,000-50,000 µS/cm value ranges in a number of studies (e.g., Mahon, 1990; Williams and Kuniansky, 2016).

Although limited research has been conducted in the area of interest to this respect, studies conducted along the Gulf coast of Florida suggest that, at a distance of 7 miles from the shore (average distance of all coastal salinity network wells), the transition zone and saltwater wedge are likely located close to 1,000 ft bgs (Mahon, 1990). Therefore, the saltwater-fresh groundwater interface in the UFA along the coastal salinity network area is most likely located significantly deeper than the existing monitoring wells.

In some coastal areas of northeast (Gulf coast) and northwest (Atlantic coast) Florida, the UFA has been reported to contain fresh to slightly brackish groundwater across the entire saturated thickness (e.g., Swarzenski et al., 2001; Barlow, 2003; Williams and Kuniansky, 2016). Furthermore, fresh to brackish diffuse submarine groundwater discharge and submarine springs from the UFA have been reported along the Gulf coast of northern Florida (Swarzenski et al., 2001; Grubbs and Candall, 2007; Dimova et al., 2011).

Conductivity values measured at Levy Co Comm Fowlers Bluff Refuge (screened 4-28 ft below the wells monitoring point [bmp]) and Rosewood Tower (screened 420-440 ft bmp), located relatively close, show a vertical difference of one order of magnitude. The highest conductivity values of approximately 6,000 µS/cm, measured at Rosewood Tower, is equivalent to an approximate salinity of only 3‰ (Wagner et al., 2006). Based on these values it is apparent that the transition zone between the fresh groundwater and saltwater starts approximately at 400 ft bgs in that area. However, the transition zone in this area can be up to 100 ft thick and saltwater might be encountered more than 500 ft bgs (Mahon, 1990).

Multiple studies conducted in coastal areas of Florida show that upconing of deep saltwater can be focalized in the immediate vicinity of production wells (e.g., Prinos et al., 2014). It is likely that along the coastal salinity network area similar processes occur temporarily in the vicinity of coastal municipality production wellfields. It is known that some coastal municipalities in the area have historically stopped withdrawals due to high conductivity issues, likely due to focalized saltwater upconing during dry periods.

Based on all the above, Geosyntec understands that the screen depths of the coastal salinity network wells are insufficient to monitor the saltwater wedge. Therefore, if the same monitoring network goal was to be implemented, deeper wells should be monitored or installed. If new wells were to be installed, Geosyntec would recommend multilevel packer testing during drilling efforts to sample isolated depth intervals and identify the saltwater wedge to guide well construction and open/screened section construction. If these wells are installed at a similar distance from the shore compared to the existing monitoring wells, Geosyntec would recommend planning well installations deeper than

500 ft bgs. In order to avoid deep drilling penetration and well installations, Geosyntec would also recommend placing the new wells closer to the Gulf, where the saltwater wedge would be located shallower.

Collecting depth profile readings within the same well, only screened in a single depth zone, would only be representative of the aquifer conditions within that screen interval. In order to generate conductivity depth profiles in the coastal salinity network, individual and isolated depth zones should be monitored. Therefore, the current depth profile readings may be discontinued, and the sampling conductivity values collected during purging should be used instead. If the same monitoring network goal was to be implemented, Geosyntec would recommend installing and monitoring clustered wells screened at different depth zones in the same locations to truly build depth profiles and capture the saltwater wedge. As mentioned above, these clustered wells should be placed closer to the Gulf to minimize the installation depths.

Geosyntec understands the magnitude of the investment potentially required to accomplish the above suggestions. Alternatively, SRWMD may slightly change the original goal of identifying the transition zone and the saltwater wedge in the UFA at each well location. If the main goal of these monitoring efforts is to ensure short-term and long-term water quality in the coastal areas of interest, the current monitoring network would satisfy the current needs. In this scenario, efforts should be focused on optimizing the network by placing transducers capable of measuring conductivity in all wells and placing all transducers within the most productive zone of the screen interval. Additionally, further efforts should be focused on avoiding the anomalous fluctuations in conductivity recorded in some of the wells during calibration and sampling efforts. Although the saltwater wedge would not be monitored or identified, temporal trends of conductivity can be used as a proxy of saltwater wedge advancement and hence, potential saltwater intrusion issues.

The conductivity time series collected at wells with transducer placed within the screen interval such as Levy Co Comm Fowlers Bluff Refuge and Cabbage Grove Tower show temporal variations typical of coastal aquifers. Groundwater elevation and conductivity are well correlated, showing the expected opposite trends depending primarily on rainfall occurrence and seasonality (Santos et al., 2009). These readings show that an optimized monitoring network can be used to 1) identify long-term conductivity increases and subsequent water quality degradation and 2) anticipate short-term and seasonal periods of lower water quality.

In order to further optimize the existing monitoring network, access to municipality production wellfield and wellfield monitoring data such as groundwater levels and conductivity could also be potentially useful. Coupling periods of wellfield production shut down with long-term conductivity measurements would 1) complement the SRWMD monitoring network and provide a more robust data set and 2) could help anticipate future wellfield production interruptions. Additionally, rainfall data collected from nearby stations should also be added to the dataset to elucidate how rain events and precipitation seasonality affects short-term and long-term groundwater elevation and conductivity trends.

5. STATISTICAL EVALUATION

A statistical evaluation of the laboratory, field, and transducer data was performed in instances where the transducer was placed within the well screen or open borehole. In instances where the transducer was not installed in the well screen/open borehole a statistical analysis of only the lab and field conductivity was performed. This evaluation is available in **Appendix D**. The evaluation showed good correlation between the laboratory and field results except at Salem and Hampton.

The agreement between transducer results with field and laboratory measurements of conductivity varied between the transducer locations. Good agreement was observed for measurements at Cabbage Grove. The transducer at Hampton was in good agreement with the laboratory and field measurements on average, although greater than ideal variability was noted. At Levy a slight positive bias beyond 5% was observed in the transducer data as compared to laboratory and field measurements. At Salem the transducer introduced a substantial (~20% on average) positive bias in conductivity measurements compared to the laboratory and field measurements. This bias at Salem could be related to substantially different locations for the transducer and pump inlet within the groundwater monitoring well or issues with the calibration of the transducer.

Finally, a trend analysis was performed with transducer data in cases where the transducer was placed within the well screen. This evaluation showed that the data was not well suited for clearly defining a trend due to the wide data variability. Additional data collection may help with trend analysis in the future.

6. EVALUATION OF FIELD SAMPLING AND DATA COLLECTION TECHNIQUES

Geosyntec evaluated the field sampling, measurement, and data retrieval techniques utilizing the Florida Department of Environmental Protection (FDEP) Standard Operating Procedures (SOPs) as the primary assessment guidance. This evaluation was conducted during a groundwater sampling event performed in the ten groundwater monitoring wells that comprise the coastal salinity network in Task Work Assignment 19/20-036.004 (**Figure 1**). Wood PLC (Wood) assists the SRWMD with groundwater sampling, measurement, and data retrieval efforts as a subcontractor. Geosyntec accompanied a Wood representative during the groundwater sampling event that occurred between 29 March and 30 March 2022.

During the groundwater sampling efforts evaluated, the applicable FDEP SOPs were implemented correctly with the exception of the groundwater purging procedure at one well and quality control blank collection.

6.1 Groundwater Purging Procedure

FDEP SOP FS2200 specifies in section FS2213 1.1.1 that during purging activities of monitoring wells the *Minimal Purge Volume* procedure can only be applied under the following conditions:

- The same pump is used for both purging and sampling,
- The well screen or borehole interval is less than or equal to 10 ft, and
- The well screen or borehole is fully submerged.

The ten monitoring wells that comprise the coastal salinity network have screen lengths that are greater than 10 ft, ranging from 20 to 50 ft (**Table 1**). Therefore, Geosyntec recommends that the *Conventional Purge* procedure is followed during subsequent sampling events at all wells to enhance data quality and ensure FDEP SOPs compliance.

Particularly, during sampling efforts at Lebanon Tower the water level was likely not stabilized at time of sampling and less than 1/4 of well volume was purged between measurements as specified in section FS2212 Section 2.3. Geosyntec recommends to either lower purge flow rate or wait for water level stabilization and ensure that at least 1/4 of the well volume is purged between measurements.

The dedicated pumps currently placed in all wells, except Foley Steinhatchee and Cabbage Grove Tower, can be left at their current depths and still adhere with FDEP SOPs. During sampling efforts at Foley Steinhatchee and Cabbage Grove Tower, the pump should be placed in the top one foot of the water column or no deeper than necessary to account for drawdown during purging (FS2213 Section 1.2). Similarly, when dedicated submersible pumps are installed at Foley Steinhatchee and Cabbage Grove Tower, the pumps should be placed at a depth that would ensure a stable water level during purging.

6.2 Quality Control Blanks Collection

FDEP SOP FQ1000 specifies in Sections FQ1212 and FQ1230 2.1.1 that field-cleaned equipment blanks collection is mandatory if any sampling equipment decontamination is performed in the field.

Foley Steinhatchee and Cabbage Grove Tower wells are sampled using a non-dedicated submersible pump that is decontaminated after sampling.

Geosyntec recommends that, in order to help ensure that samples are representative of the sampling source and have not been artificially contaminated during the sample collection process, a single field-cleaned equipment blank is collected after sampling Foley Steinhatchee and Cabbage Grove Tower wells.

As specified in FQ1212, the following instructions should be followed during the field-cleaned equipment blank collection:

- Collect this blank using the submersible pump that has been cleaned in the field. The cleaning procedures used for the blank collection must be identical to those used for the field sample collection.
- Prepare the field-cleaned equipment blank immediately after the submersible pump is cleaned in the field and before leaving the sampling site.
- Prepare the equipment blank by rinsing the submersible pump with analyte-free water and collect the rinse water in appropriate sample containers (see FQ 1100).

It is Geosyntec's understanding that dedicated submersible pumps will also be installed at Foley Steinhatchee and Cabbage Grove Tower wells in the near future. When dedicated pumps are used at all ten wells, field-cleaned equipment blank collection will no longer be necessary.

7. CONCLUSION AND RECCOMENDATIONS

Transducer measured groundwater elevation was measured at ten monitoring well locations in the Coastal Salinity Network. In eight of these locations, conductivity was also measured by transducers. Four of these locations had transducers installed within the well screen and four locations had transducers installed within the well casing. Transducers were installed within the well casing due to limitations associated with accuracy of water level readings.

In general, field measured conductivity were consistent with the transducer measured conductivity values. However, the transducer measured conductivity values in wells where the transducers were located in the well casing had a different signature from those deployed within the well screen. This signature was likely due to the transducer only being able to measure conductivity through diffusion of dissolved constituents in the well casing water column or sudden changes in the water column exchanges during groundwater level increase/decrease or well sampling. Other possible sources of the discrepancy could be conductivity sensor malfunction or a malfunction in the recording or relay of this data. This seems less likely as the transducers pass their calibration checks.

In general, field sampling, measurement, and data retrieval techniques during sampling efforts of the coastal salinity network were implemented correctly during monitoring data collection. However, monitoring procedures can be modified to improve data quality and comply with FDEP SOPs.

Geosyntec recommends the following:

- Application of the *Conventional Purge* procedure during sampling efforts of the ten monitoring wells of the coastal salinity network.
- Collection of a field-cleaned equipment blank after sampling Foley Steinhatchee and Cabbage Grove Tower wells. When dedicated pumps are used at all wells, field-cleaned equipment blanks collection will no longer be necessary.
- Place all existing transducers within the screen interval or open borehole portion of the well close to an area where geophysical logs suggest an open fracture with water entering or exiting the borehole. In situations where the pressure transducer component of the transducer must be deployed within the well casing to avoid over pressurization, it is recommended to deploy a second transducer within the screened/open portion of the well.
- Install transducers capable of measuring conductivity at Three Spot Wayside Park and Jonesboro Tower wells.
- Discontinue the current conductivity depth profile readings and use the sampling conductivity values collected during purging.

- Install clustered wells screened at different depth zones in the same locations to build depth profiles and capture the saltwater wedge. Install the new wells closer to the Gulf where the saltwater wedge would be located shallower in order to avoid deep drilling penetration and well installations.
- Alternatively, to the above recommendation, SRWMD may slightly change the original goal of identifying the transition zone and the saltwater wedge in the UFA at each well location. Focus efforts optimizing existing network by placing transducers capable of measuring conductivity in each well and place within the most productive zone of the screen interval, adding rainfall data from nearby stations, and incorporating groundwater level and conductivity data from municipality production wellfield for a more robust dataset. By optimizing the existing network SRWMD can potentially anticipate future wellfield production interruptions. This could be done by using statistical analyses to correlate production wellfield interruptions with precipitation, nearby river or stream elevation, groundwater elevations, and conductivity.
- Develop a protocol to address issues when there is discrepancy noted between transducer, lab, and/or field data.
- The trend analysis of conductivity at the four wells where the transducer was placed within the well screen was inconclusive. The transducer data was not well suited to Mann-Kendall analysis or fitting a linear regression due to frequent fluctuations to higher and lower conductivity. Geosyntec recommends a longer time series of conductivity data be collected and analyzed in the future. The exact length of time is not known and will be dictated by data evaluation. Based on current data, the use of Mann Kendall test and linear regression appears appropriate to evaluate the trends.

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TABLE

Table 1
Well Construction and Transducer Placement Summary Table
Coastal Salinity Network SRWMD

Well ID	Well Name	Latitude	Longitude	Measuring Point (ft NGVD29)	Transducer Depth (ft bmp)	Pump Depth (ft bmp)	Top of Screen (ft bmp)	Bottom of Screen (ft bmp)	Screen Length	Transducer in Well Screen/ Open Bore?	Pump in Well Screen/ Open Bore?	Lithology Monitored	Geophysics Notes	Conductivity Profile Notes
S030424003	Cabbage Grove Tower	30.094532	-83.571365	34.00	27	No Dedicated Pump in Place	9	41	32	Y	Unknown	Limestone	Gamma Log shows porosity increases and resistivity shows conductance is lowest at about 15' bgs. Possible change transducer to this elevation	Measurements within well casing. Slight decrease in conductivity with depth.
S050615002	Hampton Tower DOC	30.040958	-83.717447	28.42	36	Unknown	20	43	23	Y	Unknown- Pump reported to be 80' bgs, but well is only 40' bgs	Limestone	Not at a bad elevation. Setting it at 20 ft bgs may have connection to a more productive zone	First depth measurement is at the casing/screen interface. No consistent visual trend with depth.
S080907003	Salem Tower	29.794778	-83.466804	37.00	26	Unknown	12	44	32	Y	Unknown	Ocala LS/Dolomite	Transducer in right spot where density and fluid resistivity are greatest	Profile in well screen except 9/21 top measurement. No consistent visual trend with depth.
S090914003	Foley Steinhatchee	29.694639	-83.388167	26.03	20	No Dedicated Pump in Place	65	97	32	N	Unknown	Ocala Limestone /Dolomite starts at 55'bgs	Difficult to read	Top two measurements in casing. Third measurement at casing/screen interface. Fourth measurement in screen. Conductivity decreases with depth.
S091011004	Jonesboro Tower	29.708645	-83.294888	32.77	14	20	3	35	32	Y/No Transducer Data	Y	Ocala Limestone	No Geophysics	First depth measurement is at the casing/screen interface. No consistent visual trend with depth.
S121330002	GP6 UFA near Weeks Landing	29.413266	-83.043990	14.98	18	Unknown	22	43	21	N	Unknown	Ocala Limestone	No Geophysics	Top measurements is in casing. second measurement at casing/screen interface. Third and fourth measurement in screen. No consistent visual trend with depth.
S141305001	Levy Co Comm Fowlers Bluff Refuge	29.296556	-83.032472	9.48	19	23	4	28	24	Y	Y Approximate	Ocala Limestone	No Geophysics	Measurements within casing. No consistent visual trend with depth other than first depth measurement is either higher or lower than other depth measurements.
S141429001	Rosewood Tower	29.237583	-82.936028	19.45	25	25	424	444	20	N	N	Brown Limestone	Done for 300 to 441 ft bgs. Caliper log indicates fractures around 420 ft bgs, but fluid resistivity and temperature don't show anything remarkable at this depth, Reistance is low at this interval indicating higher conductivity water entering the boring.	Measurements within casing. Conductivity appears to increase slightly with depth.
S141620007	Three Spot Wayside Park	29.253503	-82.724401	12.76	-13	25	48	98	50	N/No Transducer Data	N	Limestone	No Geophysics	Top measurements is in casing. second measurement at casing/screen interface. Third and fourth measurement in screen. No consistent visual trend with depth.
S151719004	Lebanon Tower	29.160197	-82.630876	34.76	15	75	81	111	30	N	N	Brown Limestone	No Geophysics	All measurements within well casing. No consistent visual trend with depth.

Notes:
1. ft = feet
2. bmp = below measuring point
3. NGVD29 = National Geodetic Vertical Datum of 1929

FIGURES

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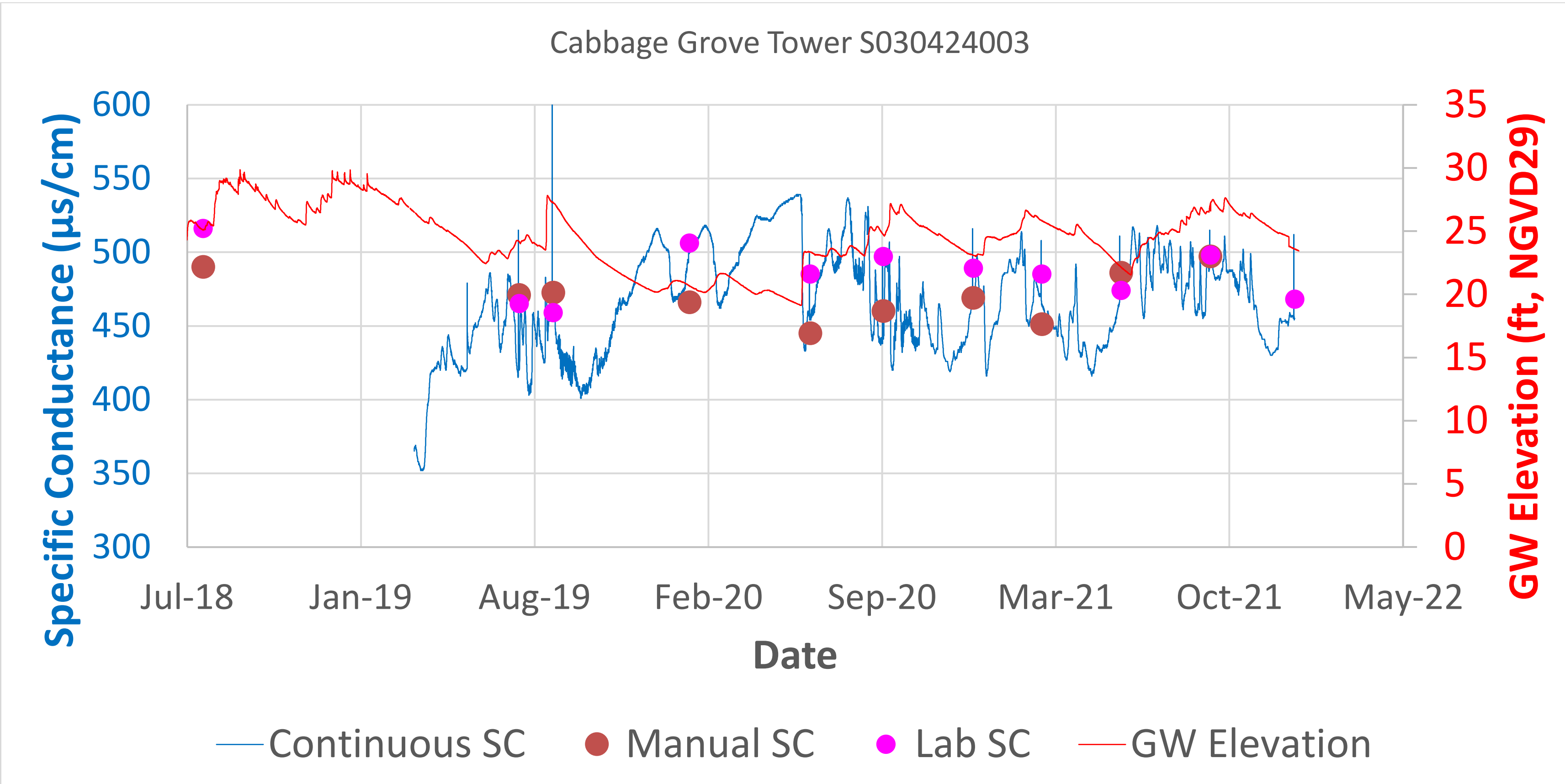

Specific Conductance and Water Elevation Cabbage Grove Tower		
Geosyntec consultants	SUWANNEE RIVER WATER MANAGEMENT DISTRICT	Figure **2**
Tampa, FL	25-Feb-2022	

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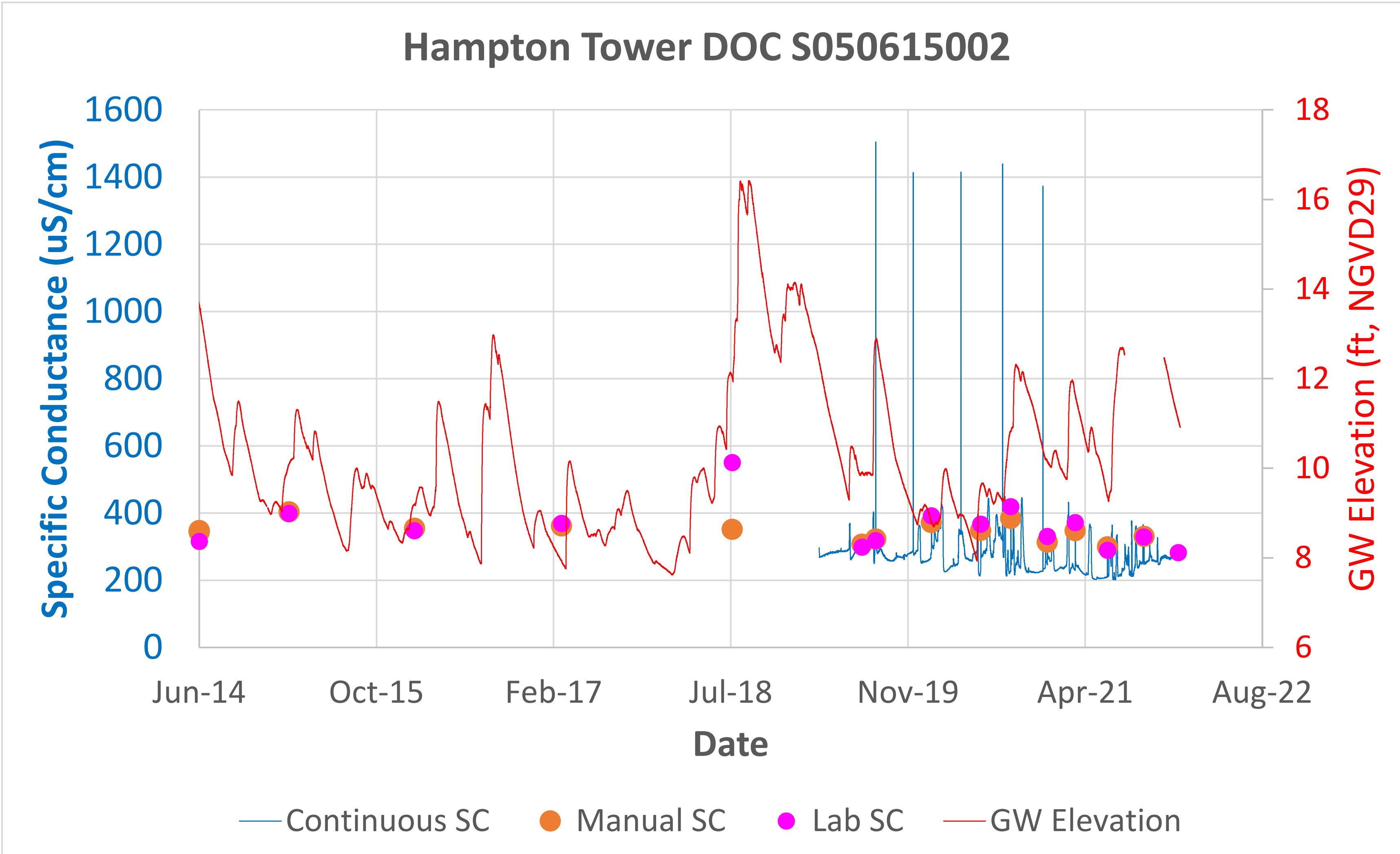

Specific Conductance and Water Elevation
Hampton Tower

Geosyntec consultants	Suwannee River Water Management District	Figure **3**
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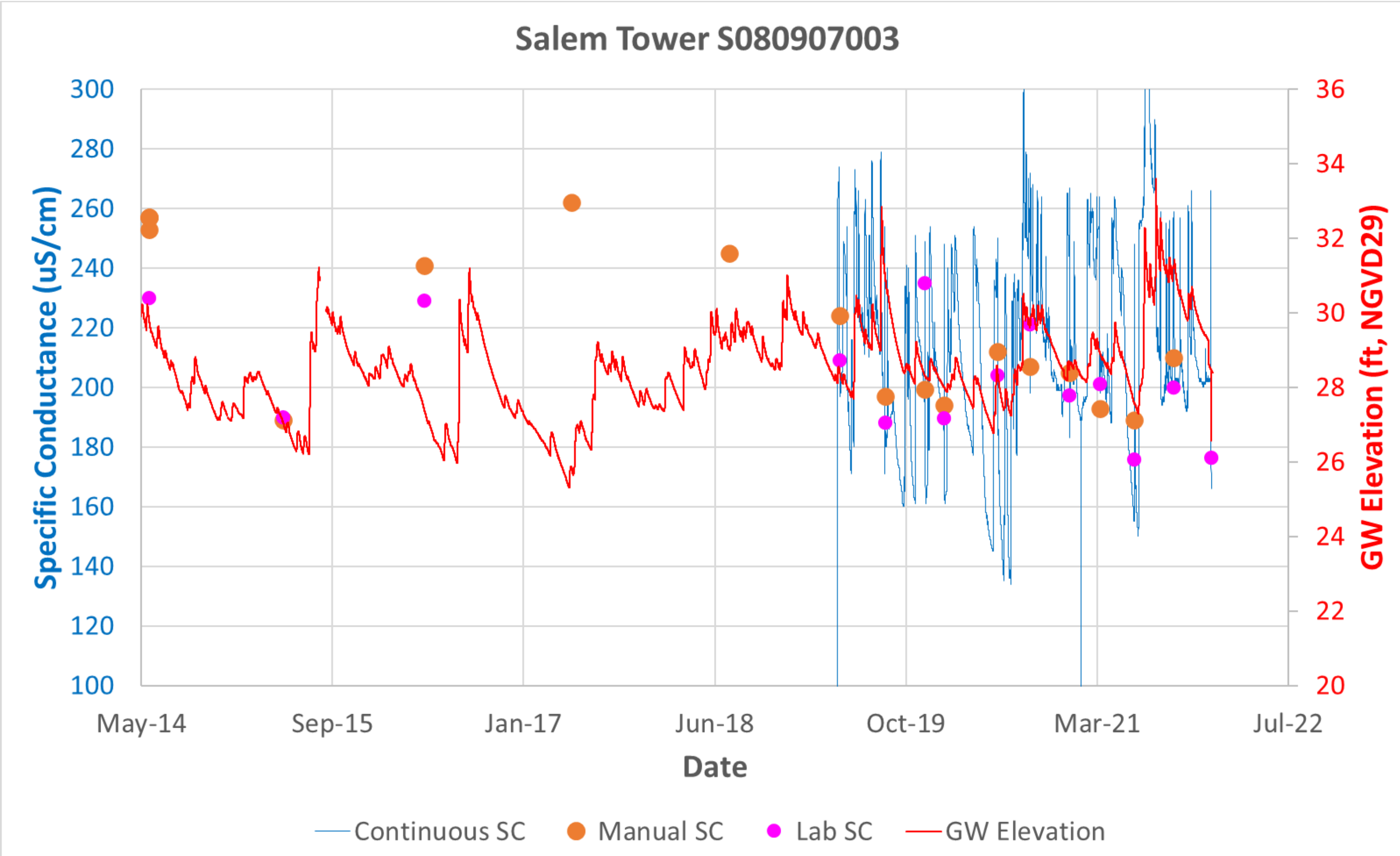
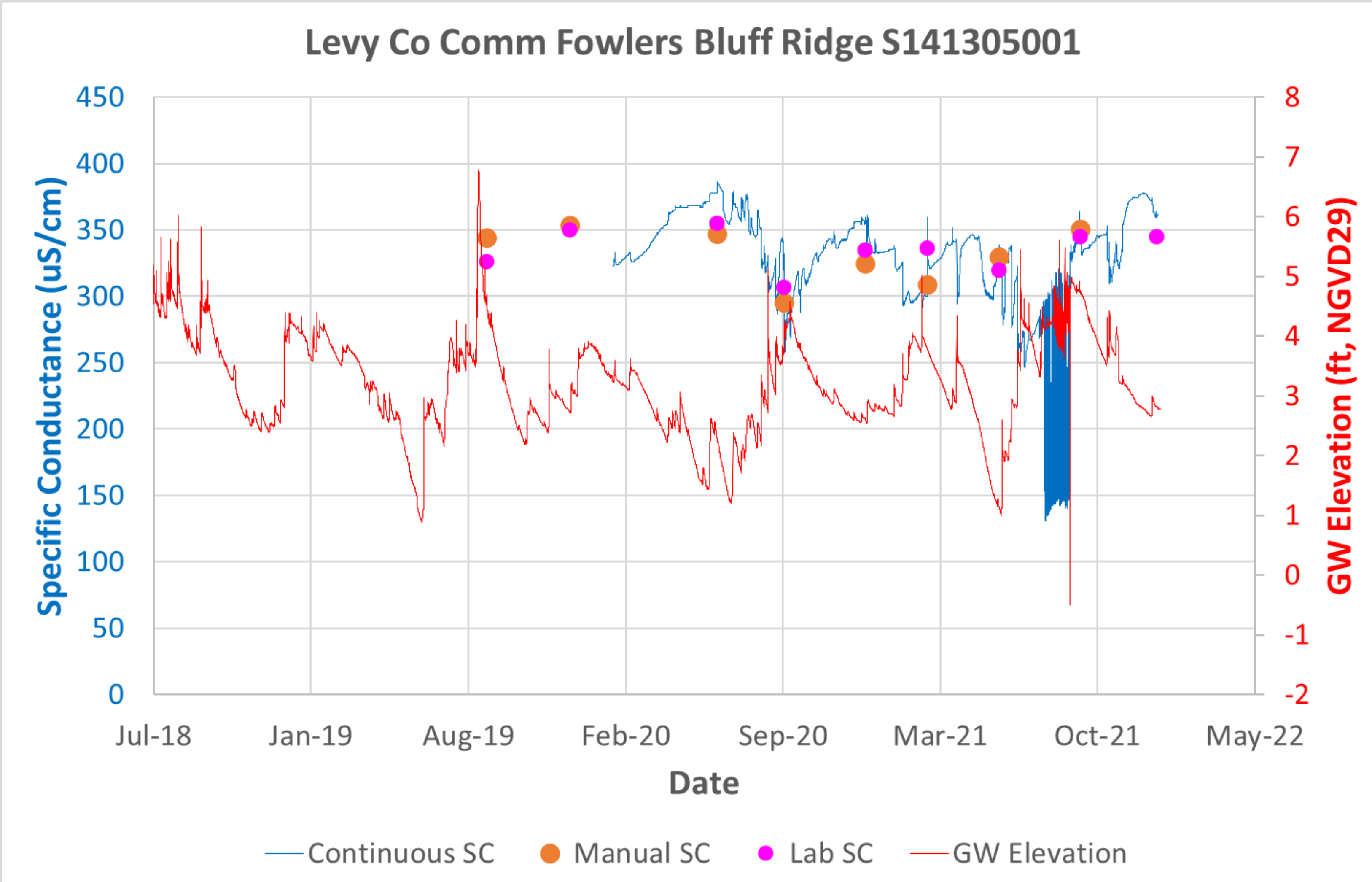


Specific Conductance and Water Elevation Salem Tower

Geosyntec consultants		Figure 4A
Tampa, FL	25-Feb-2022	



Specific Conductance and Water Elevation
Levy Co Comm fowlers Bluff Ridge

Geosyntec consultants

Figure **5**

Tampa, FL

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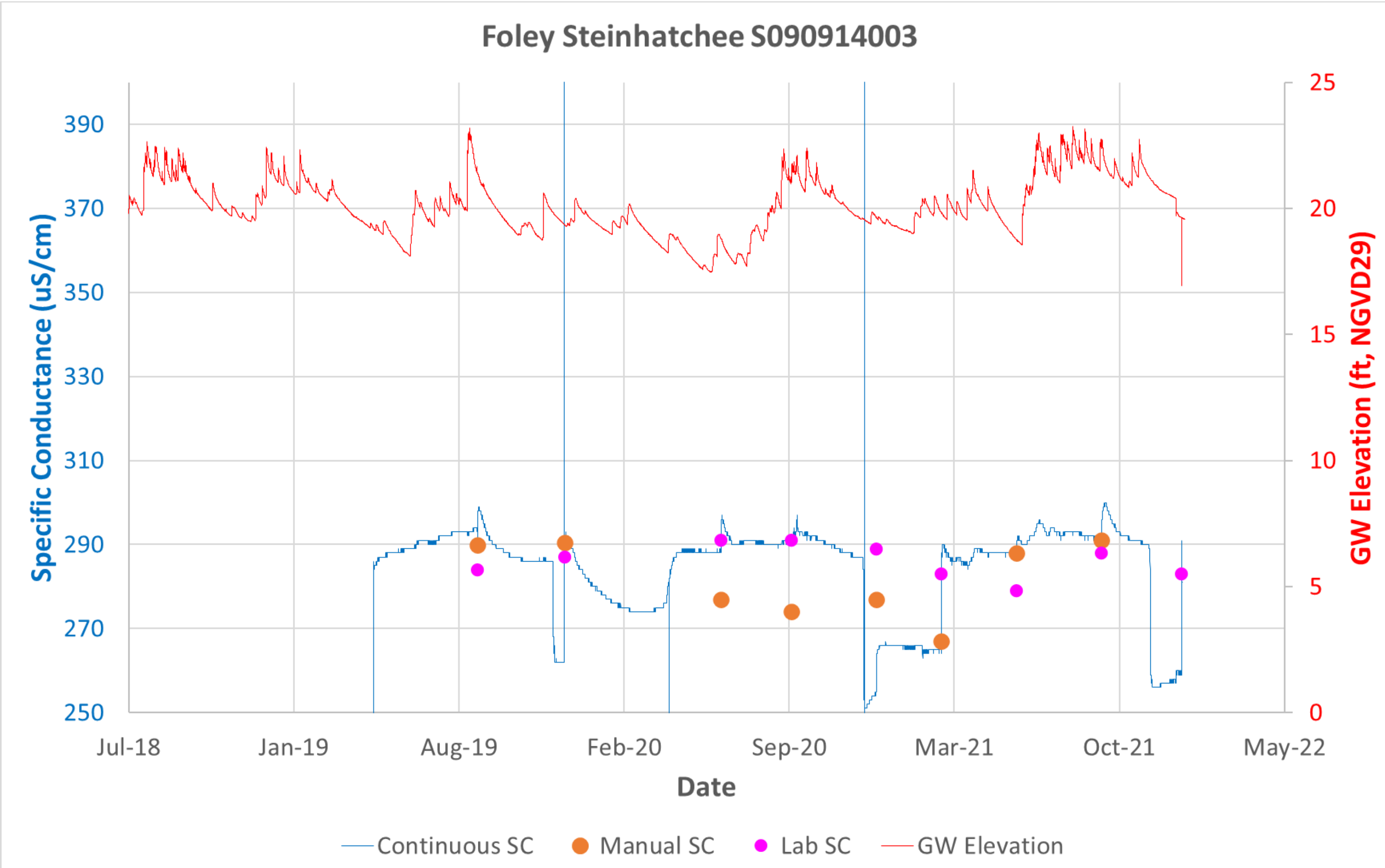
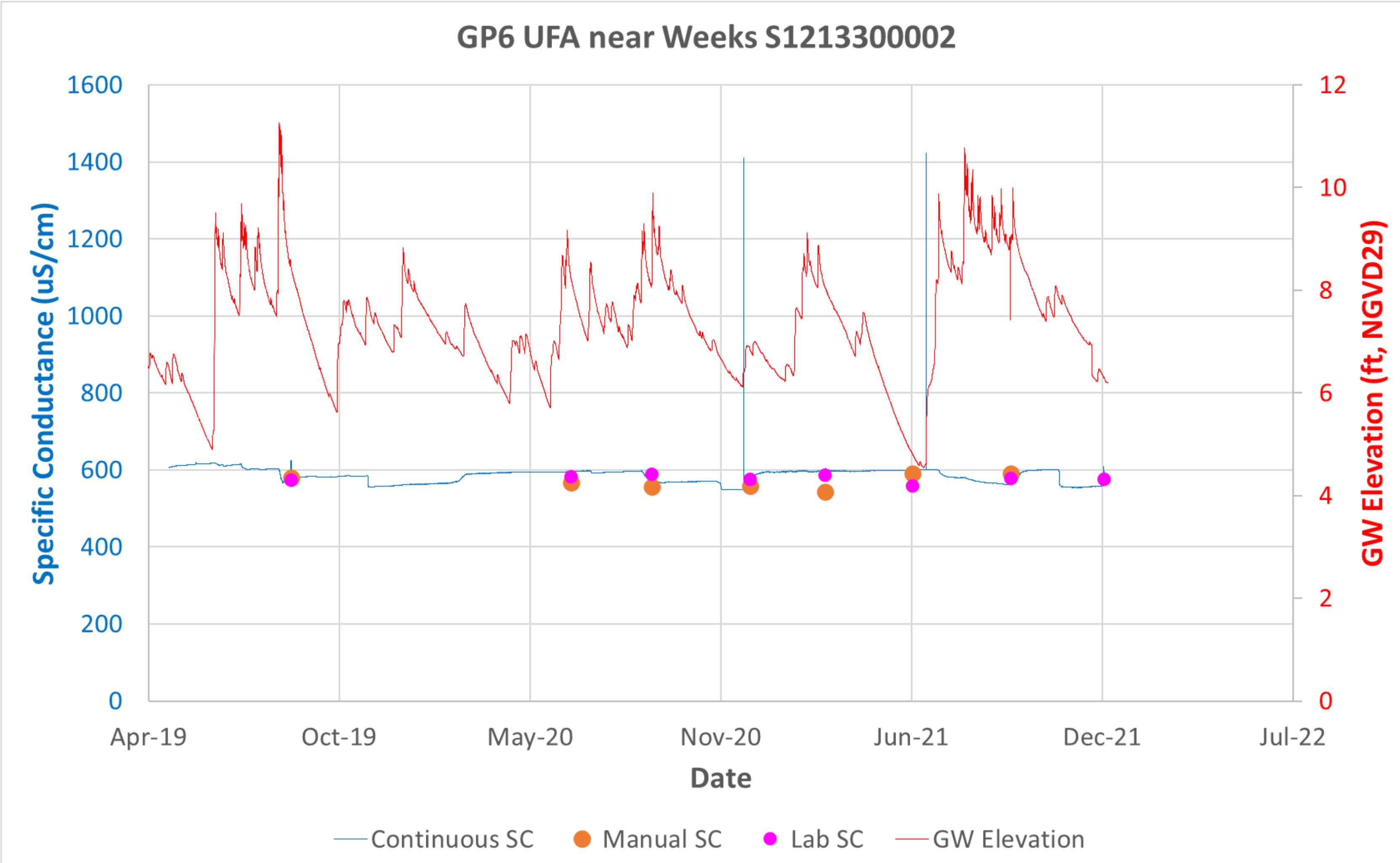


Specific Conductance and Water Elevation
Foley Steinhatchee

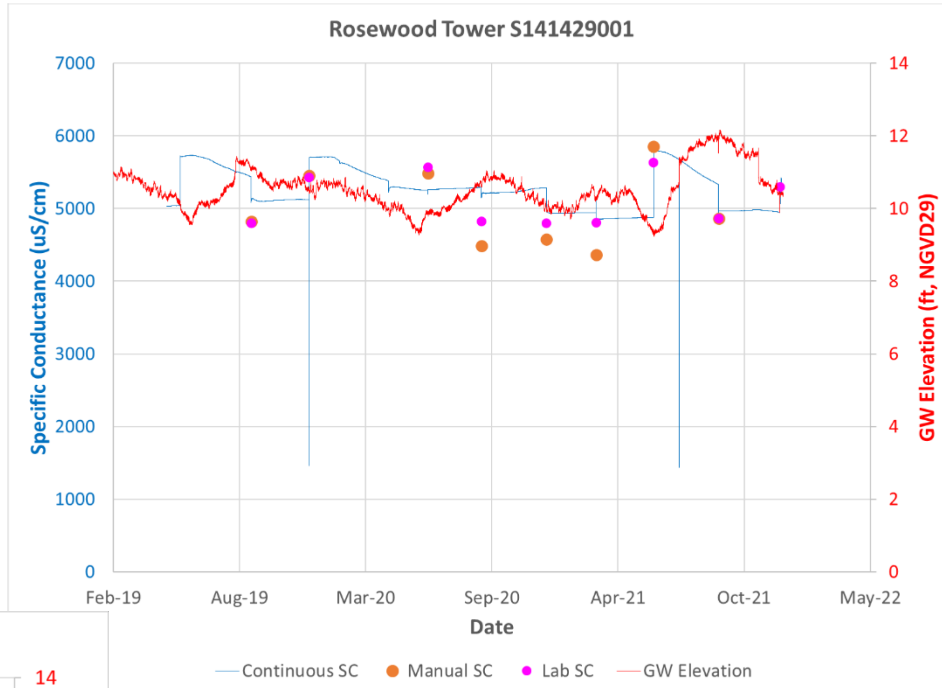
Geosyntec consultants	Suwannee River Water Management District	Figure **6**
Tampa, FL	25-Feb-2022	

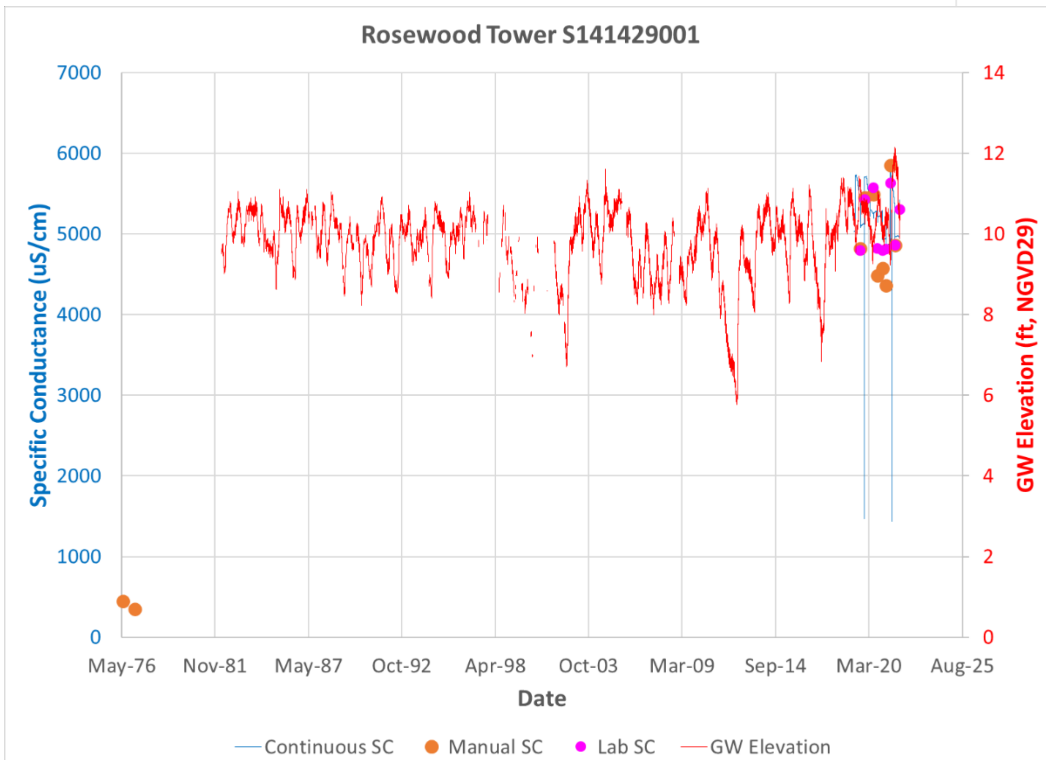


Specific Conductance and Water Elevation
GP6 UFA Near Weeks

Geosyntec consultants		Figure **7**
Tampa, FL	25-Feb-2022	

internal info: path, date revised, author





Specific Conductance and Water Elevation
Rosewood Tower

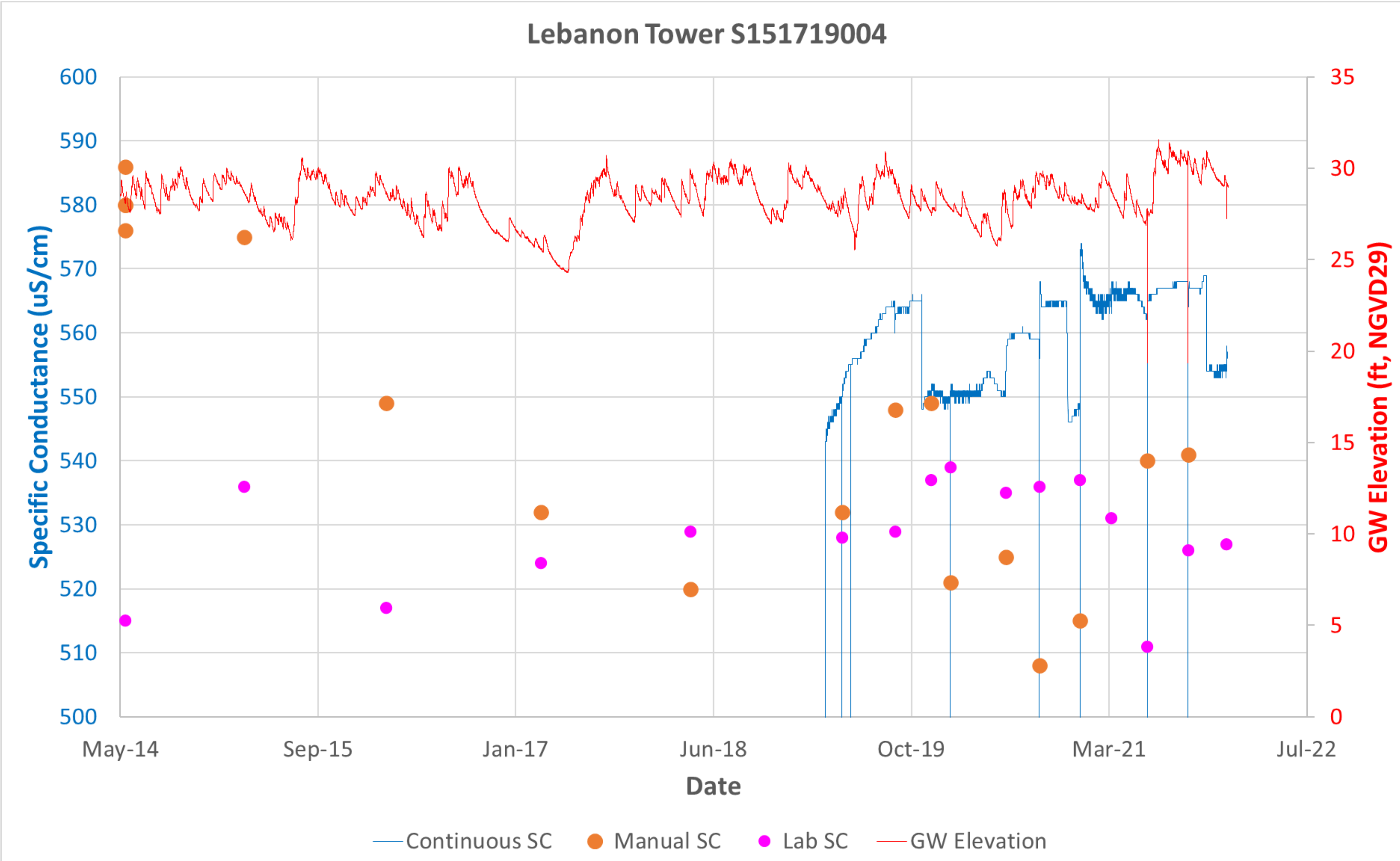
Geosyntec consultants

Figure **8**

Tampa, FL

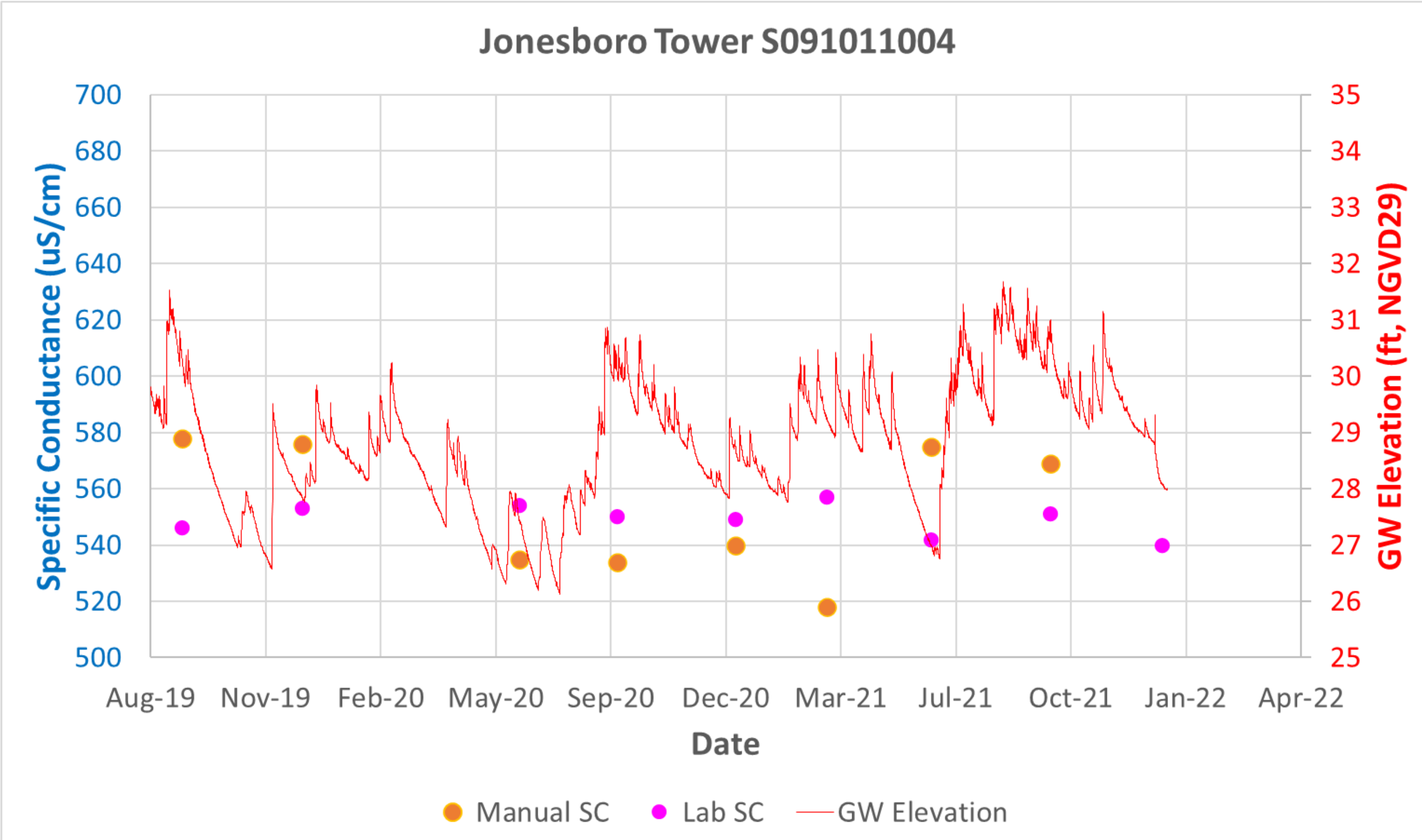
25-Feb-2022

internal info: path, date revised, author



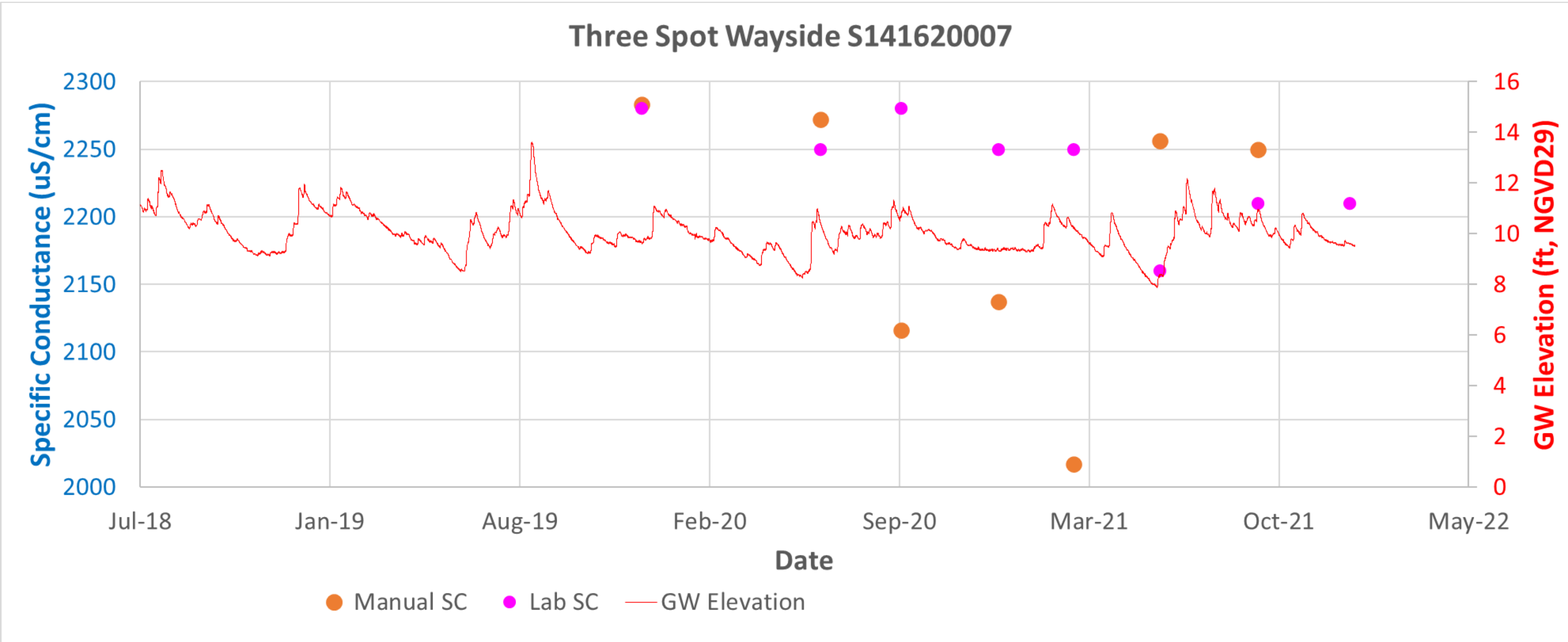
Specific Conductance and Water Elevation
Lebanon Tower

Geosyntec consultants	Suwannee River Water Management District	Figure **9**
Tampa, FL	25-Feb-2022	



Specific Conductance and Water Elevation
Jonesboro Tower

Geosyntec consultants	Suwannee River Water Management District	Figure **10**
Tampa, FL	25-Feb-2022	



Specific Conductance and Water Elevation
Three Spot Wayside Park

Geosyntec consultants		Figure **11**
Tampa, FL	25-Feb-2022	

APPENDIX A
Well Installation Records

-030424068 mlc

WELL INSPECTION/TECHNICAL DATA FORM

a.c.j. 2-6-86

SUWANNEE RIVER WATER MANAGEMENT DISTRICT
Route 3 Box 64
Live Oak, FL 32060
(904) 362-6909

SRWMD Permit No. 22068

Reason for Inspection: Location

S/D: —

Project Status: ~~In~~complete

Date of Inspection: 8-12-85

Referral: —

Blk/Lot No.: —

Equipment: Rotary

Time: 8:30 AM

Inspector: T. Newman

Qtr: DB

County: Taylor

Well Use: Monitor

Visit No.: 1

Contractor: M.P. Brown

Sec: 24

Twp: 3S

Rge: 4E

Licensing: —

Owner: D.O.F.

Pump Type: ~~Submersible~~

Construction: —

Well Size: 4"

Violations: —

Action or Personal Contact: —

Recommendation: Monitor Well D.O.F. Cabbage Grove Tower

Comments: —

Disposition: —

Transaction: (A) D M

SRWMD Site ID#: -030424003

Latitude: 30°12'40"

Longitude: 83°52'35"

Topo Map#: 76-A

FL. ST. Plane X Coord.:

Y Coord.:

Land Surface Datum Elevation (NGVD): 33 ft.

Measuring Point ID: TOC

Measuring Point Elevation (NGVD): 34'

Site Type: W

Hydrogeologic Unit: FLA

Ground-Water Condition: NON ART

Top of Producing Zone: 23' MSL

Water Level Possible? Yes

Water Sample Possible? Yes

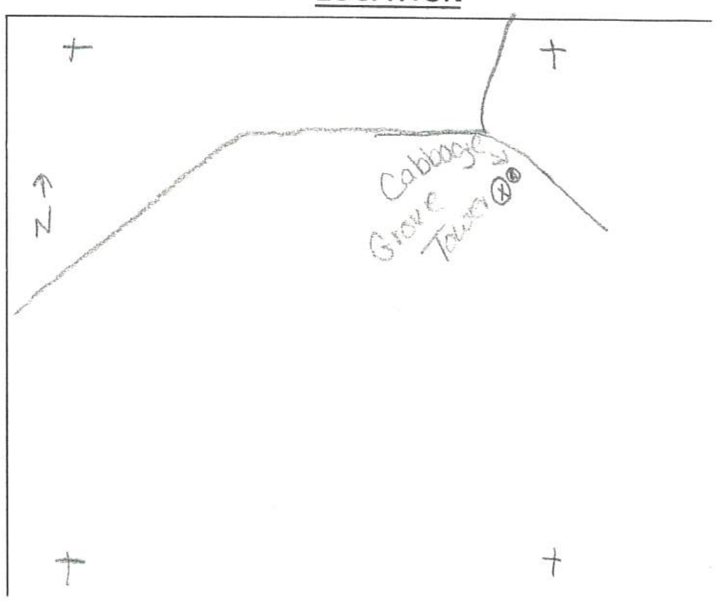
USGS ID#:

Bureau of Geology#:

Well Located by (initials): TBN

SRWMD Permit#: 22068

LOCATION



SUWANNEE RIVER
WATER MANAGEMENT DISTRICT
WELL COMPLETION REPORT

PERMIT # 22068

CABBAGE GROUP TOWER — PERRY — FLA
Owner — Address — City — State — Zip

Dennis Hatt — 1974 — 11-11-85 — 40 — 40
Contractor Signature — License # — Completion Date — Casing Depth — Total Depth

Type of work: Construct ✓ Repair ____ Abandon ____
Well Use: Private ____ Public ____ Monitor ✓ Irrigation ____
Industrial ✓ Other ____
Method: Rotary ✓ Cable Tool ____ Jet ____ Combination ____
Other ____
Casing: Black Steel ____ Galvanized ____ PVC ✓ Other ____
Bags of Grout 5 Interval Grouted 0 Ft. to 8 Ft.
Static Water Level 4' Ft. below Top of Casing
Pumping Water Level ____ Ft. after ____ Hrs. at ____ GPM
Pump Size ____ H.P. Capacity ____ GPM

N

LOCATION
Located Near PERRY
County TAYLOR
24 3S 5E
1/4 1/4 Section Township Range
Subdivision ____ Lot # ____
Latitude - Longitude ____

Locate in Section

RECEIVED NOV 20 1985

Grout	Casing		Depth (ft.)		Examine cuttings at 20 ft. or smaller intervals and at changes. Give color, grain-size and type of material. Note any cavities. Indicate producing zones. Attach additional sheets if necessary.
Thickness & Depth	Diam.	Depth	From	To	
5" 8'	3"	40'	0	1'	BRN SL SI FI SA
					W/ GRASS + RTS
			1	10	TAN-BRN SL SI FI SA
			10	12	SOFT WHT LS
			12	39	Hd BRN LS
			39	40	SOFT WHT LS

Dennis Hatt — 10072
Driller's Signature — Registration #

-050615002 mle

WELL INSPECTION/TECHNICAL DATA FORM

acj 2-6-86

SUWANNEE RIVER WATER MANAGEMENT DISTRICT
Route 3 Box 64
Live Oak, FL 32060
(904) 362-6909

SRWMD Permit No. 22065 | Reason for Inspection Location | S/D — | Project Status Incomplete

Date of Inspection 8-12-85 | Referral — | Blk/Lot No. — | Equipment Rotary

Time 10:00 AM | Inspector T. Newman | Qtr DC | County Taylor | Well Use Monitor

Visit No. 1 | Contractor American | Sec 15 | Twp 5S | Rge 6E | Licensing —

Well Size 3" | Owner D.O.F. | Pump Type None | Construction —

Violations: —

Action or Personal Contact: —

Recommendation: —

Comments: QW Monitor Well ; Hampton Springs Tower

Disposition: —

Transaction: A D M

SRWMD Site ID# -050615002 | Latitude 30°02'26" | Longitude 83°43'03" | Topo Map# 77-C

FL. ST. Plane X Coord. ______ Y Coord. ______ | Land Surface Datum Elevation (NGVD) 25 ft. | Measuring Point ID TC

Measuring Point Elevation (NGVD) 27' | Site Type W

Hydrogeologic Unit FLA | Ground-Water Condition NON ART

Top of Producing Zone 8' MSL

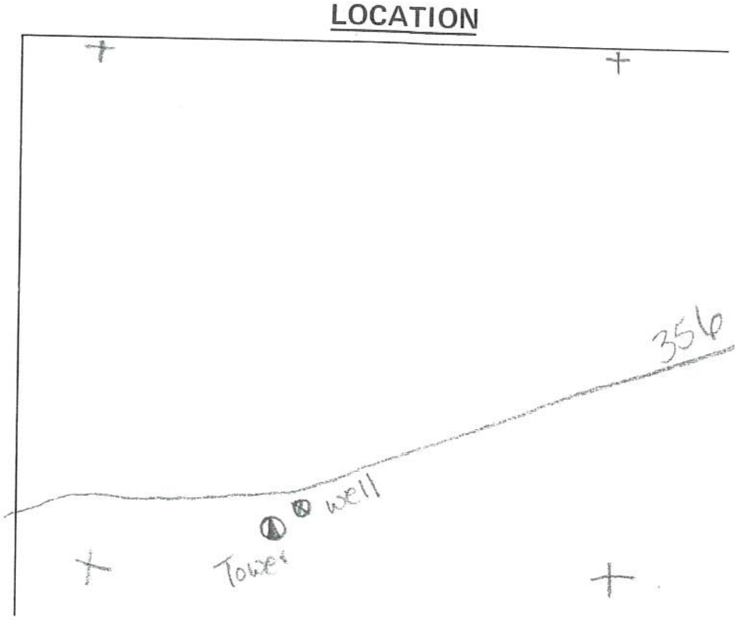
Water Level Possible? Yes

Water Sample Possible? Yes

USGS ID# ______ | Bureau of Geology# ______

Well Located by (initials) TBN | SRWMD Permit# 22065

LOCATION



WATER MANAGEMENT DISTRICT
WELL COMPLETION REPORT

PERMIT # 22065

HAMPTON SPRINGS TOWER			PERRY	FLA	
Owner		Address	City	State	Zip
Dennis Hattel	1974	11-8-85	38'	38'	
Contractor Signature	License #	Completion Date	Casing Depth	Total Depth	

Type of work: Construct ✓ Repair ___ Abandon ___
Well Use: Private ___ Public ___ Monitor ✓ Irrigation ___
Industrial ___ Other ___
Method: Rotary ✓ Cable Tool ___ Jet ___ Combination ___
Other ___
Casing: Black Steel ___ Galvanized ___ PVC ✓ Other ___
Bags of Grout 12 Interval Grouted 0 Ft. to 17 Ft.
Static Water Level 14 Ft. below Top of Casing
Pumping Water Level ___ Ft. after ___ Hrs. at ___ GPM
Pump Size ___ H.P. Capacity ___ GPM

N

LOCATION
Located Near PERRY
County TAYLOR
15 ~~24~~ 3S 6E
1/4 1/4 Section Township Range
Subdivision Lot #
Latitude - Longitude
Locate in Section

Grout Thickness & Depth	Casing Diam.	Casing Depth	Depth (ft.) From	Depth (ft.) To	Examine cuttings at 20 ft. or smaller intervals and at changes. Give color, grain-size and type of material. Note any cavities. Indicate producing zones. Attach additional sheets if necessary.
5 17	3"	38	0	15	TAN SL SI FI SA
			15'	17	DRK BRN-BLK SI FI SA
					W/ ORGANICS
			17	23	SFT WHT LS
			23	38	HD TAN LS
			38	40	SFT CL LS

Dennis Hattel 1007
Driller's Signature Registration #

080907003 MSL

SUWANNEE RIVER WATER MANAGEMENT DISTRICT

WELL INSPECTION/TECHNICAL DATA FORM

ACJ 2-6-86

SUWANNEE RIVER WATER MANAGEMENT DISTRICT
Route 3 Box 64
Live Oak, FL 32060
(904) 362-6909

SRWMD Permit No. 22067 Reason for Inspection Location S/D — Project Status Complete

Date of Inspection 8-12-85 Referral — Blk/Lot No. — Equipment Rotary

Time 1:00 PM Inspector T. Newman Qtr DC County Taylor Well Use Monitor

Visit No. 1 Contractor [illegible] Sec 17 Twp 8S Rge 9E Licensing —

Well Size 3" Owner D.O.F. Pump Type None Construction —

Violations: —

Action or Personal Contact: —

Recommendation: —

Comments: GW Monitor Well at Salem Tower

Disposition: —

Transaction: (A) D M

SRWMD Site ID# -080907003 Latitude 29°47'42" Longitude 83°27'59 Topo Map# 95-C

FL. ST. Plane X Coord. ______ Y Coord. ______ Land Surface Datum Elevation (NGVD) 35 ft. Measuring Point ID TOC

Measuring Point Elevation (NGVD) 37 Site Type W

Hydrogeologic Unit FLA Ground-Water Condition NON ART

Top of Producing Zone 30 MSL

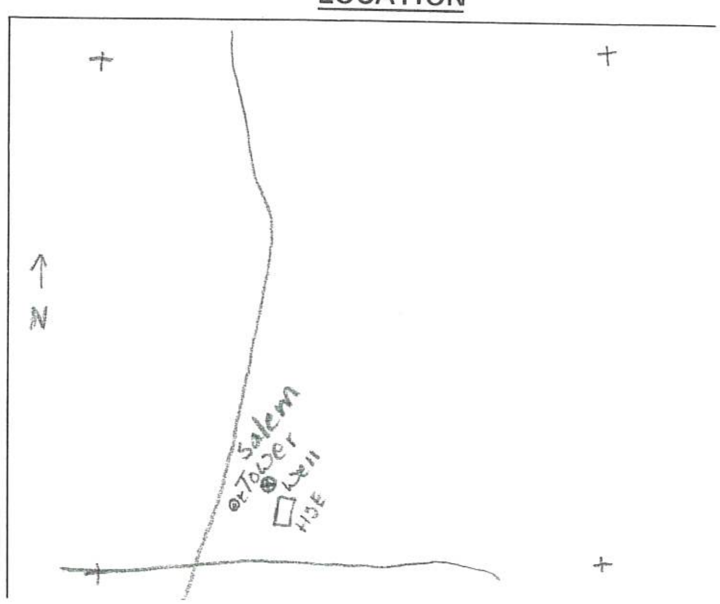
Water Level Possible? Yes

Water Sample Possible? Yes

USGS ID# ______ Bureau of Geology# ______

Well Located by (initials) TBN SRWMD Permit# 22067

LOCATION



WATER MANAGEMENT DISTRICT
WELL COMPLETION REPORT

PERMIT # 22067

SALEM TOWER — PERRY — FLA

Owner — Address — City — State — Zip

Dennis Hattel — 1974 — 11-6-85 — 38 — 38

Contractor Signature — License # — Completion Date — Casing Depth — Total Depth

Type of work: Construct ✓ Repair ___ Abandon ___

Well Use: Private ___ Public ___ Monitor ✓ Irrigation ___
Industrial ___ Other ___

Method: Rotary ✓ Cable Tool ___ Jet ___ Combination ___
Other ___

Casing: Black Steel ___ Galvanized ___ PVC ✓ Other ___

Bags of Grout 12 Interval Grouted 0 Ft. to 10' Ft.

Static Water Level 6 Ft. below Top of Casing

Pumping Water Level ___ Ft. after ___ Hrs. at ___ GPM

Pump Size ___ H.P. Capacity ___ GPM

N

LOCATION

Located Near PERRY

County TAYLOR

7 8S 9E

1/4 1/4 Section Township Range

Subdivision Lot #

Latitude - Longitude

Locate in Section

Grout: Thickness & Depth	Casing: Diam.	Casing: Depth	Depth (ft.): From	Depth (ft.): To	Examine cuttings at 20 ft. or smaller intervals and at changes. Give color, grain-size and type of material. Note any cavities. Indicate producing zones. Attach additional sheets if necessary.
5" 7'	8"	38	0	12	TAN FI SA
			12	34	OCALA LS
			34	39	Hd DOLOMITR
			39	42	DOLOMITR

RECEIVED NOV 20 1985 MLC

Dennis Hattel — 10072

Driller's Signature — Registration #

DEP MONITORING WELL INVENTORY (MWI) DATA INPUT FORM

CO	F123
SITEID	-090914003
LAT	~~294140.7~~ 294112.7 OK
LON	~~832317.4~~ 832133.3
OWNER	FOLEY TIMBER & LAND CO.
ADDRES	RT 3 BOX 258
CITY	PERRY
STATE	FL
ZIP	32347
PHONE	(850) 838-2213
USGSID	
COMP	10/26/98
BASINGS	03110102
AMCODE	A
STATUS	K
WTYPE	MW
WATUSE	
CONTYP	N
FAUC	
TOTDEP	97
CASDEP	65
FINISH	X
SCRTYP	
SCRDIA	
CASTYP	L
CASDIA	4.00
LSD	26
MPELEV	26.03
AQCODE	FU
SUBCOD	124OCAL
AQTOP	-1
AQBOT	
GEOLOG	Y
DRILOG	Y
HYDATA	C
CASMSL	-39
TDMSL	-71
MAXWL	20.00
MINWL	10.00
FNLADR	
COMMENT1	MW #1 CROSSROADS
SRDRIL	Y
COST	1000

SAMPER	Y
SAMPBY	X
PUMP	N
GWLREC	Y
FSPX	
FSPY	
TOPROCK	-1
ROKPIC	L
DPERMIT	65704
MPID	C
ACC	A
GWCOND	A
LOGGER	Z
LOGSRUN	CGV
WPERMIT	
PMDR	
LITHOLOG	Y
WELL#	17796
CORE	
PERM	
SIEVE	
PURGE	
MLUSE	
DATENTR	4/12/99
LOCQA	
LOC_ACC	GPS4
DERID	
MWI	Y

OK

delete if in there

SUWANNEE RIVER WATER MANAGEMENT DISTRICT
9225 CR 49
Live Oak FL 32060
(904) 362-1001

WELL INSPECTION/TECHNICAL DATA FORM

Well Permit No. 65704 Reason for Inspection DRILL WELL S/D ______ BLK/Lot No. ______

Date of Inspection 10/26 Project Status ______ Drilling Equipment COMB

Time ______ Inspector CERVAK Qtr ______ County TAYLOR Well Use MONIT

Contractor CANNON Twp 9S Rge 9E Sec 14 Site ID # -090914003

Well Size 4" Owner FOLEY TIMBER Pump Type NONE Construction BLACK IRON

Visit No. 1 Man Hours ______ Mileage ______

Water Use No. ______

Comments MW #1 (CROSSROADS)
CASING 65' TD 100'

Loran ______ GPS 4 Latitude 29 41 40.7 Longitude 83 23 17.4 Topo Map # 110-A

Land Surface Datum Elevation (NGVD) 26.03 Measuring Point ID TOC

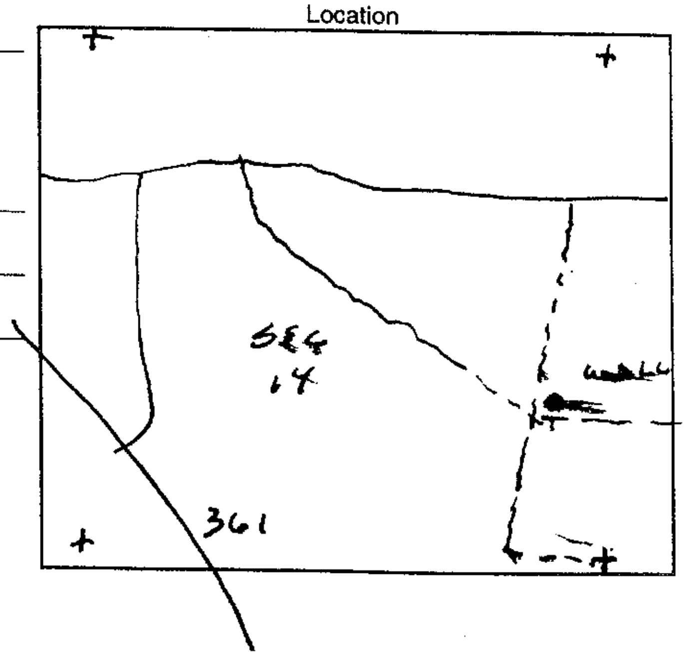
Measuring Point Elevation ______

Sample Taken Before Tank? Yes ______ No ______

First sample taken when pump starts up ______

Second sample taken after pump has run five minutes ______

Location



\# 1 CROSS ROADS

LITHOLOGIC WELL LOG PRINTOUT

SOURCE - FGS

WELL NUMBER: W-17796
TOTAL DEPTH: 100 FT.
7 SAMPLES FROM 20 TO 100 FT.

COUNTY - TAYLOR
LOCATION: T.09S R.09E S.14 BD
LAT = 29D 41M 41S
LON = 83D 23M 17S

COMPLETION DATE: 10/ /98
OTHER TYPES OF LOGS AVAILABLE - NONE

ELEVATION: 26 FT

OWNER/DRILLER:FOLEY TIMBER/ CANNON (CONTRACTOR); SRWMD SITE ID#-090914003
WELL NAME: STEINHATCHEE #1

WORKED BY:M. PONCHAK 12/14/98; SAMPLE INTERVAL IS INCONSISTENT. SAMPLES ARE LABELLED WITH A SINGLE FOOTAGE ONLY, ASSUMED TO BE T.D. OF THAT SAMPLE (ie. 20' IS 0-20').

0.0 - 55.0	090UDSC	UNDIFFERENTIATED SAND AND CLAY
55.0 - 100.0	124OCAL	OCALA GROUP

0 - 20 SAND; PINKISH GRAY
25% POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO VERY COARSE
ROUNDNESS: SUB-ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: LIMESTONE-20%
OTHER FEATURES: CHALKY
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, BENTHIC FORAMINIFERA
BRYOZOA
NUMMULITES VANDERSTOKI AND LEPIDOCYCLINA OCALANA PRESENT.
POSSIBLY RE-WORKED OCALA LIMESTONE.

20 - 40 SAND; PINKISH GRAY
25% POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO VERY COARSE
ROUNDNESS: SUB-ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: LIMESTONE-20%
OTHER FEATURES: CHALKY
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, BENTHIC FORAMINIFERA
BRYOZOA
N. VANDERSTOKI AND L. OCALANA PRESENT.(RE-WORKED OCALA)

40 - 55 SAND; PINKISH GRAY
25% POROSITY: INTERGRANULAR
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO VERY COARSE
ROUNDNESS: SUB-ANGULAR TO SUB-ROUNDED; MEDIUM SPHERICITY
UNCONSOLIDATED
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: LIMESTONE-30%, PYRITE- T%
OTHER FEATURES: CHALKY
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, BENTHIC FORAMINIFERA
BRYOZOA
N. VANDERSTOKI AND L. OCALANA PRESENT.(RE-WORKED OCALA)

55 - 70 PACKSTONE; PINKISH GRAY TO LIGHT BROWNISH GRAY
20% POROSITY: INTERGRANULAR, MOLDIC, VUGULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
75% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRANULE; RANGE: MICROCRYSTALLINE TO GRAVEL
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: IRON STAIN- T%
OTHER FEATURES: DOLOMITIC, SUCROSIC
HIGH RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS, ECHINOID, BENTHIC FORAMINIFERA
BRYOZOA, SPICULES

70 - 80 PACKSTONE; PINKISH GRAY TO LIGHT BROWNISH GRAY
20% POROSITY: INTERGRANULAR, MOLDIC, VUGULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
85% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: GRANULE; RANGE: MICROCRYSTALLINE TO GRAVEL
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
OTHER FEATURES: DOLOMITIC, SUCROSIC
MEDIUM RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS, ECHINOID, BENTHIC FORAMINIFERA
BRYOZOA, SPICULES

80 - 90 WACKESTONE; PINKISH GRAY TO WHITE
20% POROSITY: INTERGRANULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
65% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE; RANGE: MICROCRYSTALLINE TO GRAVEL
POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX
ACCESSORY MINERALS: DOLOMITE- T%
OTHER FEATURES: CHALKY, LOW RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS, ECHINOID, BENTHIC FORAMINIFERA
BRYOZOA, SPICULES

90 - 100 GRAINSTONE; PINKISH GRAY TO GRAYISH ORANGE PINK
20% POROSITY: INTERGRANULAR, VUGULAR
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE
90% ALLOCHEMICAL CONSTITUENTS
GRAIN SIZE: VERY COARSE
RANGE: MICROCRYSTALLINE TO GRANULE; POOR INDURATION
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT
ACCESSORY MINERALS: CALCITE-05%, PYRITE- T%
OTHER FEATURES: DOLOMITIC, SUCROSIC
MEDIUM RECRYSTALLIZATION
FOSSILS: FOSSIL FRAGMENTS, ECHINOID, BENTHIC FORAMINIFERA
BRYOZOA, MOLLUSKS

100 TOTAL DEPTH

SOUTHERN ANALYTICAL LABORATORIES, INC.

Suwannee River Water Management District
9225 County Road 49
Live Oak, Florida 32060

December 22, 1998
Project No. 15257

PUBLIC DRINKING WATER ANALYSIS REPORT

PUBLIC WATER SYSTEM INFORMATION (to be completed by system or lab)

System Name: Suwannee River Water Management District I.D. #:
Address: Phone #:
Type (check one): ( ) Community ( ) Nontransient Noncommunity ( ) Non-Community

SAMPLE INFORMATION (to be completed by sampler)

Sample Date (MMDDYY): 12/4/98 Sample Time: 1005
Sample Location (be specific): MW-1
Samper Name and Phone: Larry Ward (813)855-1844
Sampler's Signature: Title: Sampling Technician

Check Type(s): ( ) Distribution ( ) Recheck of MCL ( ) Resample of Lab Invalidated Sample
( ) Clearance ( ) Thm Max Res Time ( ) Plant Tap
( ) Dist. entry pt ( ) Raw ( ) Composite of Multiple Sites--Attach a format for each site

LABORATORY CERTIFICATION INFROMATION (to be completed by lab) - **ATTACH FDOH ANALYTE SHEET**

Lab Name: Southern Analytical Laboratories, Inc. FDOH #: 84269 Expiration Date: 6/30/99
Address: 110 Bayview Boulevard, Oldsmar, Florida 34677 Phone #: (813) 855-1844

Subcontracted Lab FDOH #:__________ -- **ATTACH FDOH ANALYTE SHEET FOR SUBCONTRACTED LAB**

ANALYSIS INFORMATION (to be completed by lab) -- **SAMPLE NUMBER:** 15257-01

Date Sample(s) Received: 12/4/98, 1450 Group(s) Analyzed & Results attached for compliance with 62-550, F.A.C.:

( ) Nitrate Only	( ) Nitrite Only	( ) Asbestos Only	(X) Trihalomethanes
Inorganics-- ( ) All 17 (X) Partial	Volatile Organics-- (X) All 21 ( ) Partial	Secondaries-- (X) All 14 ( ) Partial	Pesticides & PCBs-- ( ) All 30 ( ) Partial
Group I Unregulateds-- ( ) All 13 ( ) Partial	Group II Unregulateds-- ( ) All 23 ( ) Partial	Group III Unregulateds-- ( ) All 11 ( ) Partial	Radiochemicals-- ( ) Single Sample ( ) Qtly Composite*

*Provide radiochemical sample dates & locations for each quarter

I, Francis I. Daniels do HEREBY CERTIFY that all attached analytical data are correct.
Signature:
Title: Laboratory Director Date: December 22, 1998

COMPLIANCE INFORMATION (to be completed by State)

Sample Collection Satisfactory: Sample Analysis Satisfactory:
Resample Requested for: Reason:
Person notified to resample: Date Notified:
DER/ACPHU Reviewing Official:

Southern Analytical
Project No. 15257
December 22, 1998

MW-1

INORGANIC ANALYSIS
62-550.310(1)
(PWS030)

Parameter ID	NAME (MCL mg/l)	Sample Number	Analysis Result (mg/l)	Analysis Method	Analysis Date	MDL	Lab ID
1005	Arsenic (.05)	15257-01	0.001 U	SM 3113 B	12/15/98	0.001	84269
1010	Barium (2)	15257-01	0.01 U	EPA 200.7	12/15/98	0.01	84269
1015	Cadmium (.005)	15257-01	0.002 U	EPA 200.7	12/15/98	0.002	84269
1020	Chromium (0.1)	15257-01	0.02 U	EPA 200.7	12/15/98	0.02	84269
1024	Cyanide (0.2)	15257-01	0.005 U	SM 4500-CN E	12/18/98	0.005	84269
1025	Fluoride (4)	15257-01	0.03	SM 4500-F C	12/4/98	0.01	84269
1030	Lead (0.015)	15257-01	0.0022	SM 3113 B	12/15/98	0.001	84269
1035	Mercury (0.002)	15257-01	0.0002 U	EPA 245.1	12/16/98	0.0005	84269
1036	Nickel (0.1)	15257-01	0.02 U	EPA 200.7	12/15/98	0.02	84269
1040	Nitrate (10)	15257-01	0.04	EPA 353.2	12/4/98	0.01	84269
1041	Nitrite (1)	15257-01	0.01 U	SM 4500-NO_2 B	12/4/98	0.01	84269
1045	Selenium (0.05)	15257-01	0.002 U	SM 3113 B	12/15/98	0.002	84269
1052	Sodium (160)	15257-01	2.4	EPA 200.7	12/11/98	0.1	84269
1074	Antimony (0.006)	15257-01	0.001 U	SM 3113 B	12/16/98	0.001	84269
1075	Beryllium (0.004)	15257-01	0.002 U	EPA 200.7	12/15/98	0.002	84269
1085	Thallium (0.002)	15257-01	0.001 U	SM 3113 B	12/16/98	0.001	84269

U - Analyte was not detected; indicated concentration is method detection limit.

Southern Analytical
Project No. 15257
December 22, 1998

MW-1

TRIHALOMETHANE ANALYSIS
62-550.310(2)(a)
(PWS027)

Parameter ID	NAME (MCL mg/l)	Sample Number	Analysis Result (mg/l)	Analysis Method	Analysis Date	MDL	Lab ID
2950	Total THMs (0.10)	15257-01	0.0015 U	EPA 502.2	12/6/98	0.0015	84269

VOLATILE ORGANIC ANALYSIS
62-550.310(2) (b)
(PWS028)

Parameter ID	NAME (MCL ug/l)	Sample Number	Analysis Result (ug/l)	Analysis Method	Analysis Date	MDL	Lab ID
2378	1,2,4-Trichlorobenzene (70)	15257-01	0.5 U	EPA 502.2	12/6/98	0.5	84269
2380	cis-1,2-Dichloroethene (70)	15257-01	0.2 U	EPA 502.2	12/6/98	0.2	84269
2955	Xylenes (Total) (10,000)	15257-01	0.5 U	EPA 502.2	12/6/98	0.5	84269
2964	Dichloromethane (5)	15257-01	0.5 U	EPA 502.2	12/6/98	0.5	84269
2968	o-Dichlorobenzene (600)	15257-01	0.5 U	EPA 502.2	12/6/98	0.5	84269
2969	p-Dichlorobenzene (75)	15257-01	0.5 U	EPA 502.2	12/6/98	0.5	84269
2976	Vinyl chloride (1)	15257-01	0.5 U	EPA 502.2	12/6/98	0.5	84269
2977	1,1-Dichloroethene (7)	15257-01	0.5 U	EPA 502.2	12/6/98	0.5	84269
2979	trans-1,2- Dichloroethene (100)	15257-01	0.5 U	EPA 502.2	12/6/98	0.5	84269
2980	1,2- Dichloroethane (3)	15257-01	0.2 U	EPA 502.2	12/6/98	0.2	84269
2981	1,1,1-Trichloroethane (200)	15257-01	0.3 U	EPA 502.2	12/6/98	0.3	84269
2982	Carbon tetrachloride (3)	15257-01	0.3 U	EPA 502.2	12/6/98	0.3	84269
2983	1,2-Dichloropropane (5)	15257-01	0.3 U	EPA 502.2	12/6/98	0.3	84269
2984	Trichloroethene (3)	15257-01	0.2 U	EPA 502.2	12/6/98	0.2	84269
2985	1,1,2-Trichloroethane (5)	15257-01	0.3 U	EPA 502.2	12/6/98	0.3	84269
2987	Tetrachloroethene (3)	15257-01	0.2 U	EPA 502.2	12/6/98	0.2	84269
2989	Monochlorobenzene (100)	15257-01	0.5 U	EPA 502.2	12/6/98	0.5	84269
2990	Benzene (1)	15257-01	0.5 U	EPA 502.2	12/6/98	0.5	84269
2991	Toluene (1,000)	15257-01	0.5 U	EPA 502.2	12/6/98	0.5	84269
2992	Ethylbenzene (700)	15257-01	0.5 U	EPA 502.2	12/6/98	0.5	84269
2996	Styrene (100)	15257-01	0.5 U	EPA 502.2	12/6/98	0.5	84269

U - Analyte was not detected; indicated concentration is method detection limit.

Southern Analytical
Project No. 15257
December 22, 1998

MW-1

SECONDARY CHEMICAL ANALYSIS
62-550.320
(PWS031)

Parameter ID	NAME (MCL mg/l)	Sample Number	Analysis Result (mg/l)	Analysis Method	Analysis Date	MDL	Lab ID
1002	Aluminum (0.2)	15257-01	0.1 U	EPA 200.7	12/16/98	0.1	84269
1017	Chloride (250)	15257-01	3.5	SM 4500-CL D	12/4/98	0.1	84269
1022	Copper (1)	15257-01	0.01 U	EPA 200.7	12/15/98	0.01	84269
1025	Fluoride (2.0)	15257-01	0.03	SM 4500-F C	12/4/98	0.01	84269
1028	Iron (0.3)	15257-01	3.4	EPA 200.7	12/15/98	0.02	84269
1032	Manganese (0.05)	15257-01	0.03	EPA 200.7	12/15/98	0.01	84269
1050	Silver (0.1)	15257-01	0.01 U	EPA 200.7	12/10/98	0.01	84269
1055	Sulfate (250)	15257-01	2 U	EPA 375.4	12/4/98	2	84269
1096	Zinc (5)	15257-01	0.02	EPA 200.7	12/15/98	0.01	84269
1905	Color (15 PCU)	15257-01	5	SM 2120B	12/4/98	5	84269
1920	Odor (3 TON)	15257-01	1 U	SM 2150B	12/4/98	1	84269
1925	pH (6.5-8.5)	15257-01	7.6	EPA 150.1	12/4/98	N/A	84269
1930	Tot. Diss. Solids (500)	15257-01	160	SM 2540 C	12/11/98	10	84269
2905	Foaming Agents (0.5)	15257-01	0.07	SM 5540C	12/4/98	0.05	84269
Additional Parameters							
Calcium		15257-01	80	EPA 200.7	12/11/98	0.1	84269
Magnesium		15257-01	7.2	EPA 200.7	12/11/98	0.01	84269
Hardness, Total (mg/l as $CaCO_3$)		15257-01	230	SM 2340 C	12/11/98	2	84269
Bacteriological							
Fecal Coliforms (Ct/100 ml)		15257-01	10 K_1	SM 9222 D	12/4/98	1	84269
Total Coliforms (Ct/100 ml)		15257-01	1,000 K_1	SM 9222 B	12/4/98	1	84269

U - Analyte was not detected; indicated concentration is method detection limit.

K - Analyte was less than indicated concentration; indicated concentration is method detection limit multiplied by sample dilution factor.
[1]Elevated detection limit due to interference from non-coliform bacteria..

-09101004

RCJ 2-6-86

WELL INSPECTION/TECHNICAL DATA FORM

SUWANNEE RIVER WATER MANAGEMENT DISTRICT
Route 3 Box 64
Live Oak, FL 32060
(904) 362-6909

SRWMD Permit No. 22062
Reason for Inspection: Location
S/D: —
Project Status: Complete
Date of Inspection: 8-14-85
Referral: —
Blk/Lot No.: —
Equipment: Rotary
Time: 11:45 AM
Inspector: T. Newman
Qtr: BC
County: Dixie
Well Use: Monitor
Contractor: [illegible]
Sec: 11
Twp: 9S
Rge: 10E
Licensing: —
Visit No.: 1
Owner: D.O.F.
Pump Type: [illegible]
Construction: —
Well Size: 3"

Violations: —

Action or Personal Contact: —

Recommendation: —

Comments: GW Monitor Well, Jonesboro Tower

Disposition: —

Transaction: (A) D M

SRWMD Site ID# -091011004
Latitude 29°42'32"
Longitude 83°17'45
Topo Map# 110-B

FL. ST. Plane X Coord. ______ Y Coord. ______
Land Surface Datum Elevation (NGVD): 35 ft.
Measuring Point ID: TOC

Measuring Point Elevation (NGVD): 36'
Site Type: W

Hydrogeologic Unit: FLA
Ground-Water Condition: NON ART

Top of Producing Zone: 29' MSL

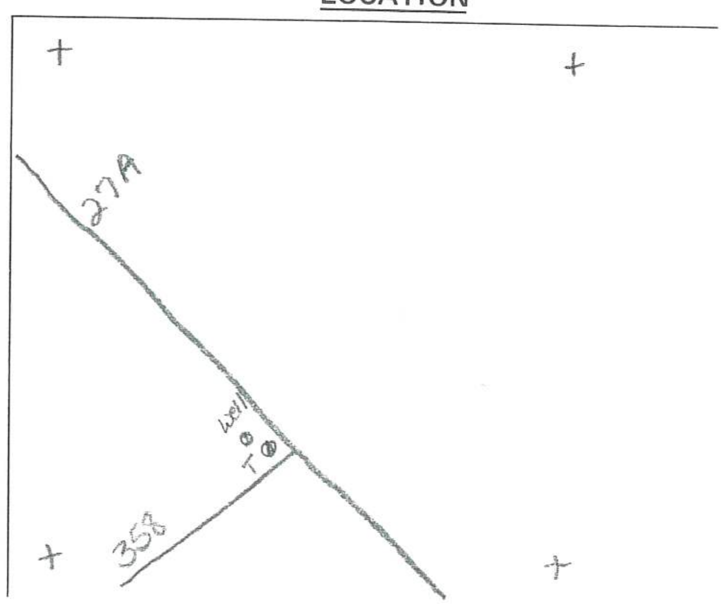
Water Level Possible? Yes

Water Sample Possible? Yes

USGS ID# ______
Bureau of Geology# ______

Well Located by (initials): TBN
SRWMD Permit# 22062

LOCATION



WATER MANAGEMENT DISTRICT
WELL COMPLETION REPORT

PERMIT # 22062

JONE BORO TOWER — CROSSCITY — FLA

Owner — Address — City — State — Zip

Dennis Hattel — 1974 — 10-28-85 — 37' — 37'

Contractor — Signature — License # — Completion Date — Casing Depth — Total Depth

Type of work: Construct ✓ Repair ___ Abandon ___

Well Use: Private ___ Public ___ Monitor ✓ Irrigation ___ Industrial ___ Other ___

Method: Rotary ✓ Cable Tool ___ Jet ___ Combination ___ Other ___

Casing: Black Steel ___ Galvanized ___ PVC ✓ Other ___

Bags of Grout 6 Interval Grouted 0 Ft. to 5' Ft.

Static Water Level 4 Ft. below ~~Top of Casing~~ GROUND

Pumping Water Level ___ Ft. after ___ Hrs. at ___ GPM

Pump Size ___ H.P. Capacity ___ GPM

N

LOCATION

Located Near CROSSCITY

County DIXIE

11 — 9S — 10E

1/4 1/4 Section Township Range

Subdivision — Lot #

Latitude - Longitude

JONES BORO TOWER

Grout Thickness & Depth	Casing Diam.	Casing Depth	Depth (ft.) From	Depth (ft.) To	Examine cuttings at 20 ft. or smaller intervals and at changes. Give color, grain-size and type of material. Note any cavities. Indicate producing zones. Attach additional sheets if necessary.
5/5'	3	0	0	5	TAN-BRN SI FI SA
			5	7	BLU-GRY SL SA CL
		37	7	37	OCALA LS

RECEIVED NOV 20 1985 — Location of Section

MLC Dennis Hattel — 10072

Driller's Signature — Registration #

DEP MONITORING WELL INVENTORY (MWI) DATA INPUT FORM

CO	F029
SITEID	-121330002
LAT	292447.7574
LON	830238.3628

SAMPER	Y
SAMPBY	1234S
PUMP	N
GWLREC	Y
FSPX	2432146.66
FSPY	153341.96

OWNER	TENNECO PACKAGING - GP6
ADDRES	1661 NW US HIGHWAY 19
CITY	CROSS CITY
STATE	FL
ZIP	32628
PHONE	(352) 498-3380
USGSID	
COMP	5/ 1/86
BASINGS	03110205
AMCODE	GV
STATUS	N
WTYPE	MW
WATUSE	
CONTYP	R
FAUC	B
TOTDEP	40
CASDEP	20
FINISH	G
SCRTYP	X
SCRDIA	3
CASTYP	X
CASDIA	3.00
LSD	12
MPELEV 29	14.98
MPELEV 88	14.33
AQCODE	FU
SUBCOD	124OCAL
AQTOP	+8
AQBOT	
GEOLOG	
DRILOG	Y
HYDATA	
CASMSL	-8
TDMSL	-28
MAXWL	8.00
MINWL	5.00
FNLADR	0
COMMENT1	CONTACT GLENN OSTEEN, AREA MANAGER, TOP 3" PVC = 14.44
SRDRIL	Y
COST	887

TOPROCK	-7
ROKPIC	L
DPERMIT	23623
MPID	R
ACC	D
GWCOND	N
LOGGER	
LOGSRUN	
WPERMIT	
PMDR	0
LITHOLOG	Y
WELL#	
CORE	
PERM	
SIEVE	
PURGE	55
MLUSE	Y
DATENTR	7/29/2003
LOCQA	Y
LOC_ACC	GPS4
DERID	292453083023301
MWI	Y

WELL INSPECTION/TECHNICAL DATA FORM

-121330002 mle

SUWANNEE RIVER WATER MANAGEMENT DISTRICT
Route 3 Box 64
Live Oak, FL 32060
(904) 362-6909

WMD Permit No. 23623
Reason for Inspection: Ambient Well Locati...
S/D ______
Project Status: Comp

Date of Inspection: 4-25-86
Referral ______
Blk/Lot No. ______
Equipment: Eutin

Inspector: D. Brown
Qtr ______
County: Dixie
Well Use: Monitor

Time: 11:00 AM
Contractor: Dennis Hittel
Sec 30 Twp 12S Rge 13E
Licensing: 1979

Deposit No. GP #6
Owner: Georgia-Pacific
Pump Type: None
Construction ______

Well Size: 3 in

Violations: ______

Action or Personal Contact: ______

Recommendation: ______

Comments: Sample Point - T.O.C.

Disposition: ______

Transaction: A D M

SRWMD Site ID#: -121330002

Latitude: 29°24'53" (47.7574)

Longitude: 83°02'33" (38.3628)

Topo Map#: 121B

FL. ST. Plane X Coord. ______ Y Coord ______

Land Surface Datum Elevation (NGVD): 12'

Measuring Point ID: ~~T.O.C.~~ RECORDER SHELF

Measuring Point Elevation (NGVD): ~~14'~~ ~~15.03~~ 14.98 OSCTA 12/02

TOP 3" PVC IS 14.44

Site Type: Well

Hydrogeologic Unit: FL

Ground-Water Condition: NON ART

Top of Producing Zone: -8

Water Level Possible? Yes

Water Sample Possible? Yes

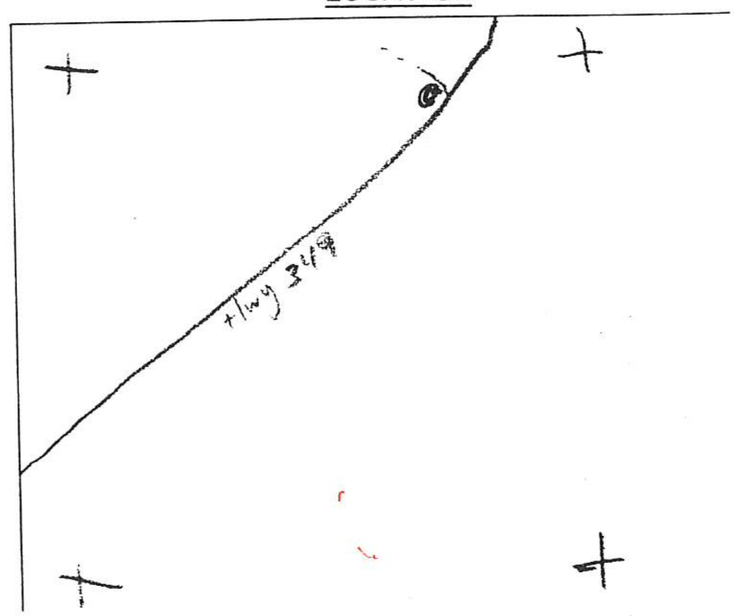
USGS ID#: —

Bureau of Geology#: —

Well Located by (initials): D. Brown

SRWMD Permit#: 23623

LOCATION



WELL INSPECTION/TECHNICAL DATA FORM

-121330002 mle

SUWANNEE RIVER WATER MANAGEMENT DISTRICT
Route 3 Box 64
Live Oak, FL 32060
(904) 362-6909

SRWMD Permit No. 23623
Reason for Inspection: Ambient Well Locati.
S/D
Project Status: Comp
Date of Inspection: 4-25-86
Referral
Blk/Lot No.
Equipment
Inspector: D. Brown
Qtr
County: Dixie
Well Use: Monitor
Time: 11:00 AM
Contractor: Dennis Hittle
Sec 30 Twp 12S Rge 13E
Licensing: 1974
Visit No. GP#6
Owner: Georgia Pacific
Pump Type: None
Construction
Well Size: 3 in

Violations:

Action or Personal Contact:

Recommendation:

Comments: Sample Point - T.O.C.

Disposition:

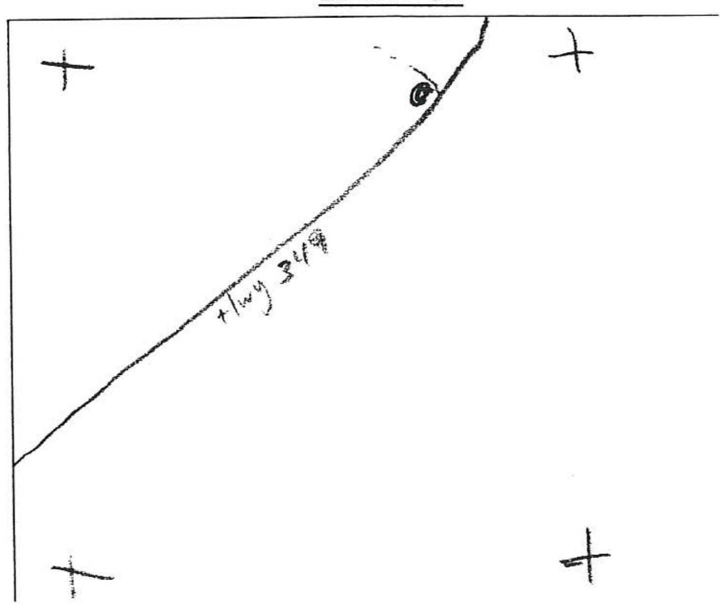
Transaction: A D M

SRWMD Site ID# -121330002
Latitude 29°24'~~53"~~ 47.7574
Longitude 83°02'~~33"~~ 38.3628
Topo Map# 121B

FL. ST. Plane X Coord.
Y Coord.
Land Surface Datum Elevation (NGVD): 12'
Measuring Point ID: ~~T.O.C~~ RECORDER SHELF

Measuring Point Elevation (NGVD): ~~14'~~ 15.03
TOP 3" PVC IS 14.49
Site Type: Well

LOCATION



Hydrogeologic Unit: FL
Ground-Water Condition: NON ART

Top of Producing Zone: -8

Water Level Possible? yes

Water Sample Possible? yes

USGS ID# —
Bureau of Geology# —

Well Located by (initials): D. Brown
SRWMD Permit# 23623

SUWANNEE RIVER WATER MANAGEMENT DISTRICT

ACJ 7-10-86

WELL INSPECTION/TECHNICAL DATA FORM

-121330002 mle

SUWANNEE RIVER WATER MANAGEMENT DISTRICT
Route 3 Box 64
Live Oak, FL 32060
(904) 362-6909

SRWMD Permit No. 23623
Reason for Inspection: Ambient Well Locating
S/D
Project Status: Comp
Date of Inspection: 4-25-86
Referral
Blk/Lot No.
Equipment: Ext
Time: 11:00 AM
Inspector: D. Brown
Qtr
County: Dixie
Well Use: Monitor
Visit No. GP#6
Contractor: Dennis Hatfield
Sec 30 Twp 12S Rge 13E
Licensing: 1979
Well Size: 3 in
Owner: Georgia Pacific
Pump Type: None
Construction

Violations:

Action or Personal Contact:

Recommendation:

Comments: Sample Point - T.O.C.

Disposition:

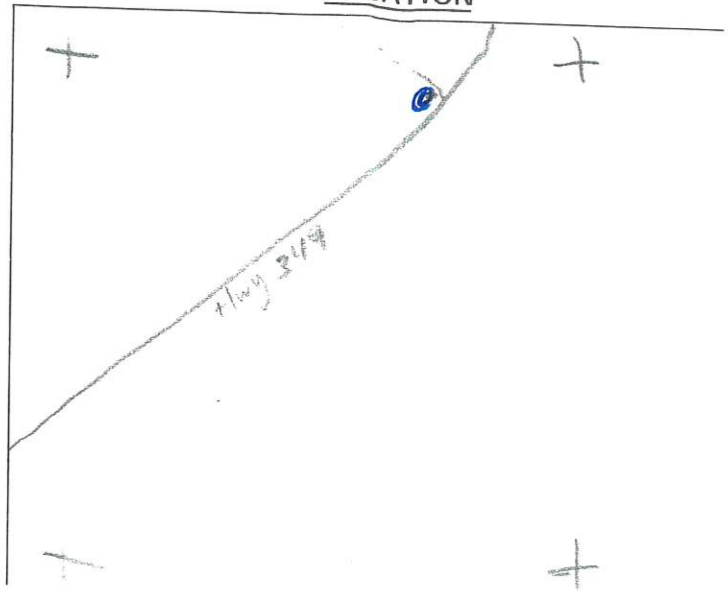
Transaction: A D M

SRWMD Site ID# -121330002
Latitude 29°24'53"
Longitude 83°02'33"
Topo Map# 121B

FL. ST. Plane X Coord.
Y Coord.
Land Surface Datum Elevation (NGVD) 12'
Measuring Point ID T.O.C

Measuring Point Elevation (NGVD) 14'
Site Type Well

LOCATION



Hydrogeologic Unit FL
Ground-Water Condition NON ART

Top of Producing Zone -8

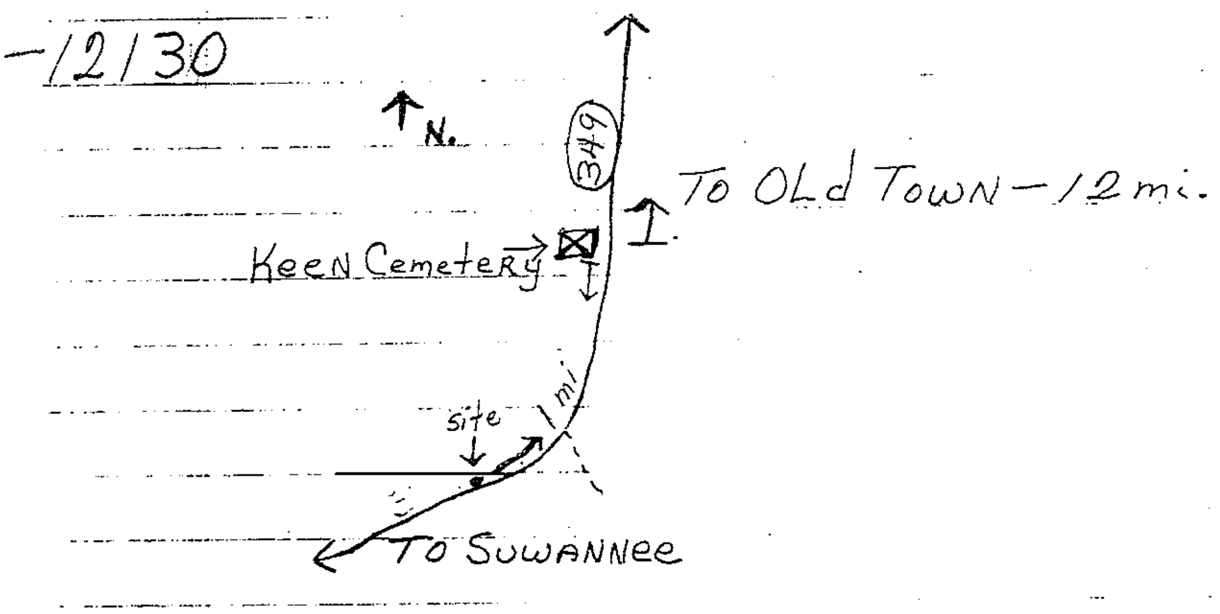
Water Level Possible? yes

Water Sample Possible? yes

USGS ID# —
Bureau of Geology# —

Well Located by (initials) D. Brown
SRWMD Permit# 23623

Georgia Pacific #6
Dixie Co.



...ATER MANAGEMENT DISTRICT
WELL COMPLETION REPORT

GEORGIA - PACIFIC #6 — Owner

PERMIT # 2362

Dennis Hattel — Contractor Signature | 1974 — License # | Address | 5-1-86 — Completion Date | City | State | 40 — Casing Depth | Zip | 40 — Total Depth

Type of work: Construct ✓ Repair ___ Abandon ___

Well Use: Private ___ Public ___ Monitor ✓ Irrigation ___ Industrial ___ Other ___

Method: Rotary ✓ Cable Tool ___ Jet ___ Combination ___ Other ___

Casing: Black Steel ___ Galvanized ___ PVC ✓ Other ___

Bags of Grout 6 Interval Grouted 0 Ft. to 17 Ft.

Static Water Level ___ Ft. below Top of Casing

Pumping Water Level ___ Ft. after ___ Hrs. at ___ GPM

Pump Size ___ H.P. Capacity ___ GPM

LOCATION

Located Near SWANEE WBBK CREEK

County DIXIE

30 12S 13E — 1/4 1/4 Section Township Range

Subdivision ___ Lot # ___

Latitude - Longitude ___

N

Locate in Section

Grout Thickness & Depth	Casing Diam.	Casing Depth	Depth (ft.) From	Depth (ft.) To	Examine cuttings at 20 ft. or smaller intervals and at changes. Give color, grain-size and type of material. Note cavities. Indicate producing zones. Attach additional sheets if necessary
2.5'	3"	0	0	12'	LT-BRN FI SA
		Blank	12'	13'	BRN SLSI FI SA
		20	13'	19'	GRY COARSE SA
	3"	20	19	40	OCLA LS
		SCRN.			
		40			
					BT. 40'

Dennis Hattel — Driller's Signature

10072 — Registration #

Siteid # -121330002

SUWANNEE RIVER WATER MANAGEMENT DISTRICT
WELL - RECORDER - STAFF GAUGE
ELEVATIONS

SITE ID: -121330002 ✓

OWNER: TENNECO PACKAGING-GP6 ✓

COUNTY: F029 ✓

FSPX: 2479504.27

FSPY: 255968.06

LAT: 292447.7574 ✓

LON: 830238.3628 ✓

Section Twp Rge: 30-12-13

MEASURING POINT: TOC

TYPE: RECORDER

NAVD 88 MP: 13.78

NGVD 29 MP: 14.43 14.98 ✓

Surveying and Mapping Firm

DATE: 10/22/02

DELTA LAND SURVEYORS, INC
114 West Green St.
Perry, Florida 32347
(850) 584-2849

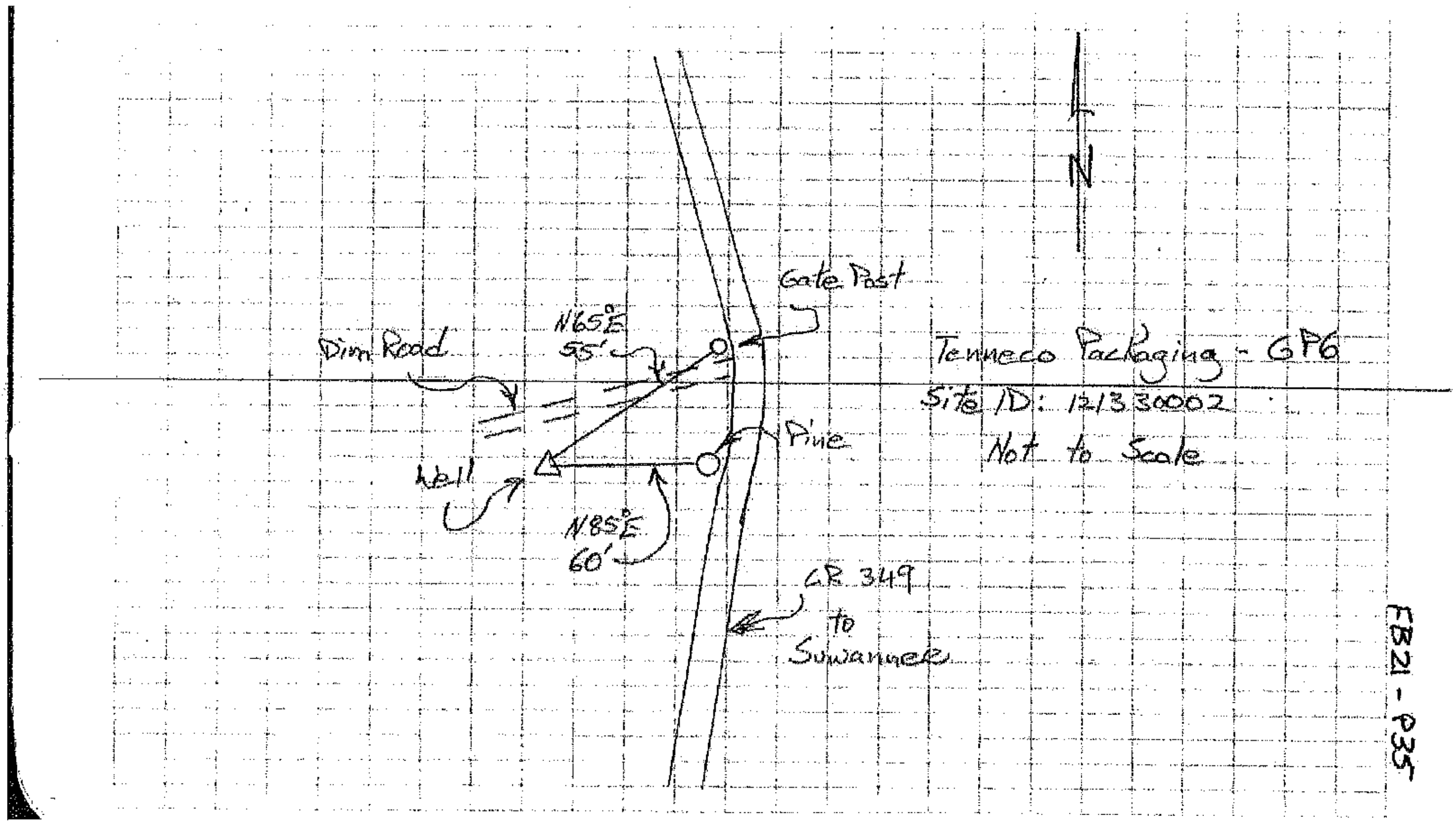
Party_Chief: David L. Goodman, PSM

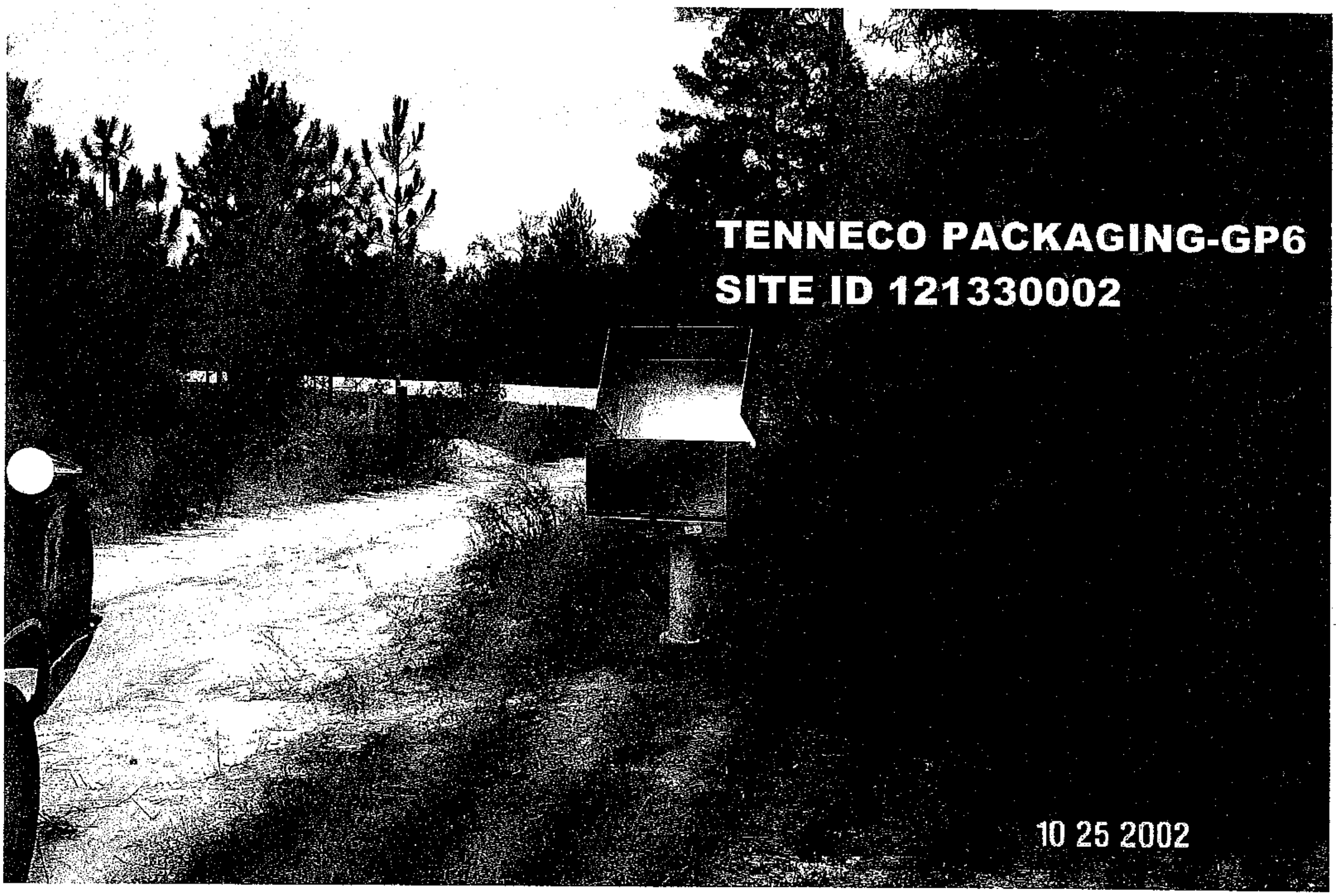
FIELD_BOOK: 17

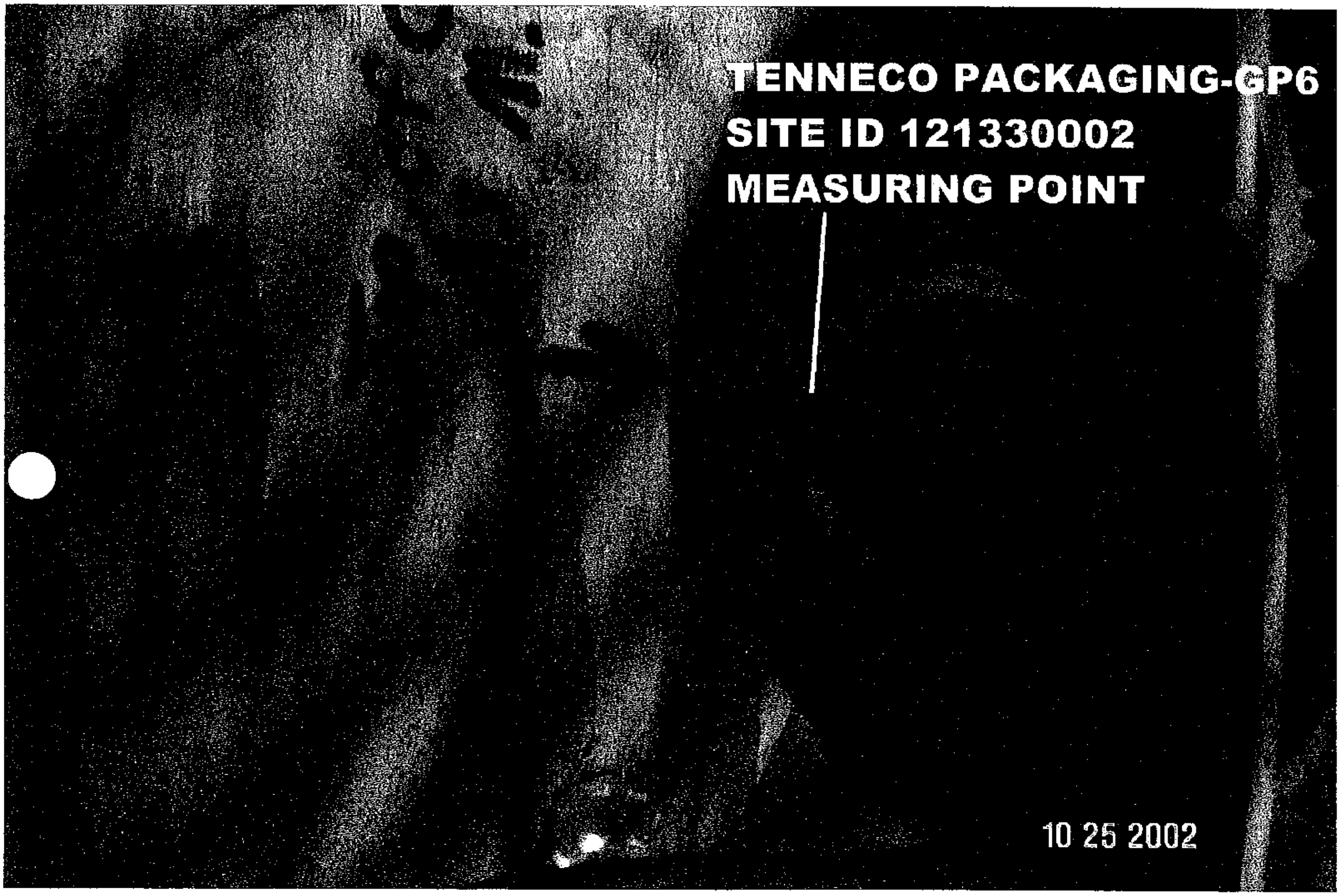
PAGE: 78

Comments:

Measuring point is top of casing as written in box.


N
Gate Post
N65°E
55'
Dim Road
Tenneco Packaging - GP6
Site ID: 121330002
Not to Scale
Pine
Well
N85°E
60'
CR 349
to
Suwannee
FB21-P35


TENNECO PACKAGING-GP6
SITE ID 121330002
10 25 2002


TENNECO PACKAGING-GP6
SITE ID 121330002
MEASURING POINT
10 25 2002

DEP MONITORING WELL INVENTORY (MWI) DATA INPUT FORM

CO	F075
SITEID	-141305001
LAT	291747.6
LON	830156.9
OWNER	LEVY CO COMM
ADDRES	P O DRAWER 310
CITY	BRONSON
STATE	FL
ZIP	32621
PHONE	(904) 486-2295
USGSID	
COMP	9/14/1987
BASINGS	03110101
AMCODE	G
STATUS	N
WTYPE	MW
WATUSE	
CONTYP	R
FAUC	B
TOTDEP	25
CASDEP	5
FINISH	G
SCRTYP	X
SCRDIA	3
CASTYP	X
CASDIA	3.00
LSD	7
MPELEV 29	9.48
MPELEV 88	8.84
AQCODE	FU
SUBCOD	124OCAL
AQTOP	+5
AQBOT	
GEOLOG	
DRILOG	Y
HYDATA	
CASMSL	+2
TDMSL	-18
MAXWL	5.00
MINWL	1.00
FNLADR	0
COMMENT1	CONTACT MR. HAMMELL
SRDRIL	Y
COST	563

SAMPER	Y
SAMPBY	12345
PUMP	N
GWLREC	Y
FSPX	2436360.58
FSPY	110949.6
TOPROCK	+2
ROKPIC	L
DPERMIT	28110
MPID	C
ACC	D
GWCOND	N
LOGGER	
LOGSRUN	
WPERMIT	
PMDR	0
LITHOLOG	
WELL#	
CORE	
PERM	
SIEVE	
PURGE	35
MLUSE	Y
DATENTR	6/16/2004
LOCQA	Y
LOC_ACC	GPS2
DERID	291746083015801
MWI	Y

-141305001

WELL INSPECTION/TECHNICAL DATA FORM

SUWANNEE RIVER WATER MANAGEMENT DISTRICT
Route 3 Box 64
Live Oak, FL 32060
(904) 362-6909

SRWMD Permit No. 28110 Reason for Inspection assurance. S/D ______ Project Status ______

Date of Inspection 9/14/87 Referral ______ Blk/Lot No. ______ Equipment ROT

Time 11:00 Inspector Ceryak Qtr CBA County LEVY Well Use M

Visit No. 1 Contractor HATTSC Sec 5 Twp 14S Rge 13E Licensing ______

Well Size 3" Owner LEVY CY Pump Type NON Construction ______

Violations: ______

Action or Personal Contact: ______

Recommendation: ______

Comments: ______

Disposition: ______

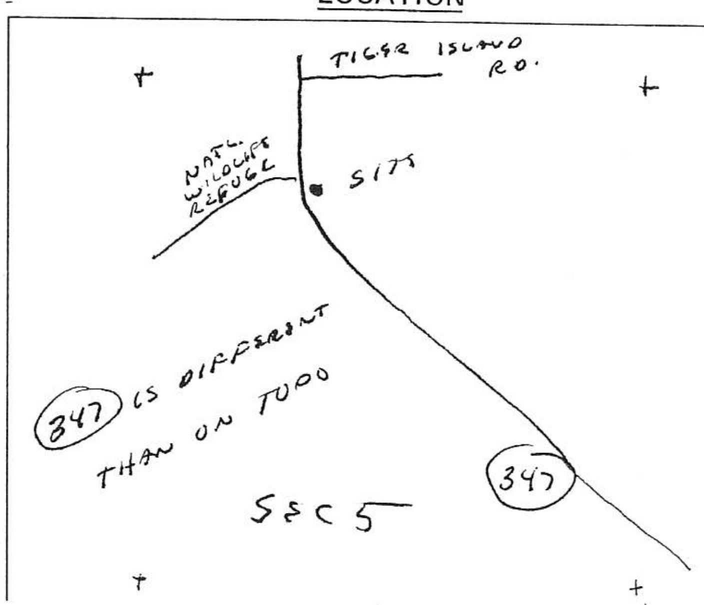
Transaction: A D M

SRWMD Site ID# -141305001 Latitude 291746 (7.6) Longitude 830158 (6.9) Topo Map# 121-D

FL. ST. Plane X Coord. ______ Y Coord. ______ LOCATED OSCTA 5/04 Land Surface Datum Elevation (NGVD) 6 Measuring Point ID TOC (TOP PVC)

Measuring Point Elevation (NGVD) ~~8.855~~ 9.48 ~~leveled 2/12/98~~ Site Type W

LOCATION



Hydrogeologic Unit FL Ground-Water Condition NON ART

Top of Producing Zone ______

Water Level Possible? yes

Water Sample Possible? yes

USGS ID# ______ Bureau of Geology# ______

Well Located by (initials) Ron SRWMD Permit# 28110

Am
11-24-87

-141305001

WELL INSPECTION/TECHNICAL DATA FORM

SUWANNEE RIVER WATER MANAGEMENT DISTRICT
Route 3 Box 64
Live Oak, FL 32060
(904) 362-6909

OK 5-4-88 (signature)

SRWMD Permit No. 28110
Reason for Inspection: assurance.
S/D:
Project Status:

Date of Inspection: 9/14/87
Referral:
Blk/Lot No.:
Equipment: ROT

Time: 11:00
Inspector: Cerjok
Qtr: CBA
County: LEVY
Well Use: M

Visit No.: 1
Contractor: HATTSC
Sec: 5
Twp: 14S
Rge: 13E
Licensing:

Well Size: 3"
Owner: LEVY CY
Pump Type: NON
Construction:

Violations:

Action or Personal Contact:

Recommendation:

Comments:

Disposition:

Transaction: A D M

SRWMD Site ID#: -141305001
Latitude: 291746
Longitude: 830158
Topo Map#: 121-0

FL. ST. Plane X Coord.:
Y Coord.:
Land Surface Datum Elevation (NGVD): 6
Measuring Point ID: TOC

Measuring Point Elevation (NGVD): 8
Site Type: W

Hydrogeologic Unit: FL
Ground-Water Condition: NON ART

Top of Producing Zone:

Water Level Possible? yes

Water Sample Possible? yes

USGS ID#:
Bureau of Geology#:

Well Located by (initials): Ron
SRWMD Permit#: 28110

LOCATION

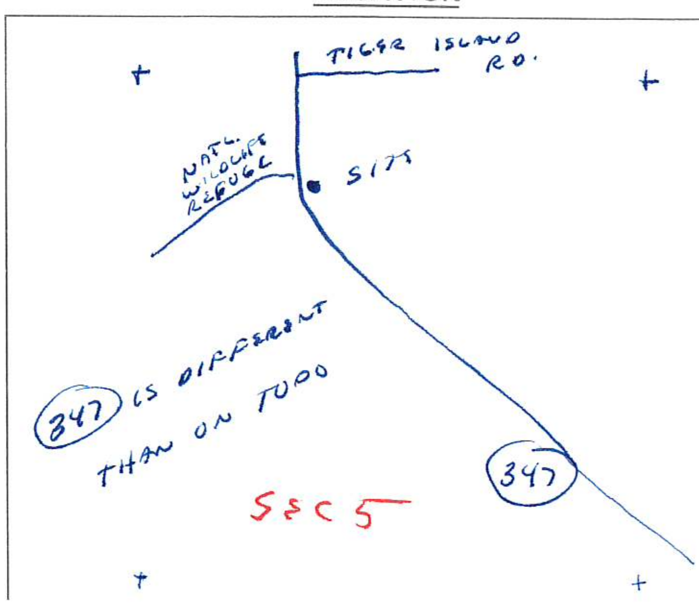
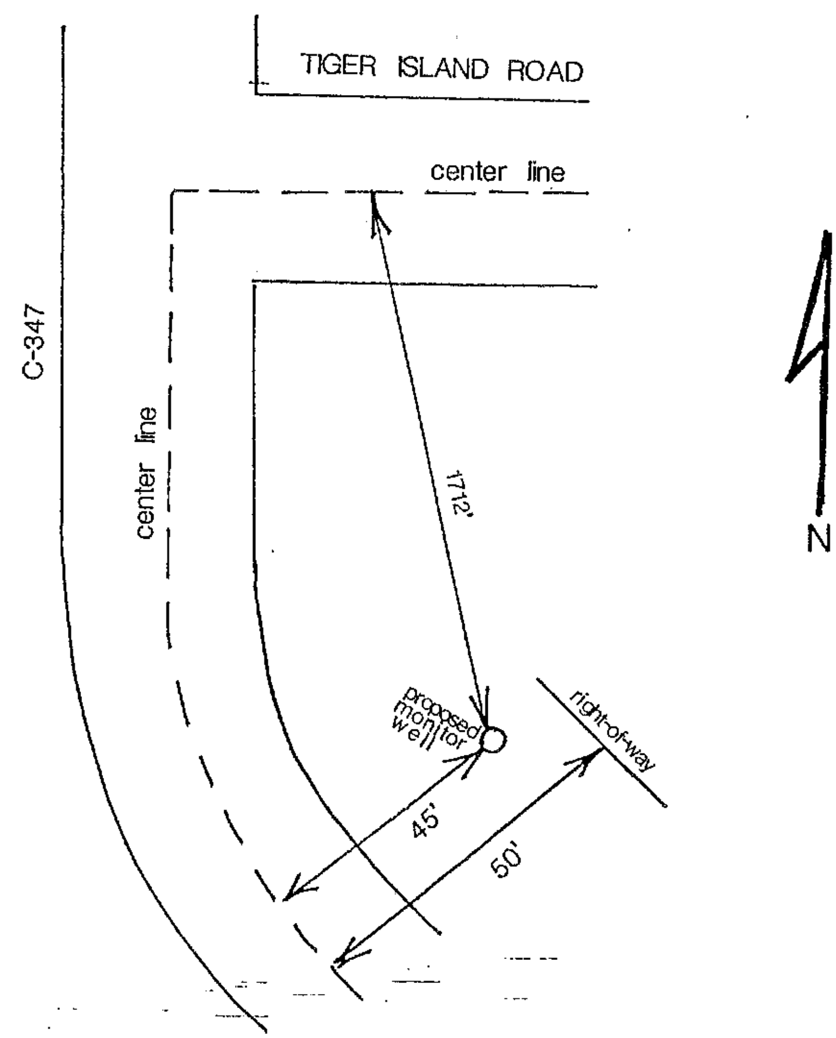


EXHIBIT C-1

LEVY COUNTY ROAD 347 SOUTH

TOWNSHIP 14 SOUTH, RANGE 13 EAST, SECTION 5



SUWANNEE RIVER
WATER MANAGEMENT DISTRICT
WELL COMPLETION REPORT — **PERMIT #** 28110

SRWMD Levy Co 347 Live Oak

Owner	Address	City	State	Zip

Dennis A. Hattel — 1974 — 9-14-87 — 5 — 25

Contractor Signature	License #	Completion Date	Casing Depth	Total Depth
Dennis A. Hattel	1974	9-14-87	5	25

Type of work: Construct ✓ Repair ____ Abandon ____
Well Use: Private ____ Public ____ Monitor ✓ Irrigation ____ Industrial ____ Other ____
Method: Rotary ✓ Cable Tool ____ Jet ____ Combination ____ Other ____
Casing: Black Steel ____ Galvanized ____ PVC ✓ Other ____
Bags of Grout 1 Interval Grouted 1 Ft. to 0 Ft.
Static Water Level ____ Ft. below Top of Casing
Pumping Water Level ____ Ft. after ____ Hrs. at ____ GPM
Pump Size ____ H.P. Capacity ____ GPM

Grout Thickness & Depth	Casing Diam.	Casing Depth	Depth (ft.) From	Depth (ft.) To	Examine cuttings at 20 ft. or smaller intervals and at changes. Give color, grain-size and type of material. Note any cavities. Indicate producing zones. Attach additional sheets if necessary.
	3"	0	0	5	TAN GRY SA
2'		25'	5	25'	WHT LR

LOCATION
Located Near South of Tiger Island Rd EAST of 347
County Levy

1/4	1/4	Section	Township	Range
		5	-14	13

Subdivision ____ Lot # ____

Latitude - Longitude ____

N ↑

Locate in Section

Chris Tomlinson — 10356
Driller's Signature — Registration #

RECEIVED OCT 08 1987

SUWANNE RIVER WATER MANAGEMENT DISTRICT
WELL-RECORDER-STAFF GAUGE
FIELD CHECKLIST

SITE_ID: -141305001 ✓ OWNER: LEVY CO COMM

COUNTY: LEVY F075 ✓ BASIN: FanMan

DEPARTMENT: GROUND WATER

TYPE: MONITORING WELL

MW1 LAT 291747.6 LON 830156.9

MEASURING POINT #1: TOC MEASURING POINT #2: N/A

NAVD88 (feet) 8.84 NAVD88MP_2: N/A

NGVD29 (feet) 9.48 ✓ Bmg 6/2/10 NGVD29MP_2: N/A

OWNER INFORMATION

PRESENT OWNER: LEVY CO COMM

BENCHMARK (FOUND OR SET): FOUND

NAME OR STAMPING: 84 LM (DELTA)

BM_ELEV_NAVD_88:(feet) 5.35 BM_ELEV_NGVD_29:(feet) 5.99

BM_LAT: N29 18 19.44 BM_LON: W083 01 58.14

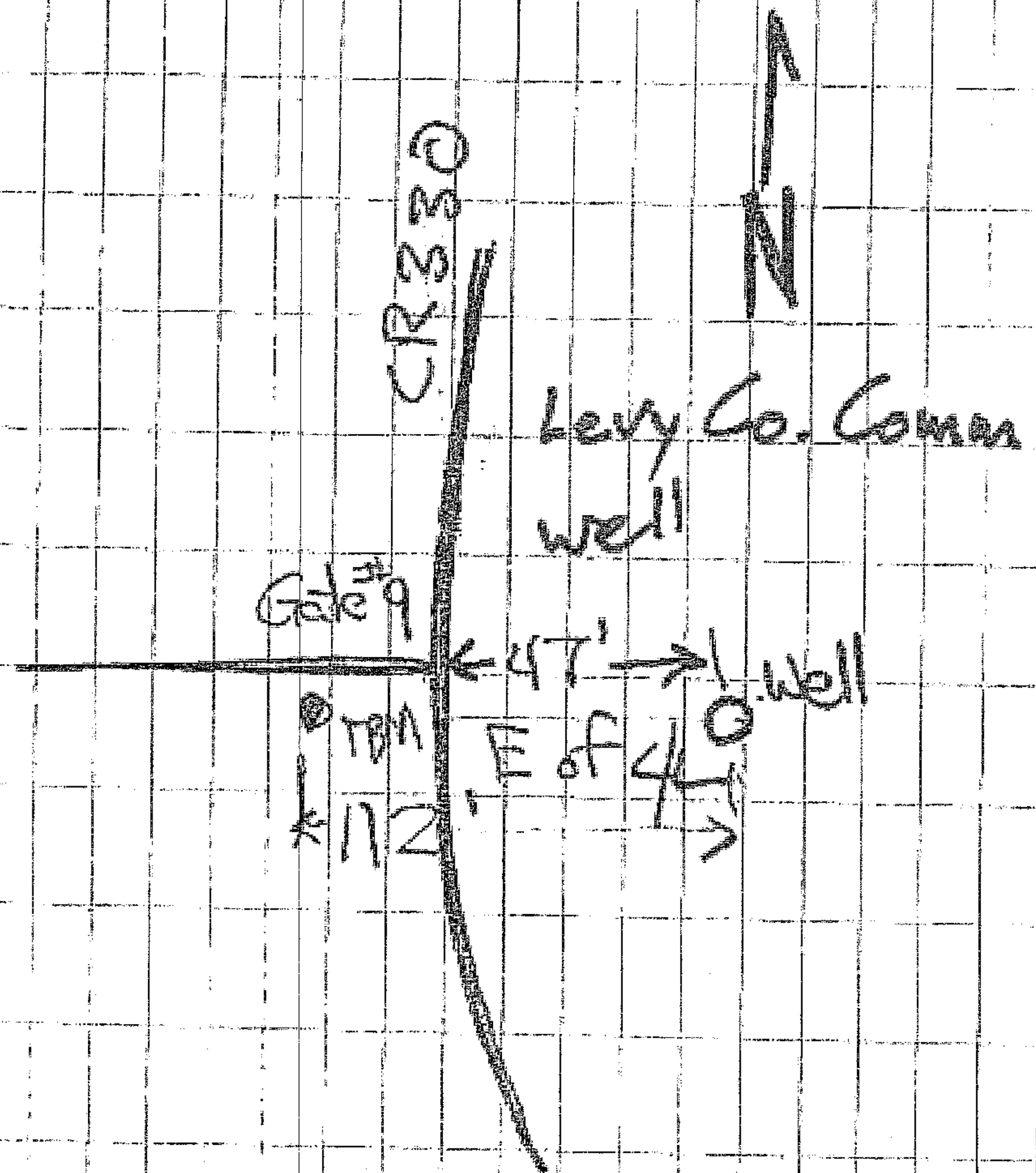
DELTA LAND SURVEYORS, INC 114 WEST GREEN ST. PERRY, FLORIDA 323477
PHONE (850) 584-2849
FAX (850) 584-7906

DELTA PROJECT NO. 03-318-41

CONTRACT_NO: 02/03-186 AMEND 3

PARTY CHIEF: David L. Goodman PSM

P.S.



MWI (MONITORING WELL INVENTORY) DATA INPUT FORM

1. TRCODE: A
2. CO: 075
3. SACODE: 8027
4. SITEID: -141429001
5. LATLON: 291414825609.7 5.3
6. GMSID:
7. OWNER: DOF - ROSEWOOD TWR
8. ADDRES: P O BOX 1569
9. CITY: OCALA
10. STATE: FL
11. ZIP: 32678
12. PHONE: 9043527505
13. USGSID: 291414082560901
14. DATCOMP: 8/22/74
15. GSCODE: 03110101
16. AMCODE: A
17. STATUS: N
18. WTYPE: MW
19. WATUSE:
20. CONTYP: R
21. FAUC:
22. TOTDEP: 442
23. CASDEP: 422
24. FINISH: X
25. OPHOLE: 422- 442
26. SCRTYP:
27. SCRDIA:
28. CASTYP: L
29. CASDIA: 6.00
30. LSD: 17
31. MPELEV: 19.45
32. AQCODE: FU
33. SUBCOD: UNKNOWN
34. AQTOP: +2
35. AQBOT:
36. GEOLOG: Y
37. DRILOG: Y
38. HYDATA:
39. CASMSL: -405
40. TDMSL: -425
41. MAXWL: 15
42. MINWL: 5
43. FNLADR:
44. COMMENT1:
45. SRDRIL:
46. COST:
47. SAMPER: Y
48. SAMPBY: W
49. PUMP: N
50. GWLREC: Y

51. FSPX: 2498921.76
52. FSPY: 89692.59
53. TOPROK: +2
54. ROKPIC: D
55. DPERMIT:
56. MPID: R
57. ACC: A
58. GWCOND: A
59. LOGGER: S
60. LOGSRUN: CEFGT
61. INSTID:
62. WPERMIT:
63. PMDR:
64. LITHOLOG:
65. WNUM:
66. CORE:
67. PERM:
68. SIEVE:
69. PURGE:
70. MLUSE:
71. UPDATE: 1/25/1991

GPS2
red 9/91

470152 ✓

GROUND-WATER STATION DATA SHEET

Transaction	SRWMD Site No.	Bureau of Geology No.	USGS No.
(A) D M	1: +S 1 4 1 4 2 9 0 0 1 (+=North, -=South)	11:	17:

QW Frequency (32): Z
Level Frequency (33): ~~Q~~ C
Hydrogeologic Unit (34): F
Ground-Water Condition (35): N

QW Frequency	Level Frequency	Hydrogeologic Unit	Ground-Water Condition
R = Random	Q = Quarterly	S = Surficial	N = Nonartesian
A = Annual	W = Weekly	D = Secondary	A = Artesian
S = Semiannual	D = Daily	H = Hawthorn	U = Unknown
B = Bimonthly	C = Continuous	F = Floridan	
M = Monthly	Z = Other	U = Unknown	

Site Type (36): W
Site Use (37): D
Water Use (38): X

Site Type	Site Use	Water Use	
W = Well	O = Observation	U = Urban Domestic	N = Industrial
H = Sinkhole	T = Test	R = Rural Domestic	C = Commercial
S = Spring	R = Drainage	I = Irrigation	S = Institution
B = Boring	E = Dewater	L = Livestock	T = Thermoelectric
Z = Other	I = Injection	M = Municipal	A = Air Condition
	W = Withdrawal	P = Public Supply	Z = Other
	U = Unused		X = Unused
	D = Destroyed		

LOCATION

Topo Map No. (39): 1 3 1 A

¼ ¼ ¼ AB CD (43): D A A

Basin No. (46): 0 1 0 1

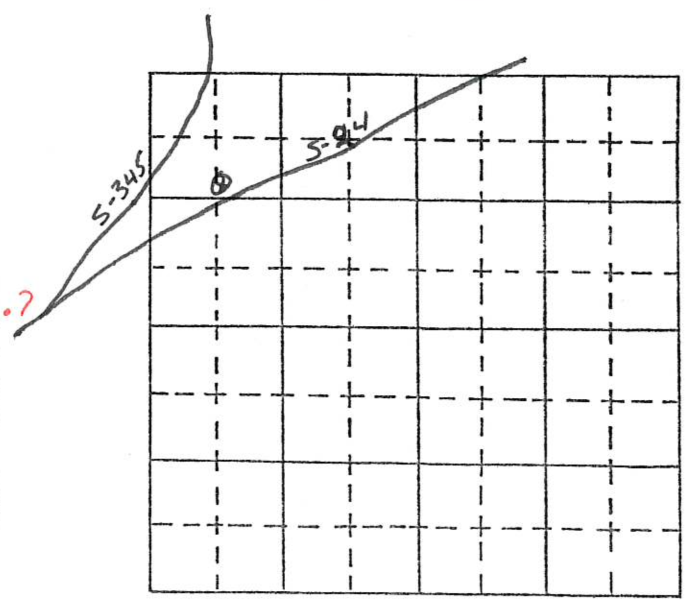
County No. (50): 5 4

Latitude - Longitude (52): 2 9 1 4 1 ~~4~~ 5.3 8 2 5 6 0 9 .7

Florida State Plane Coord. (64–77):

UTM Coord. (1–14):

Well located by (Initials) (15):



Remarks (18–57): Recorder at ~~Hower entrance~~ on S24

C 603

STATE OF FLORIDA

WATER WELL CONTRACTOR'S NOTIFICATION OF CONSTRUCITON OR REPAIR OF A WATER WELL

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF INTERIOR RESOURCES
505 Larson Building, Tallahassee, Florida 32304
Telephone: (904) 488-8476

Permit

Owner's Well Identification

№ 7212

For Department Use ONLY

1. OWNER: Southwest Florida Water Management District
Name
Address City State

2. LOCATION OF WELL: State Rd 24
Street Address/Road
Cedar Key — Levy
City County
Subdivision Lot No.
29 — 14 — 14
Section Township Range

3. PURPOSE OF WELL:
☐ Domestic ☐ Irrigation ☐ Public Supply
☐ Industrial ☐ Stock ☑ Other Monitor Well

4. TYPE OF WORK:
☑ New Well ☐ Plugging ☐ Other
☐ Deepening ☐ Reconditioning

5. QUALITY:
☐ Clear ☐ Colored ☐ Sulfur ☐ Salty ☐ Other

CHECK TEST MADE
☐ None
☐ Bacteria
☐ Chemical
Chloride PPM 378.7
(Check ☐ if test was for sodium chloride)
Temperature °F
Well Disinfected ☐ Yes ☐ No

Test By:
☐ County Health Dept.
☐ State Health Dept.
☐ U.S.G.S.
☑ Other Quest Well Drilling
Name
Sarasota, FL
Address

6. EQUIPMENT:
☑ Rotary ☐ Cable Tool ☐ Other
☐ Jet ☐ Reverse Rotary

7. GROUT: ☐ None ☐ Cement ☐ Other

Describe and give number of bags (94)lb.)	From (ft)	To (ft)
131 Bags	350'	0'

8. CASING AND LINER PIPE: ?? 322' ?? 449' ??

Diameter (inches)	Kind	From (ft)	To (ft)
6"	PVC	0'	350'
10"	PVC	0'	70'
12"	PVC	0'	1?'

(Check One) ☐ Threaded & Coupled ☐ Welded Only
☐ T & C & Welded ☐ Other Grouted

9. WATER LEVEL:
Water level after well completed 5'11" feet
☐ Above ☑ below land surface
Well Flowing: ☐ Yes ☑ No Flow gal/min

10. SCREENS:

Make	Materials	Diameter (in)	Slot Size	Location (ft) Below Surface From (ft)	To (ft)

11. UPPER END OF WELL:
☐ Pump Installed ☐ Valve ☐ Cap ☐ Other

12. PUMPING TEST:
Date ☐ Test Pump ☐ Permanent Pump
Measure point is
which is ___ feet ☐ above ☐ below land surface
Static water level ___ feet ☐ above ☐ below measure point
Maximum Drawdown ___ feet below measure point
Discharge at maximum drawdown ___ gal/min
After ___ hours

13. PUMP INSTALLED:
Type ___ Make ___ Model No. ___
Motor Power ___ Make ___ H.P. ___
Capacity ___ Gal/min at ___ ft. of total dynamic head
No. of bowls or stages
Pump setting ___ feet

14. WELL LOG:

Note each type of material, producing zones, & cavities if any. Give description at not less than 20 foot intervals and at changes.

Well bore (in)	Depth (feet) From	To	Material
	0	8'	YELLOW SAND
	8	15	RED SANDY CLAY
	15	30	LIMESTONE LIGHT GRAY
	30	33	LIMESTONE HARD
	33	40	LIMESTONE MED.
	40	55	LIMESTONE ROUGH POROUS
	55	58	CAVITY
	58	60	LIMESTONE SOFT
	60	61	LIMESTONE--CAVITY
	61	67	LIMESTONE MED.
	67	70	LIMESTONE HARD
	70	78	LIMESTONE MED.
	78	80	LIMESTONE SOFT
	80	82	LIMESTONE MED. HARD
	82	83	DARK MED. HARD LIMESTONE
	83	86	REAL HARD LIMESTONE
	86	101	MED. LIMESTONE DARK BROWN (BROKEN)
	101	102	HARD LIMESTONE
	102	103	LIMESTONE SOFT
	103	104	LIMESTONE HARD
	104	106	LIMESTONE SOFT
	106	107	HARD LIMESTONE
	107	117	LIMESTONE SOFT W/THIN HARD STREAKS
	117	118	LIMESTONE MED. HARD
	118	123	LIMESTONE SOFT
	123	124	LIMESTONE HARD
	124	126	LIMESTONE SOFT
	126	128	LIMESTONE HARD
	128	131	LIMESTONE SOFT
	131	132	LIMESTONE HARD
	132	135	BROWN LIMESTONE MED. HARD
	135	136	TAN CLAY SOFT
	136	138	TAN & BROWN LIMESTONE HARD
	138	142	BROWN LIMESTONE [illegible]
	142	155	BROWN LIMESTONE HARD
	155	158	BROWN LIMESTONE MED. SOFT
	158	167	BROWN LIMESTONE HARD
	167	170	BROWN LIMESTONE MED. SOFT W/WHITE STREAK OF CLAY
	170	172	BROWN LIMESTONE MED. SOFT
	172	179	BROWN LIMESTONE HARD
	179	187	BROWN LIMESTONE MED. SOFT
	187	191	BROWN LIME SOFT
	191	195	HARD BROWN LIMESTONE
	195	200	HARD BROKEN LIMESTONE BROWN
	200	203	SOFT LIMESTONE & CLAY
	203	205	HARD LIMESTONE
	205	218	HARD BROWN LIMESTONE
	218	220	SOFT BROWN LIMESTONE
	220	222	HARD BROWN LIMESTONE
			(continued)

15. CONTRACTOR'S CERTIFICATION:
This work was done under my jurisdiction and this report is true to the best of my knowledge and belief. The work commenced on 5/9/74 and was completed on 8/22/74

Quest Well Drilling Co. — 1048
Contractor License Number

Signature of Representative — 5008 N. Lockwood Ridge Rd.
P.O. Box or Street

Sarasota — Sarasota — Florida
City County State

?? 813-355-3070 ??
Phone Number — Jack Tetter
Driller

FORM: DNR/BW

R-8

GUEST WELL DRILLING

Southwest Florida Water Management DistrictLog Continued
Levy County Well
Sec. 29--T. 14--R. 14

222' to	224'	SOFT BROWN LIMESTONE
224	232	LIGHT TAN LIMESTONE MED. SOFT
232	242	LIGHT TAN & GRAY LIMESTONE MIX SOFT
242	292	LIGHT TAN LIMESTONE SOFT
292	312	LIGHT GRAY LIMESTONE MED. SOFT
312	332	LIGHT GRAY TO LIGHT BROWN LIME SOFT
332	334	GRAY LIMESTONE HARD
334	342	LIGHT TAN LIMESTONE MED. SOFT
342	344	LIGHT TAN LIMESTONE MED. SOFT
344	352	LIGHT GRAY LIMESTONE SOFT (BROKEN)
352	354	MED. HARD TAN LIMESTONE
354	355	SOFT TAN LIMESTONE
355	361	HARD GRAY LIMESTONE
361	370	SOFT GRAY LIMESTONE
370	375	HARD GRAY LIMESTONE
375	382	MED. SOFT GRAY & TAN LIME MIXED
382	387	HARD GRAY LIMESTONE
387	391	SOFT DARK GRAY LIMESTONE
391	393	MED. HARD LIMESTONE WHITE, STREAKS OF BLACK MUD MIXED
393	395	SOFT WHITE LIMESTONE
395	397	BROWN FLINT ROCK
397	400	SOFT WHITE LIMESTONE
400	402	HARD BROWN LIMESTONE
402	418	BROWN LIMESTONE
418	422	BROKEN BROWN LIMESTONE
422	432	BROWN LIMESTONE W/BLACK FLINT STREAKS
432	442	BROWN LIMESTONE W/BLACK FLINT STREAKS

Levy

STATE OF FLORIDA PERMIT APPLICATION TO CONSTRUCT, REPAIR, MODIFY, OR ABANDON A WELL

- ☐ Southwest
- ☐ Northwest
- ☐ St. Johns River
- ☐ South Florida
- ■ Suwannee River
- ☐ DEP
- ☐ Delegated Authority (If Applicable)

PLEASE, FILL OUT ALL APPLICABLE FIELDS
(*Denotes Required Fields Where Applicable)

The water well contractor is responsible for completing this form and forwarding the permit application to the appropriate delegated authority where applicable.

Permit No: 3-075-231615-1
Florida Unique ID
Permit Stipulations Required (See Attached)
62-524 Quad No. ______ Delineation No. ______
CUP/WUP Application No.
ABOVE THIS LINE FOR OFFICIAL USE ONLY

1. LEVY BOCC (*Owner, Legal Name if Corporation) PO BOX 310 (*Address) BRONSON (*City) FL (*State) 32621 (*Zip) 386-362-1001 (*Telephone Number)
2. 5230 SE HIGHWAY 19;, INGLIS; FL - 34449 (*Well Location – Address, Road Name or Number, City)
3. 0262800800 (*Parcel ID No. (PIN) or Alternate Key (Circle One)) Lot ___ Block ___ Unit ___
4. 20 (*Section or Land Grant) 14S (*Township) 16E (*Range) Levy (*County) Subdivision ___ Check if 62-524: ___ Yes X No
5. Stephanie Stallsmith (*Water Well Contractor) 9342 (*License Number) 3525679500 (*Telephone Number) stephanie@hussdrilling.com (E-mail Address)
6. 35920 State Road 52 (*Water Well Contractor's Address) Dade City (City) FL (State) 33525-8332 (ZIP)
7. *Type of Work: X Construction ___ Repair ___ Modification ___ Abandonment ___ (*Reason for Repair, Modification, or Abandonment)
8. *Number of Proposed Wells 1
9. *Specify Intended Use(s) of Well(s):
   ___ Domestic ___ Landscape Irrigation ___ Agricultural Irrigation ___ Site Investigation
   ___ Bottled Water Supply ___ Recreation Area Irrigation ___ Livestock X Monitoring
   ___ Public Water Supply (Limited Use/DOH) ___ Nursery Irrigation ___ Test
   ___ Public Water Supply (Community or Non-Community/DEP) ___ Commercial/Industrial ___ Earth-Coupled Geothermal
   ___ Class I Injection ___ Golf Course Irrigation ___ HVAC Supply ___ HVAC Return
   Class V Injection: ___ Recharge ___ Commercial/Industrial Disposal ___ Aquifer Storage and Recovery ___ Drainage
   Remediation: ___ Recovery ___ Air Sparge ___ Other (Describe) ___
   ___ Other (Describe) ___ (Note: Not all types of wells are permitted by a given permitting authority)

Date Stamp

Official Use Only

10. *Distance from Septic System if ≤ 200 ft. ___ 11. Facility Description ___ 12. Estimated Start Date 02/01/2018
13. *Estimated Well Depth 80 ft. *Estimated Casing Depth 30 ft. *Primary Casing Diameter 4 in. Open Hole: From 30 To 80 ft.
14. Estimated Screen Interval: From ___ To ___ ft.
15. *Primary Casing Material: ___ Black Steel ___ Galvanized X PVC ___ Stainless Steel ___ Not Cased ___ Other: ___
16. Secondary Casing: ___ Telescope Casing ___ Liner ___ Surface Casing Diameter 0 in.
17. Secondary Casing Material: ___ Black Steel ___ Galvanized ___ PVC ___ Stainless Steel ___ Other ___
18. *Method of Construction, Repair, or Abandonment: ___ Auger ___ Cable Tool ___ Jetted X Rotary ___ Sonic
    ___ Combination (Two or More Methods) ___ Hand Driven (Well Point, Sand Point) ___ Hydraulic Point (Direct Push)
    ___ Horizontal Drilling ___ Plugged by Approved Method ___ Other (Describe) ___
19. Proposed Grouting Interval for the Primary, Secondary, and Additional Casing:
    From 0 To 30 Seal Material (___ Bentonite ___ Neat Cement X Other Cement)
    From ___ To ___ Seal Material (___ Bentonite ___ Neat Cement ___ Other ___)
    From ___ To ___ Seal Material (___ Bentonite ___ Neat Cement ___ Other ___)
    From ___ To ___ Seal Material (___ Bentonite ___ Neat Cement ___ Other ___)
20. Indicate total number of existing wells on site ___ List number of existing unused wells on site ___
21. *Is this well or any existing well or water withdrawal on the owner's contiguous property covered under a Consumptive/Water Use Permit (CUP/WUP) or CUP/WUP Application? ___ Yes X No If Yes, complete the following: CUP/WUP No. ___ District Well ID No. 133172
22. Latitude 291512.4884 Longitude 824327.462
23. Data Obtained From: ___ GPS X Map ___ Survey Datum: ___ NAD 27 X NAD 83 ___ WGS 84

I hereby certify that I will comply with the applicable rules of Title 40, Florida Administration Code, and that a water use permit or artificial recharge permit, if needed, has been or will be obtained prior to commencement of well construction. I further certify that information provided in this application is accurate and that I will obtain necessary approval from other federal, state, or local governments, if applicable. I agree to provide a well completion report to the District within 30 days after completion of the construction, repair, modification, or abandonment authorized by this permit, or the permit expiration, whichever occurs first.

I certify that I am the owner of the property, that the information provided is accurate, and that I am aware of my responsibilities under Chapter 373, Florida Statutes, to maintain or properly abandon this well; or, I certify that I am the agent for the owner, that the information provided is accurate, and that I have informed the owner of his responsibilities as stated above. Owner consents to allowing personnel of this WMD or Delegated Authority access to the well site during the construction, repair, modification, or abandonment authorized by this permit.

Stephanie Stallsmith (*Signature of Contractor) 9342 (*License No.) LEVY BOCC (*Signature of Owner of Agent) 01/19/2018 (*Date)

BELOW THIS LINE – FOR OFFICIAL USE ONLY

Approval Granted By Gloria J. Hancock Issue Date 01/19/2018 Expiration Date 04/19/2018 Hydrologist Approval ___ Initials

Fee Received $ 40 Receipt No. 133791 Check No. OnLine-45081732-28495

THIS PERMIT IS NOT VALID UNTIL PROPERLY SIGNED BY AUTHORIZED OFFICER OR REPRESENTATIVE OF THE WMD OR DELEGATED AUTHORITY. THE PERMIT SHALL BE AVAILABLE AT THE WELL SITE DURING ALL CONSTRUCTION, MODIFICATION, OR ABANDONMENT ACTIVITIES.

*Permi No. 3-075-231615-1

SOU HWEST FLORIDA WATER MANAGEMENT DISTRICT
2379 BROAD STREET, BROOKSVILLE, FL 34604-6899
PHONE: (352) 796-7211 or (800) 423-1476
WWW.SWFWMD.STATE.FL.US

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
4049 REID STREET, PALATKA, FL 32178-1429
PHONE: (386) 329-4500
WWW.SJRWMD.COM

NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT
152 WATER MANAGEMENT DR., HAVANA, FL 32333-4712
(U.S. Highway 90, 10 miles west of Tallahassee)
PHONE: (850) 539-5999
WWW.NWFWMD.STATE.FL.US

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
P.O. BOX 24680
3301 GUN CLUB ROAD
WEST PLAM BEACH, FL 33416-4680
PHONE: (561) 686-8800
WWW.SFWMD.GOV

SUWANNEE RIVER WATER MANAGEMENT DISTRICT
9225 CR 49
LIVE OAK, FL 32060
PHONE: (386) 362-1001 or (800) 226-1066 (Florida only)
WWW.MYSUWANNEERIVER.COM

Comments:

***General Site Map of Proposed Well Location**

N.

Identify known roads and landmarks. Give distances from all reference points or structures, septic systems, sanitary hazards, and contamination sources, if applicable.

STATE OF FLORIDA WELL COMPLETION REPORT

☐ Southwest
☐ Northwest
☐ St. Johns River
☐ South Florida
■ Suwannee River
☐ DEP
☐ Delegated Authority (If Applicable)

PLEASE, FILL OUT ALL APPLICABLE FIELDS
(*Denotes Required Fields Where Applicable)

Date Stamp
Confirmation# 29275
Date:03/05/2018
Official Use Only

1. *Permit Number 231615 *CUP/WUP Number ______ *DID Number 133172 62-524 Delineation No. ______
2. *Number of permitted wells constructed, repaired, or abandoned 1 *Number of permitted wells not constructed, repaired, or abandoned 0
3. *Owner's Name LEVY BOCC 4.*Completion Date 02/14/2018 5. Florida Unique ID ______
5230 SE HIGHWAY 19;
6. INGLIS; FL - 34449
*Well Location – Address, Road Name or Number, City, ZIP
7. *County ______ *Section 20 Land Grant ______ *Township 14S *Range 16E
8. Latitude 291512.4884 Longitude 824327.462
9. Data Obtained From: ___ GPS _X_ Map ___ Survey Datum: ___ NAD 27 _X_ NAD 83 ___ WGS 84

10. *Type of Work: _X_ Construction ___ Repair ___ Modification ___ Abandonment
11. *Specify Intended Use(s) of Well(s):
___ Domestic ___ Landscape Irrigation ___ Agricultural Irrigation ___ Site Investigation
___ Bottled Water Supply ___ Recreation Area Irrigation ___ Livestock _X_ Monitoring
___ Public Water Supply (Limited Use/DOH) ___ Nursery Irrigation ___ Test
___ Public Water Supply (Community or Non-Community/DEP) ___ Commercial/Industrial ___ Earth-Coupled Geothermal
___ Class I Injection ___ Golf Course Irrigation ___ HVAC Supply ___ HVAC Return
Class V Injection: ___ Recharge ___ Commercial/Industrial Disposal ___ Aquifer Storage and Recovery ___ Drainage
Remediation: ___ Recovery ___ Air Sparge ___ Other (Describe) ______
___ Other (Describe) ______

12. *Drill Method: ___ Auger ___ Cable Tool _X_ Rotary ___ Combination (Two or More Methods) ___ Jetted ___ Sonic ___ Horizontal Drilling ___ Hydraulic Point (Direct Push) ___ Other ______
13. *Measured Static Water Level 0 ft. Measured Pumping Water Level ___ ft. After ___ Hours at ___ GPM
14. *Measuring Point (Describe) ______ Which is ___ ft. ___ Above ___ Below Land Surface *Flowing: ___ Yes _X_ No
15. *Casing Material: ___ Black Steel ___ Galvanized _X_ PVC ___ Stainless Steel ___ Not Cased ___ Other ______
16. *Total Well Depth 85 ft. Cased Depth 35 ft. *Open Hole: From 35 To 85 ft. *Screen: From ___ To ___ ft. Slot Size ______

17. *Abandonment: ___ Other(Explain) ______

From	To	No. of Bags	Seal Material (Check One)
___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___
___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___
___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___
___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___
___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___

18. *Surface Casing Diameter and Depth:

Dia	From	To	No. of Bags	Seal Material (Check One)
___ in.	___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___
___ in.	___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___

19. *Primary Casing Diameter and Depth:

Dia	From	To	No. of Bags	Seal Material (Check One)
2 in.	0 ft.	35 ft.	9	___ Neat Cement ___ Bentonite _X_ Other Cement
___ in.	___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___
___ in.	___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___
___ in.	___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___
___ in.	___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___

20. *Liner Casing Diameter and Depth:

Dia	From	To	No. of Bags	Seal Material (Check One)
___ in.	___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___
___ in.	___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___
___ in.	___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___

21. *Telescope Casing Diameter and Depth:

Dia	From	To	No. of Bags	Seal Material (Check One)
___ in.	___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___
___ in.	___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___
___ in.	___ ft.	___ ft.	___	___ Neat Cement ___ Bentonite ___ Other ___

22. Pump Type (If known):
___ Centrifugal ___ Jet ___ Submersible ___ Turbine
Horsepower ______ Pump Capacity (GPM) ______
Pump Depth ___ ft. Intake Depth ___ ft.

23. Chemical Analysis (When Required):
Iron ___ ppm Sulfate ___ ppm Chloride ___ ppm
___ Laboratory Test ___ Field Test Kit

24. Water Well Contractor:
*Contractor Name Stephanie Stallsmith *License Number 9342 E-mail Address stephanie@hussdrilling.com
*Contractor's Signature ______ *Driller's Name (Print or Type) Roy Rowland
(I certify that the information provided in this report is accurate and true.)

*Permit No. 231615

SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
2379 BROAD STREET, BROOKSVILLE, FL 34604-6899
PHONE: (352) 796-7211 or (800) 423-1476
WWW.SWFWMD.STATE.FL.US

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
4049 REID STREET, PALATKA, FL 32178-1429
PHONE: (386) 329-4500
WWW.SJRWMD.COM

NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT
152 WATER MANAGEMENT DR., HAVANA, FL 32333-4712
(U.S. Highway 90, 10 miles west of Tallahassee)
PHONE: (850) 539-5999
WWW.NWFWMD.STATE.FL.US

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
P.O. BOX 24680
3301 GUN CLUB ROAD
WEST PLAM BEACH, FL 33416-4680
PHONE: (561) 686-8800
WWW.SFWMD.GOV

SUWANNEE RIVER WATER MANAGEMENT DISTRICT
9225 CR 49
LIVE OAK, FL 32060
PHONE: (386) 362-1001 or (800) 226-1066 (Florida only)
WWW.MYSUWANNEERIVER.COM

***DRILL CUTTINGS LOG** (Examine cuttings every 20 ft. or at formation changes. Note cavities and depth to producing zone. Grain Size: F=Fine, M=Medium, and C=Coarse)

From (ft.)	To (ft.)	Color	Grain Size (F, M, C)	Material
0	8	Brown	Fine	Sand
8	18	Gray	Medium	Clay
18	85	White	Medium	Limestone

Comments:

Barnes, Ferland and Associates, Inc.
1230 Hillcrest Street
Orlando, FL 32803
PHONE: (407) 896 8608

LEVY 6 WELLSITE
SPT BORING LOG

PROJECT NUMBER: BFA# 2015-01.1
PROJECT NAME: Monitor Well Network Improvement Project
LOCATION: Levy 6 UFA, Gulf Hammock
DRILLING CO. Huss Drilling, Inc.
DRILLING METHOD: SPT boring
HYDROGEOLOGIST: Roger Simon
DATE BEGIN: 2/13/2018 DATE COMPLETED: 2/14/2018

PAGE: 1 of 1
TOTAL DEPTH: 87 ft.
GROUND SURFACE ELEVATION:
STATIC WATER LEVEL (Ft. BLS) 3.1
APPROX. WATER LEVEL (Ft ELEV.) :
TIME:
DATE :

SAMPLE			SAMPLE DESCRIPTION	STRATUM DESCRIPTION	REMARKS
No.	DEPTH (ft)	Blows/6"			
1	5		Brown, SAND W/Clay,(CL) low plasticity, cohesive	SAND AND CLAY	
2	10	3,3,3,3	Gray, LEAN CLAY W/ SAND, (CL) medium plasticity, cohesive		
3	15	13,4,12,12	Gray, LEAN CLAY W/ GRAVEL, (CH) medium plasticity, cohesive		
4	20	18,20,23,31	Gray, poorly graded SAND W/ CLAY and GRAVEL, (SP-SM)		1
5	25	wash cuttings	Brown, LIMESTONE, hard	LIMESTONE	
6	30		SAME AS ABOVE		
7	35		SAME AS ABOVE		
8	40		Cream, LIMESTONE		2
9	45		SAME AS ABOVE		
10	50		SAME AS ABOVE		
11	55		SAME AS ABOVE		
12	60		SAME AS ABOVE		
13	65		SAME AS ABOVE		
14	70		SAME AS ABOVE		
15	75		SAME AS ABOVE		
16	80		SAME AS ABOVE		
17	85		SAME AS ABOVE		3

REMARKS:
1 SPT refusal at 20 ft bls. Set nominal 4" PVC casing at 35 ft.
2 Loss mud circulation at 44 ft. bls
3 Boring complete at 87 ft. bls

DEP MONITORING WELL INVENTORY (MWI) DATA INPUT FORM

CO	F075
SITEID	-151719004

LAT	290936.708
LON	823751.152

SAMPER	Y
SAMPBY	12345
PUMP	S
GWLREC	Y
FSPX	
FSPY	

OWNER	JOHN FOLKS-DOF-LEBANON TOWER
ADDRES	FDACS 3125 CONNER BLVD
CITY	TALLAHASSEE
STATE	FL
ZIP	32399-165
PHONE	(904) 488-5096
USGSID	
COMP	3/ 4/86
BASINGS	03110101
AMCODE	W
STATUS	N
WTYPE	MW
WATUSE	
CONTYP	R
FAUC	B
TOTDEP	109
CASDEP	79
FINISH	G

TOPROCK	-42
ROKPIC	L
DPERMIT	22977

MPID	C
ACC	A
GWCOND	A
LOGGER	
LOGSRUN	

WPERMIT	
PMDR	0
LITHOLOG	
WELL#	
CORE	
PERM	
SIEVE	
PURGE	155
MLUSE	Y

SCRTYP	X
SCRDIA	3
CASTYP	X
CASDIA	3.00
LSD	33
MPELEV	34.76
AQCODE	FU
SUBCOD	124OCAL
AQTOP	+30
AQBOT	
GEOLOG	
DRILOG	Y
HYDATA	
CASMSL	-46
TDMSL	-76
MAXWL	30.00
MINWL	20.00
FNLADR	0
COMMENT1	PUMP SET AT 75'

DATENTR	12/18/00
LOCQA	Y

SRDRIL	Y
COST	2040

LOC_ACC	GPS4
DERID	290937082375201
MWI	Y

SUWANNEE RIVER
WATER MANAGEMENT DISTRICT
WELL COMPLETION REPORT

PERMIT # 22977

LEBANON TOWER (DOF)
Owner — Address — City — State — Zip

Dennis D. Hattel — 1974 — 3-4-86 — 110 — 110
Contractor Signature — License # — Completion Date — Casing Depth — Total Depth

Type of work: Construct ✓ Repair ____ Abandon ____

Well Use: Private ____ Public ____ Monitor ✓ Irrigation ____ Industrial ____ Other ____

Method: Rotary ✓ Cable Tool ____ Jet ____ Combination ____ Other ____

Casing: Black Steel ____ Galvanized ____ PVC ✓ Other ____

Bags of Grout 22 Interval Grouted 0 Ft. to 78 Ft.

Static Water Level 3.1 Ft. below Top of ~~Casing~~ GROUND

Pumping Water Level ____ Ft. after ____ Hrs. at ____ GPM

Pump Size ____ H.P. Capacity ____ GPM

LOCATION

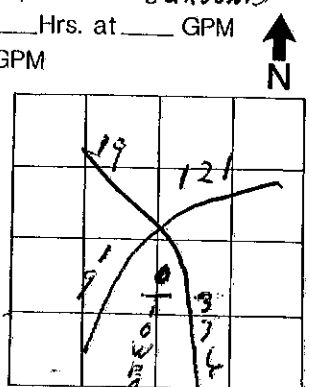
Located Near LEBANON TOWER

County LEVY

19 15S 17E
1/4 1/4 Section Township Range

Subdivision ____ Lot # ____

Latitude - Longitude ____



Locate in Section

Grout Thickness & Depth	Casing Diam.	Casing Depth	Depth (ft.) From	Depth (ft.) To	Examine cuttings at 20 ft. or smaller intervals and at changes. Give color, grain-size and type of material. Note any cavities. Indicate producing zones. Attach additional sheets if necessary.
2.5"	3"	0	0	1	DRK-BRN SI FI SA
0		110			W/RTS
78'			1	15	DRK-BRN - BLK
					SI SA W/ORGANICS
			15	36	BRN SL SI FI SA
			36	42	BRN SL SI CL
					FI SA
			42	74	BLUE CL
			74	110	GRY TO BRN SOFT-
					MED LS
					BT. 110'

Dennis D. Hattel — 10072
Driller's Signature — Registration #

-151719004
A-CJ

SUWANNEE RIVER WATER MANAGEMENT DISTRICT
Route 3 Box 64
Live Oak, FL 32060
(904) 362-6909

WELL INSPECTION/TECHNICAL DATA FORM

SRWMD Permit No. 22977
Reason for Inspection AMBIENT
S/D —
Project Status COMP

Date of Inspection 3/4/86
Referral —
Blk/Lot No. —
Equipment ROT

Time —
Inspector CERYAK
Qtr C
County LEVY
Well Use MONITOR

Visit No. 1
Contractor HATTEL
Sec 19 Twp 15S Rge 17E
Licensing —

Well Size 3"
Owner D.O.F.
Pump Type NON
Construction —

Violations: —

Action or Personal Contact: LEBANON TOWER (WEST) (WELL)

Recommendation:

Comments:

Disposition:

Transaction: A D M

SRWMD Site ID# -151719004
Latitude 290933 ~~26~~ 36.708 12/00
Longitude 823757 ~~[illegible]~~ 51.152
Topo Map# 132-A

FL. ST. Plane X Coord.
Y Coord.
Land Surface Datum Elevation (NGVD) 33
Measuring Point ID TOC

Measuring Point Elevation (NGVD) ~~35~~ 34.76 TOP PVC 34.77 TOP 6" STEEL
Site Type

Hydrogeologic Unit FLA
Ground-Water Condition ?

Top of Producing Zone -41 MSL

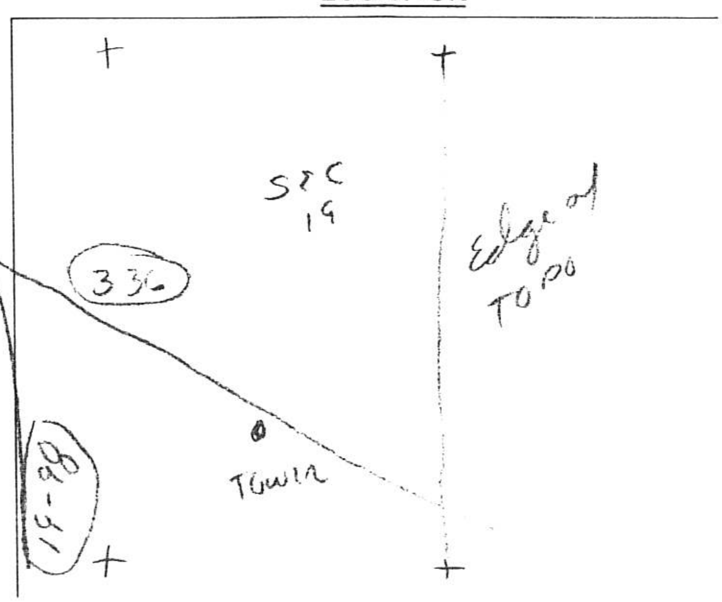
Water Level Possible? yes

Water Sample Possible? yes

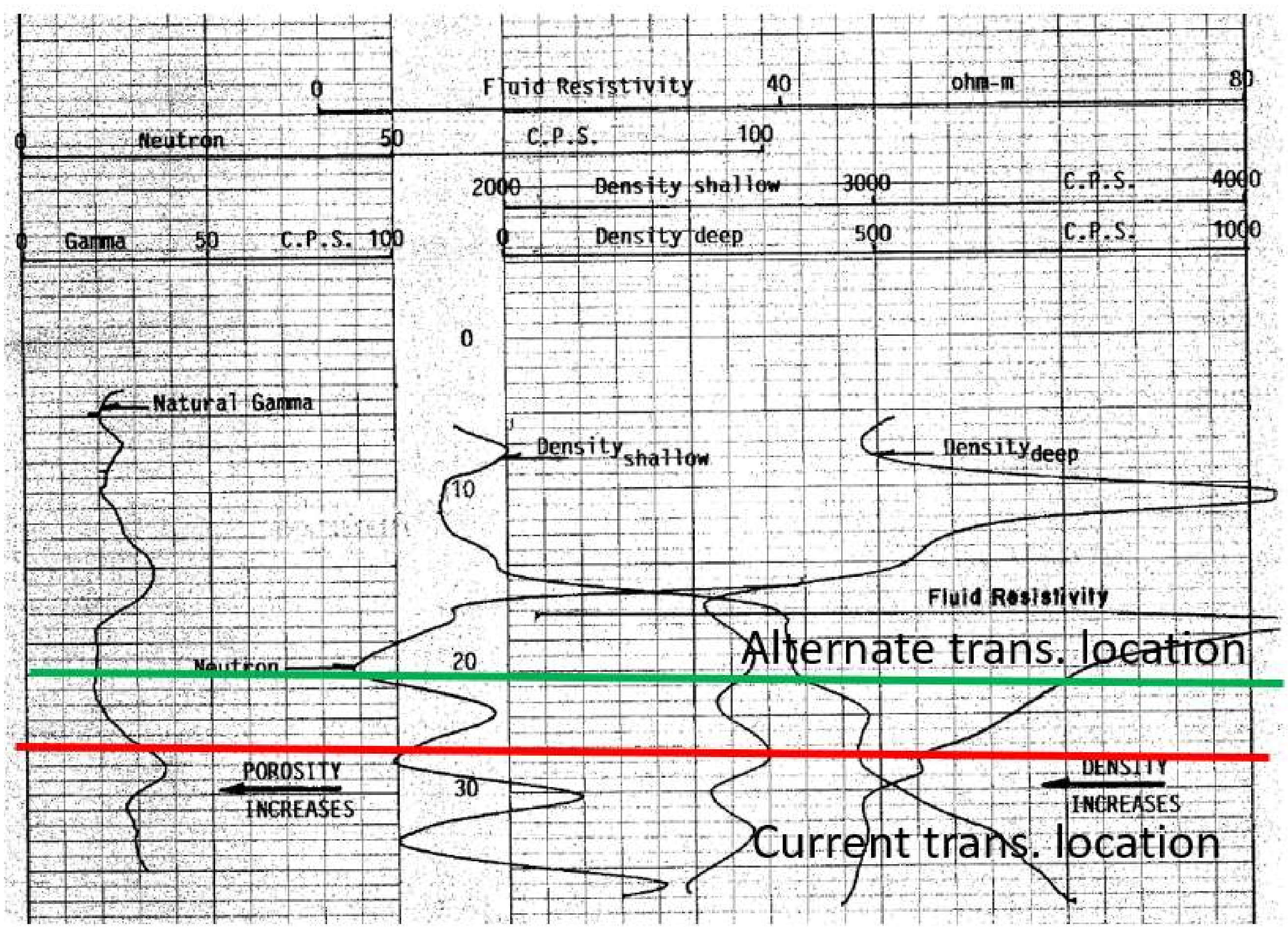
USGS ID# —
Bureau of Geology# —

Well Located by (initials) Ron
SRWMD Permit# 22767

LOCATION



APPENDIX B
Well Geophysical Records



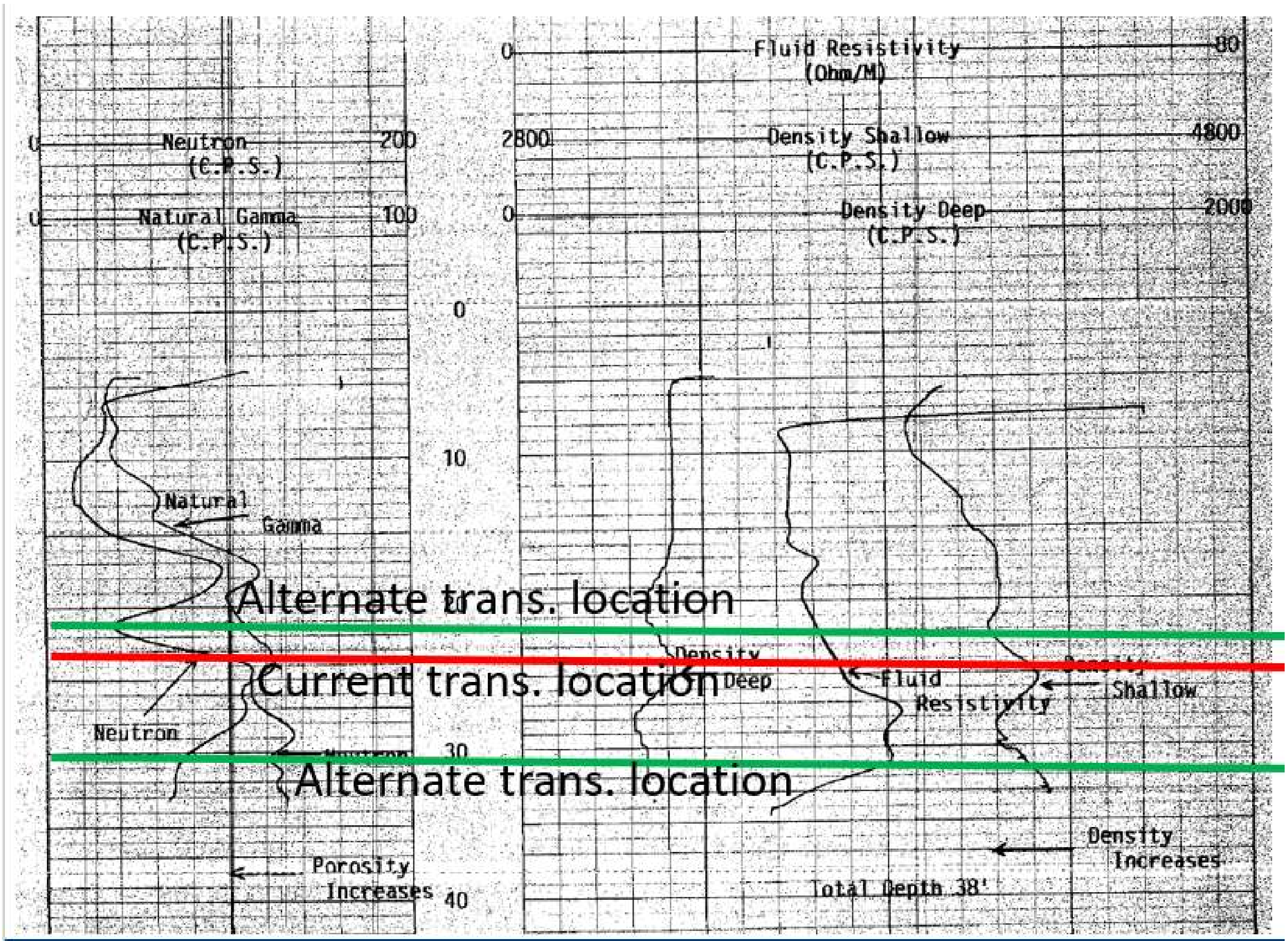
Geophysical Log
Hampton Tower

Geosyntec consultants

SUWANNEE RIVER WATER MANAGEMENT DISTRICT

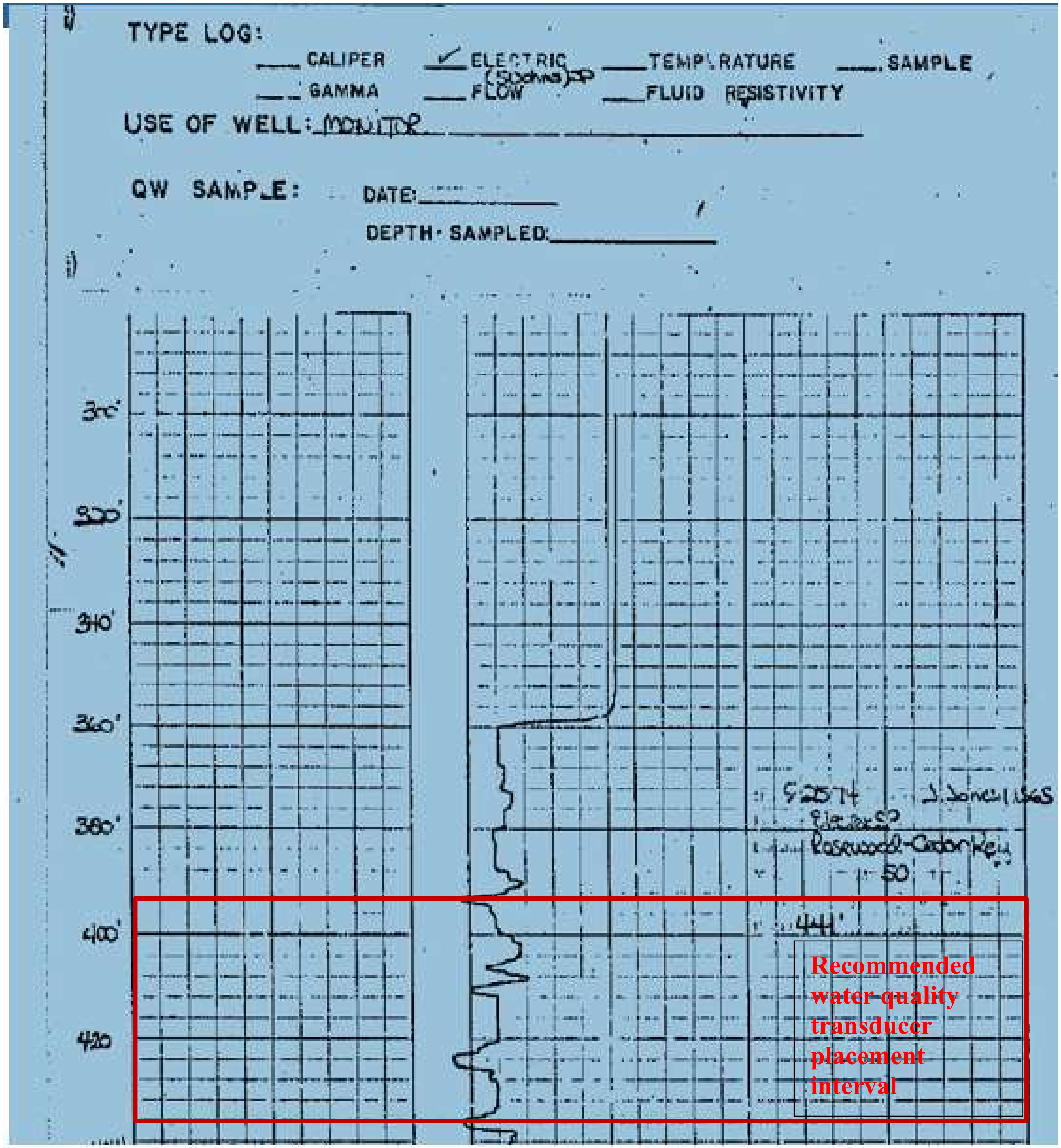
Figure **2**

Office Location | 25-Feb-2022



Geophysical Log
Salem Tower

Geosyntec consultants		Figure **3**
Office Location	25-Feb-2022	



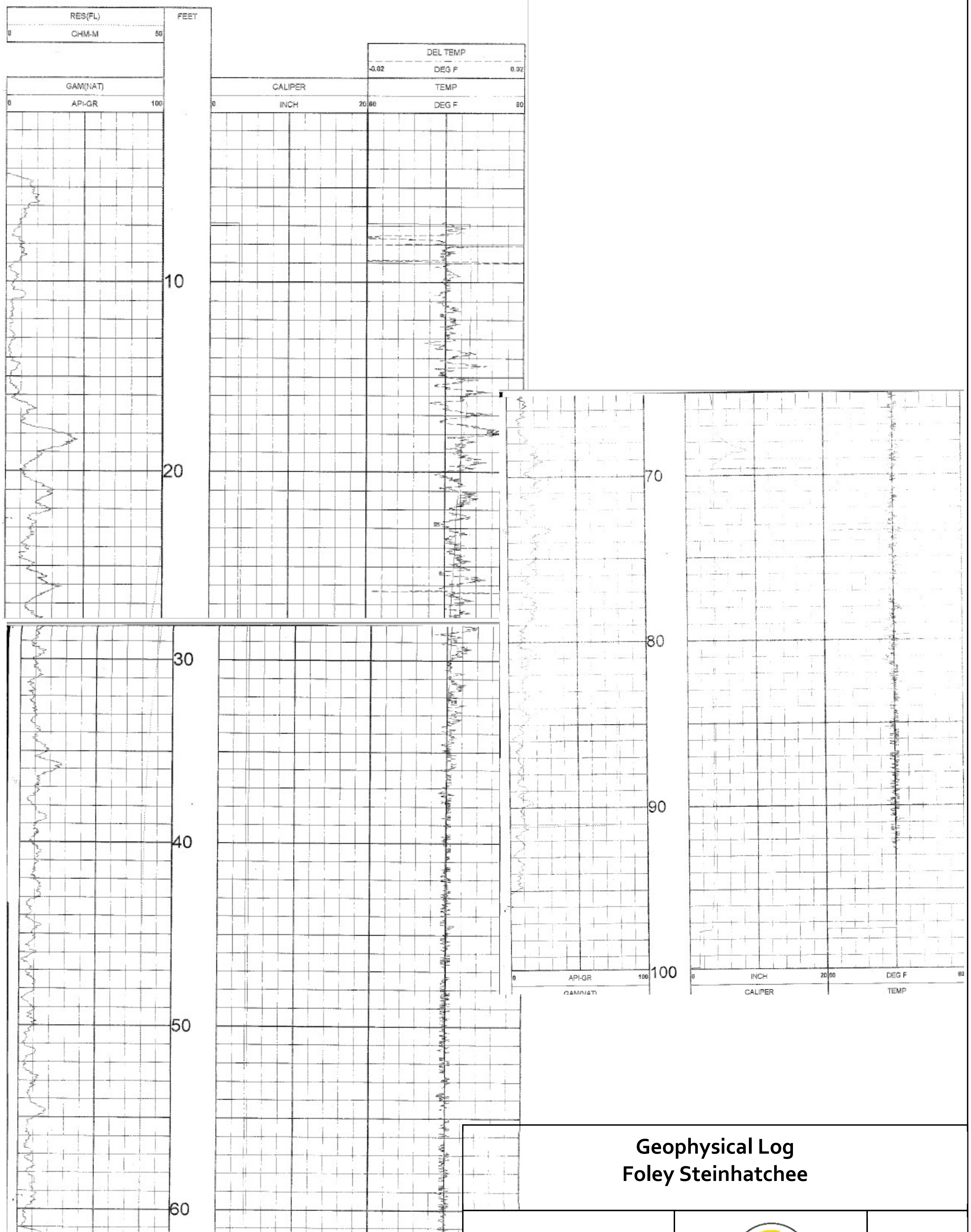
Geophysical Log
Rosewood Tower

Figure 4

Office Location

25-Feb-2022

internal info: path, date revised, author



Geophysical Log
Foley Steinhatchee

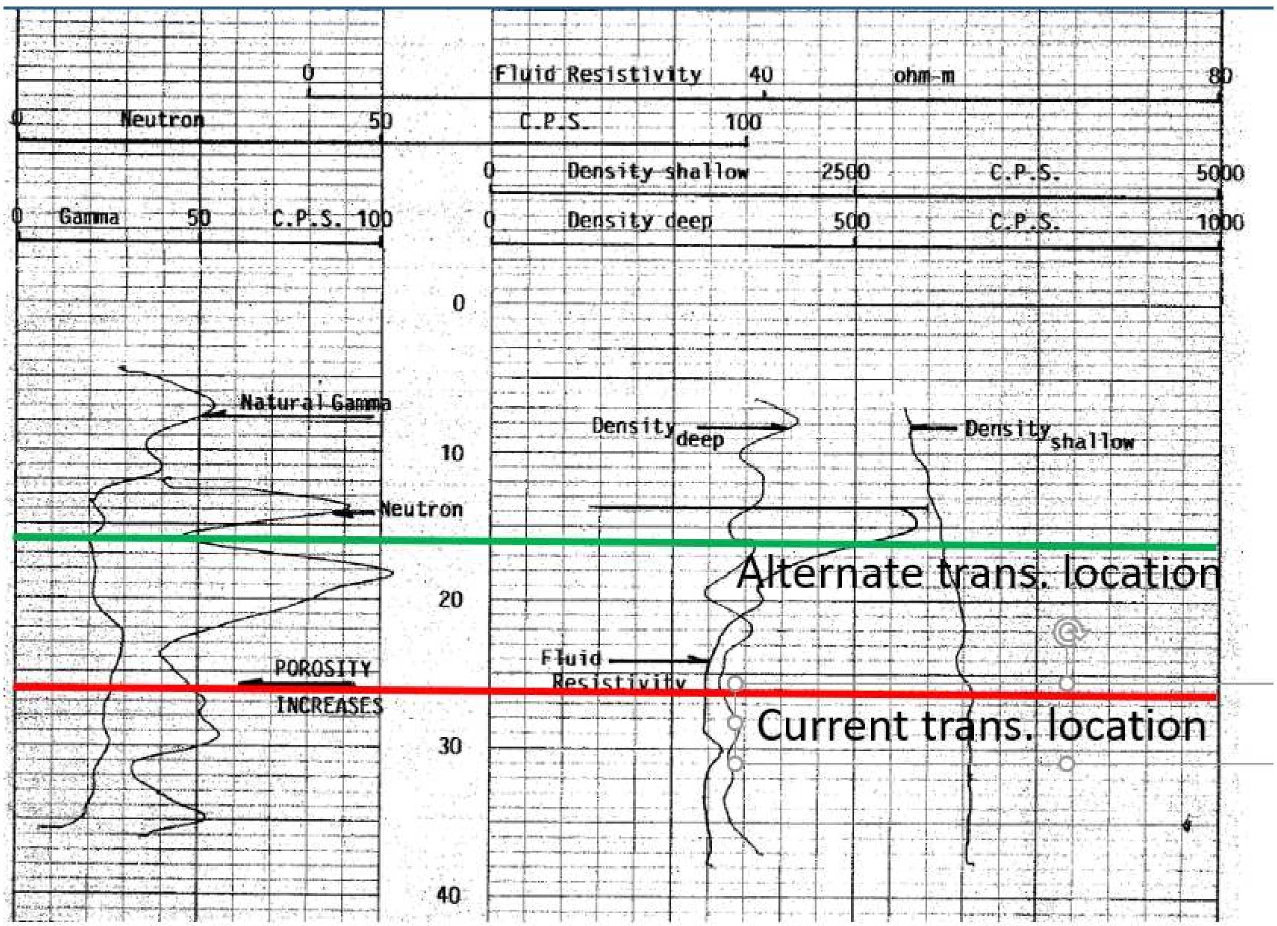
Geosyntec consultants

Figure **5**

Office Location

25-Feb-2022

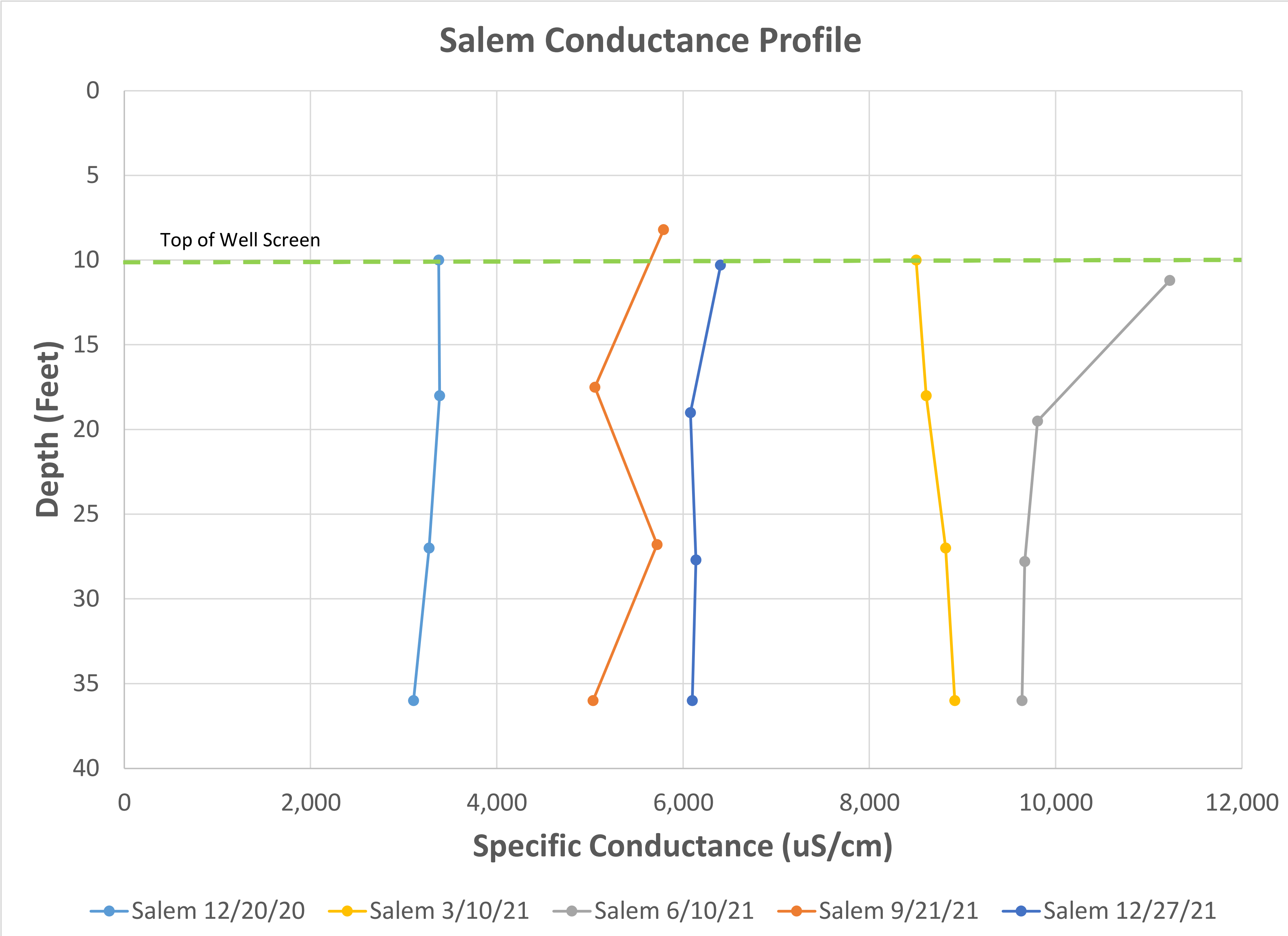
internal info; path, date revised, author



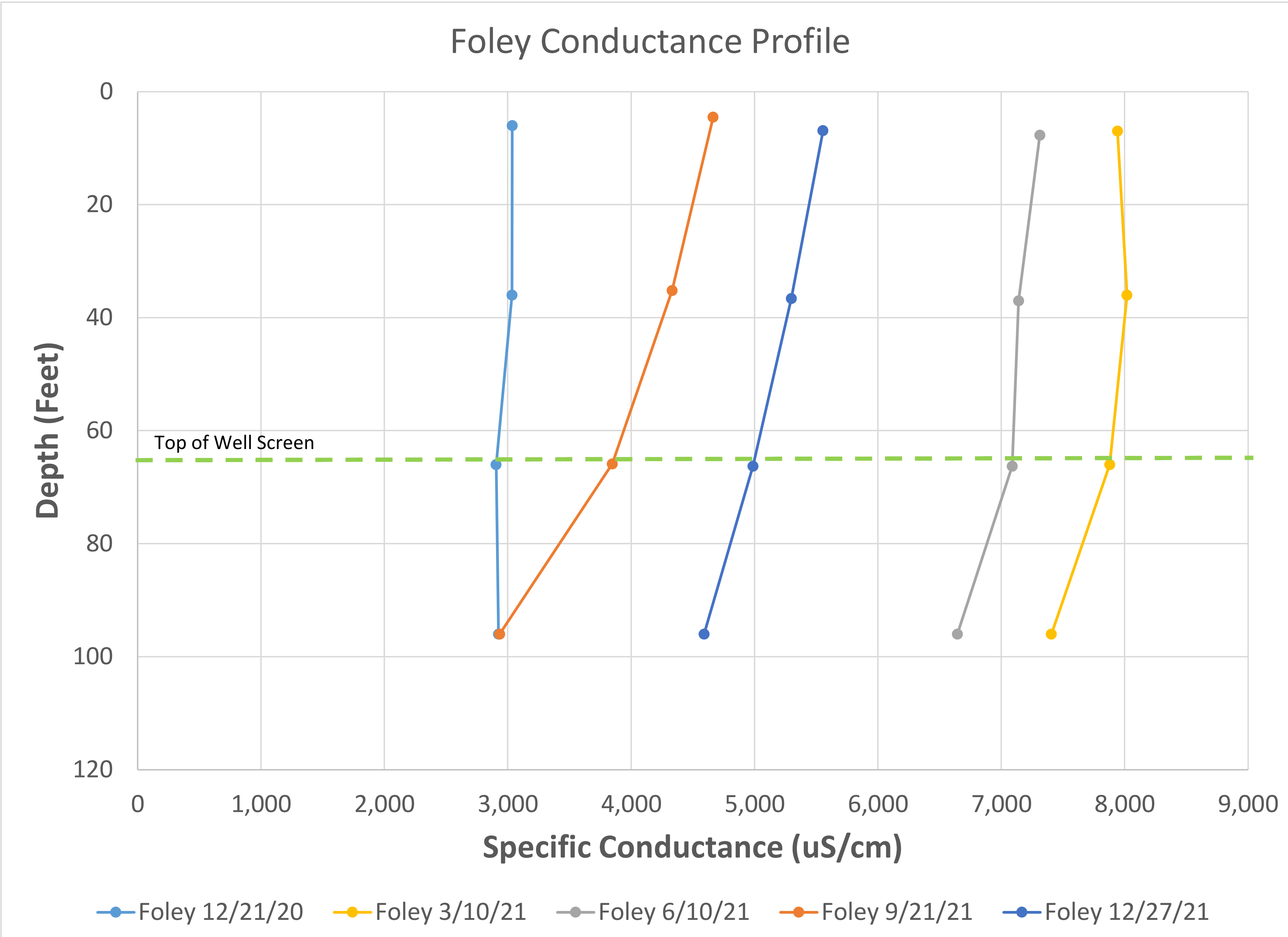
Geophysical Log
Cabbage Grove Tower

Geosyntec consultants	SUWANNEE RIVER WATER MANAGEMENT DISTRICT	Figure **1**
Office Location	25-Feb-2022	

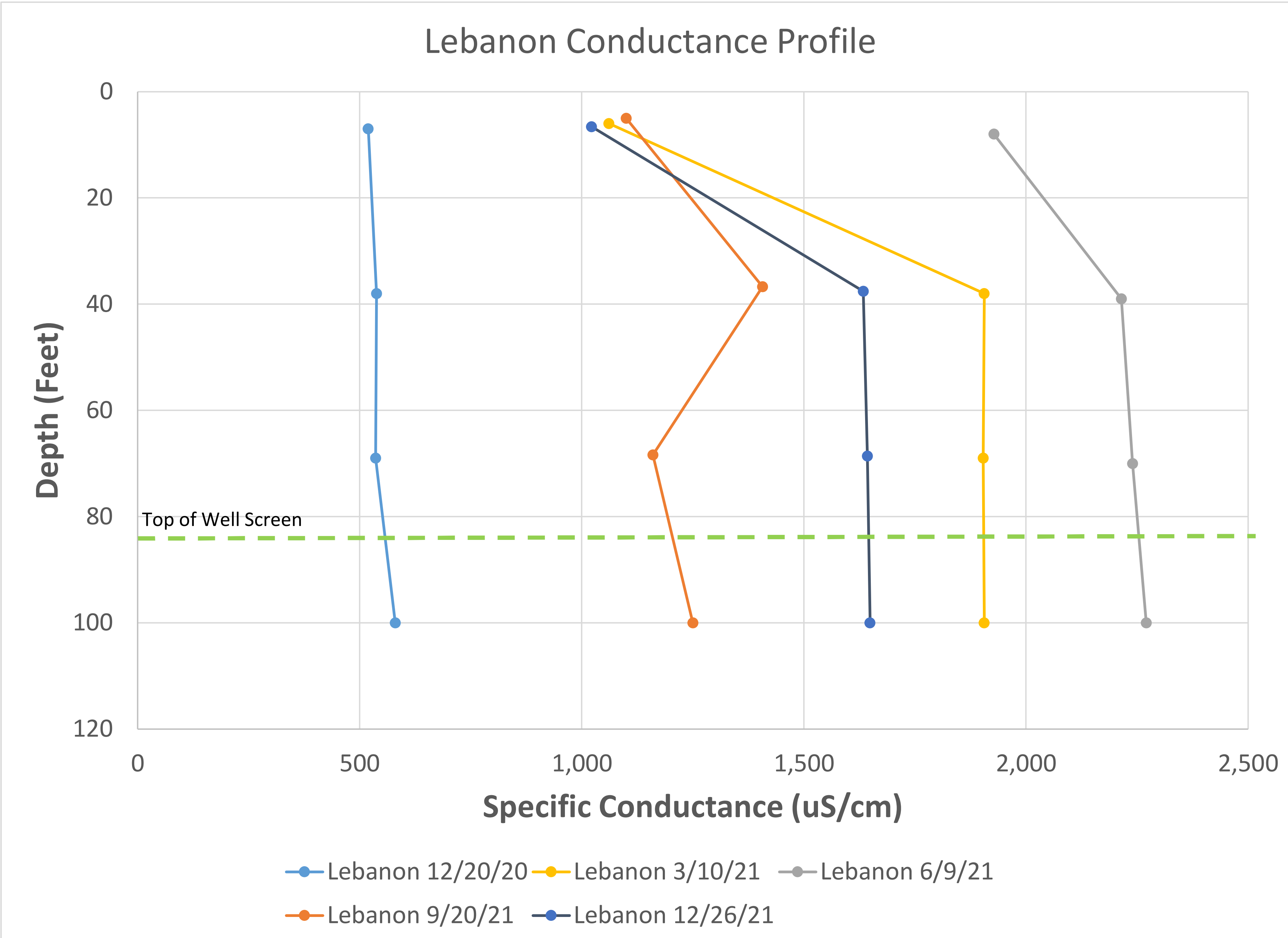
APPENDIX C
Conductivity Profiles



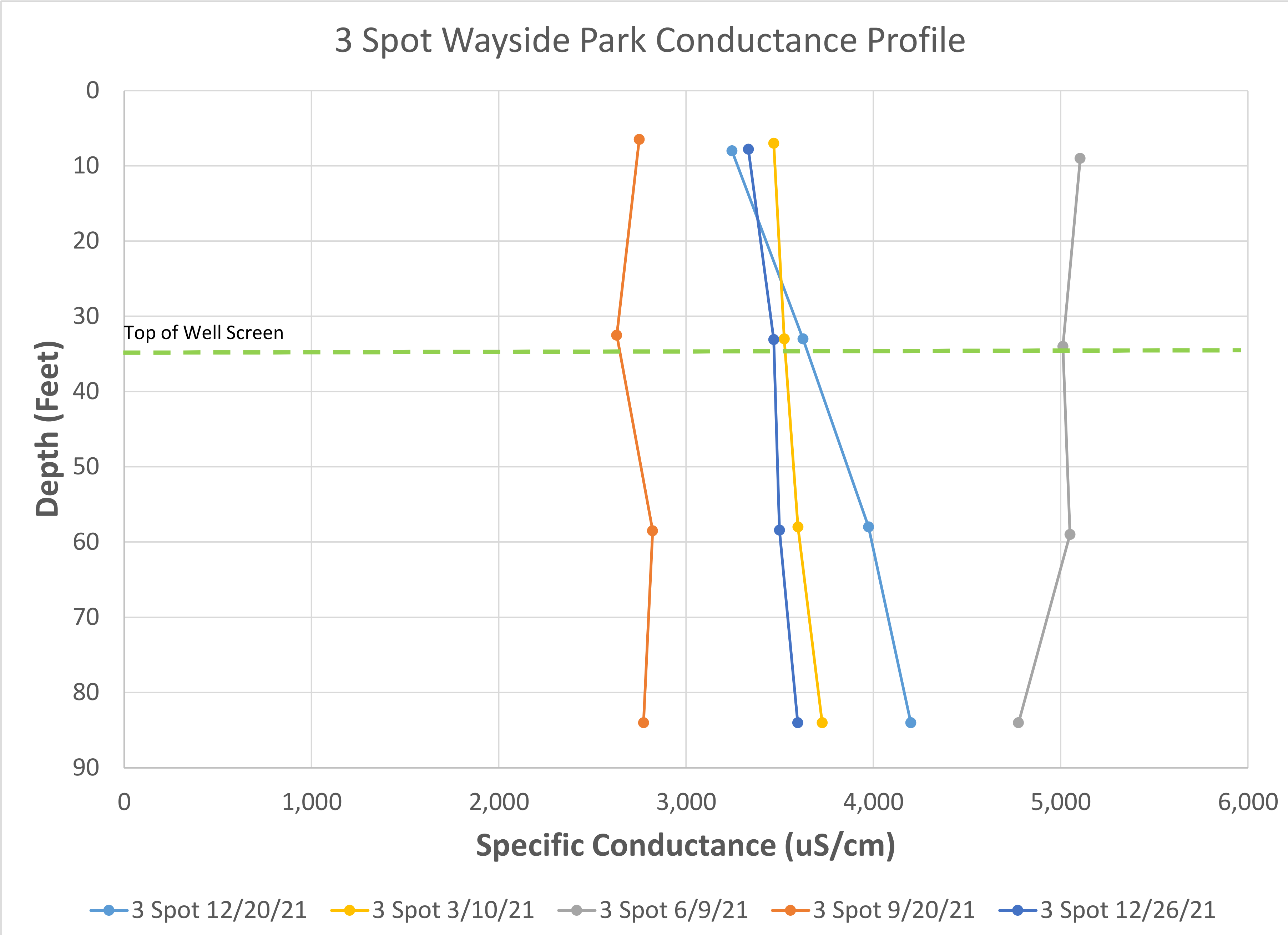
Salem Conductance Profile
Top of Well Screen
Depth (Feet)
0
5
10
15
20
25
30
35
40
0
2,000
4,000
6,000
8,000
10,000
12,000
Specific Conductance (uS/cm)
Salem 12/20/20
Salem 3/10/21
Salem 6/10/21
Salem 9/21/21
Salem 12/27/21

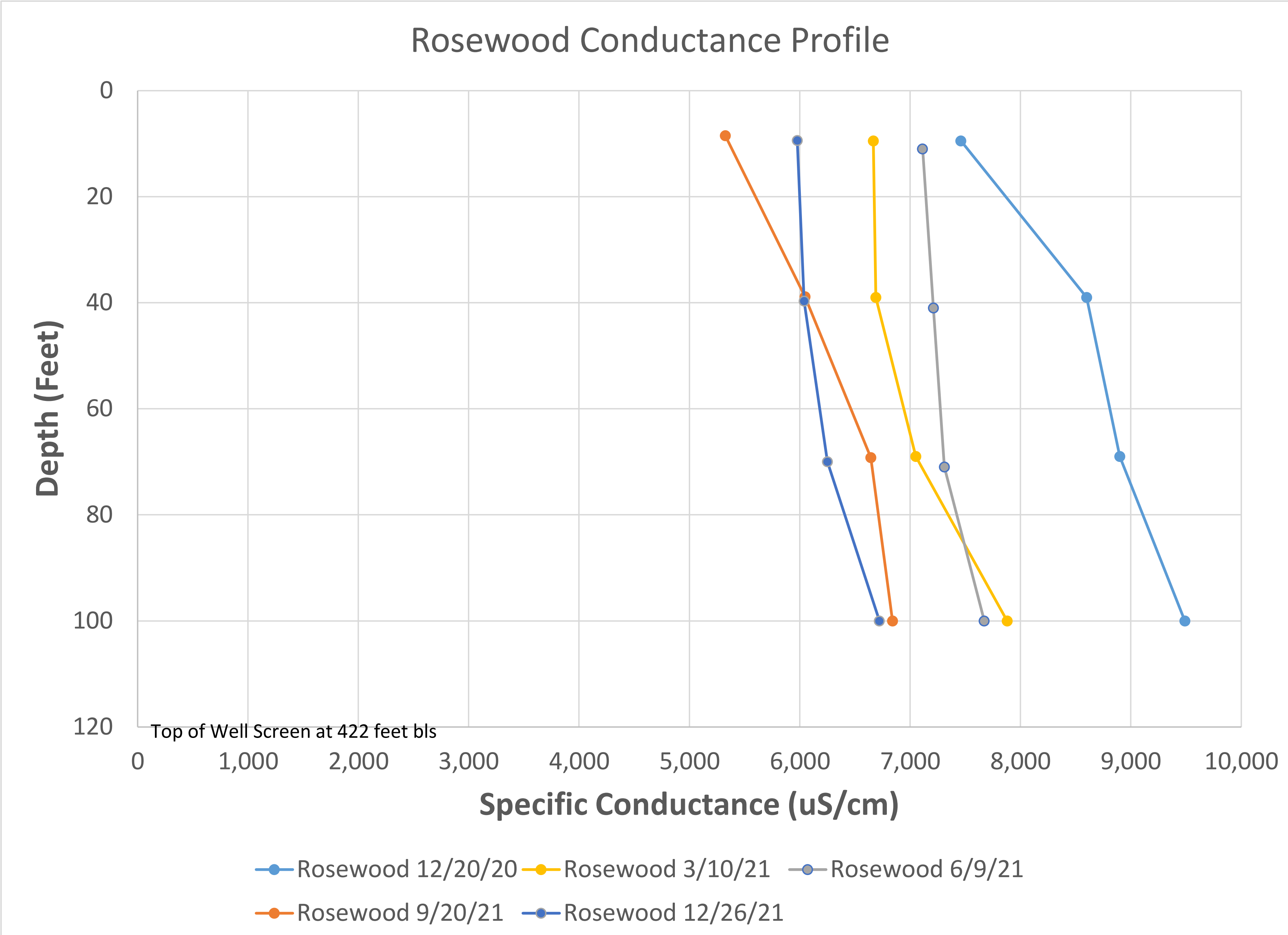


Foley Conductance Profile
Depth (Feet)
0
20
40
60
80
100
120
Top of Well Screen
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
Specific Conductance (uS/cm)
Foley 12/21/20
Foley 3/10/21
Foley 6/10/21
Foley 9/21/21
Foley 12/27/21

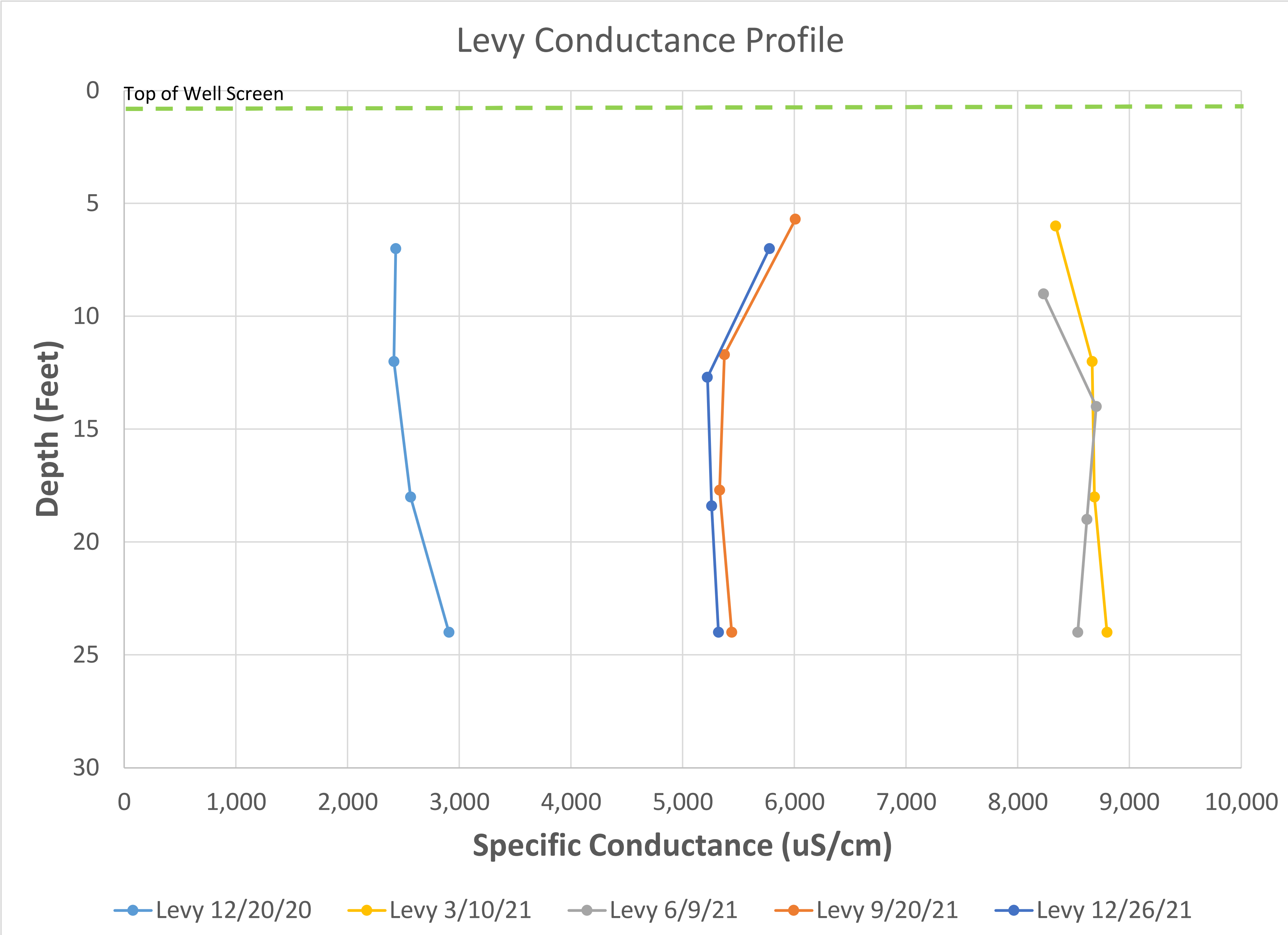


Lebanon Conductance Profile
Depth (Feet)
0
20
40
60
80
100
120
Top of Well Screen
0
500
1,000
1,500
2,000
2,500
Specific Conductance (uS/cm)
Lebanon 12/20/20
Lebanon 3/10/21
Lebanon 6/9/21
Lebanon 9/20/21
Lebanon 12/26/21

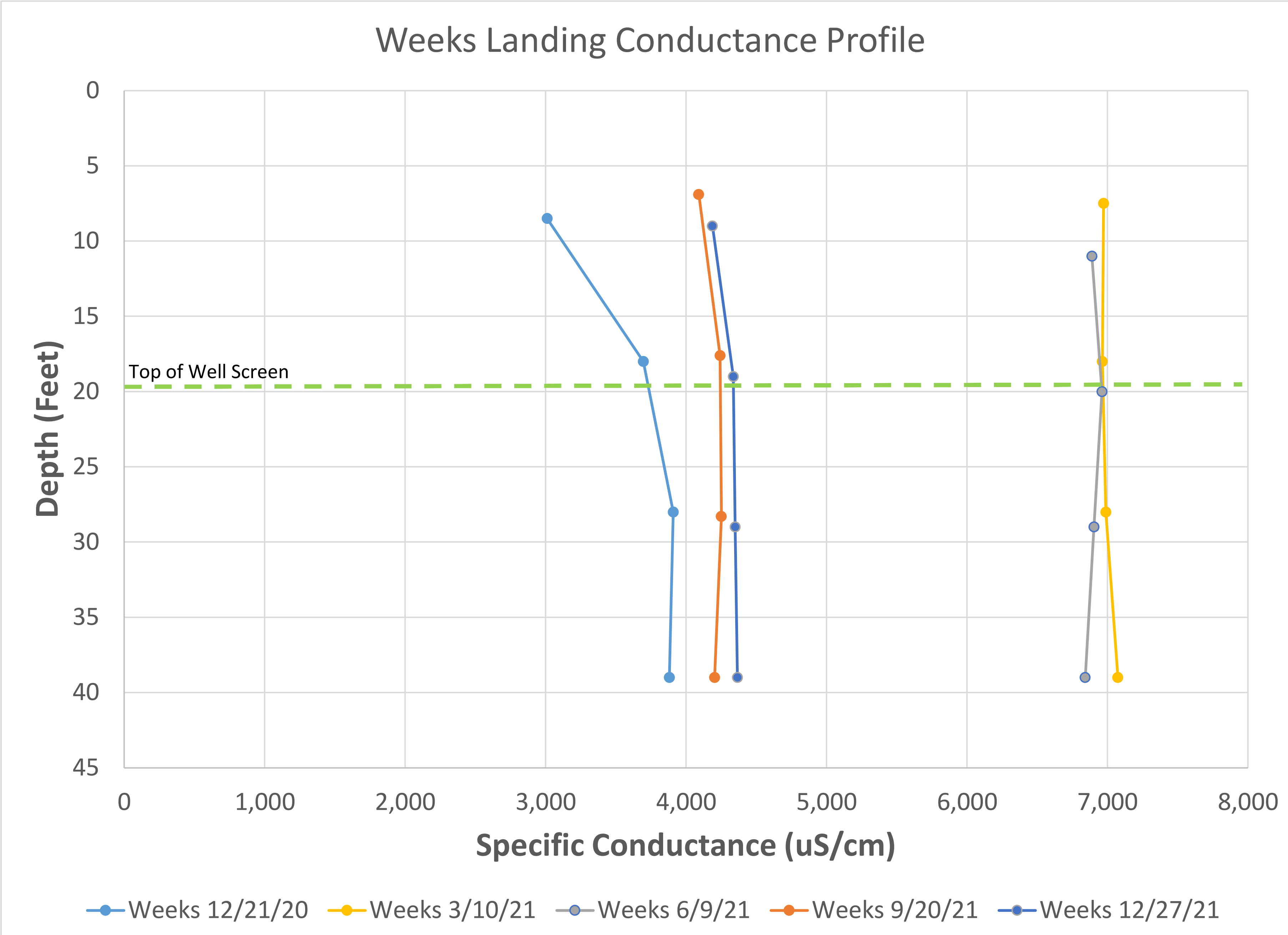

3 Spot Wayside Park Conductance Profile
Top of Well Screen
Depth (Feet)
0
10
20
30
40
50
60
70
80
90
0
1,000
2,000
3,000
4,000
5,000
6,000
Specific Conductance (uS/cm)
3 Spot 12/20/21
3 Spot 3/10/21
3 Spot 6/9/21
3 Spot 9/20/21
3 Spot 12/26/21



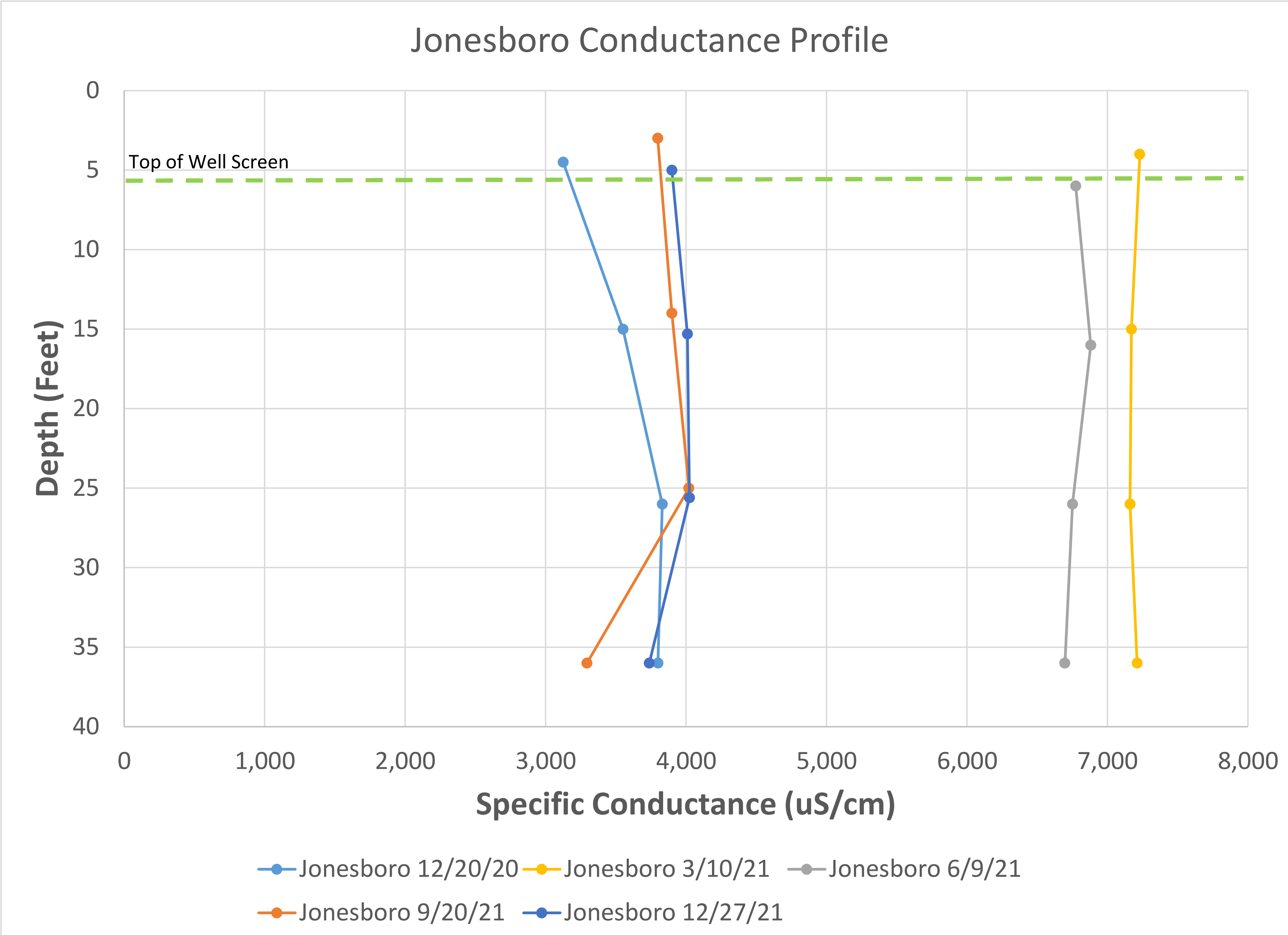
Rosewood Conductance Profile
Depth (Feet)
0
20
40
60
80
100
120
Top of Well Screen at 422 feet bls
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
Specific Conductance (uS/cm)
Rosewood 12/20/20
Rosewood 3/10/21
Rosewood 6/9/21
Rosewood 9/20/21
Rosewood 12/26/21



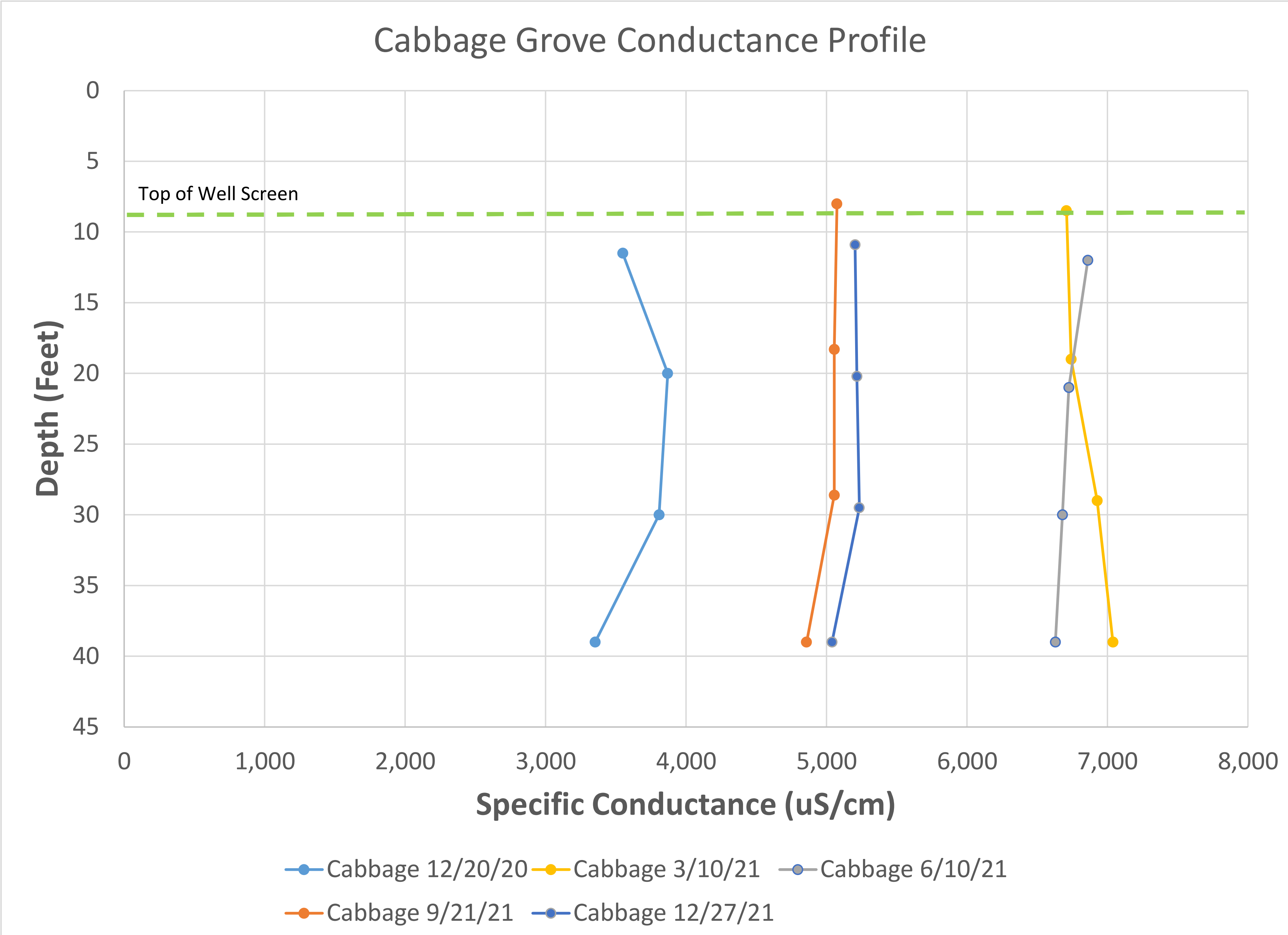
Levy Conductance Profile
Top of Well Screen
Depth (Feet)
0
5
10
15
20
25
30
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
Specific Conductance (uS/cm)
Levy 12/20/20
Levy 3/10/21
Levy 6/9/21
Levy 9/20/21
Levy 12/26/21



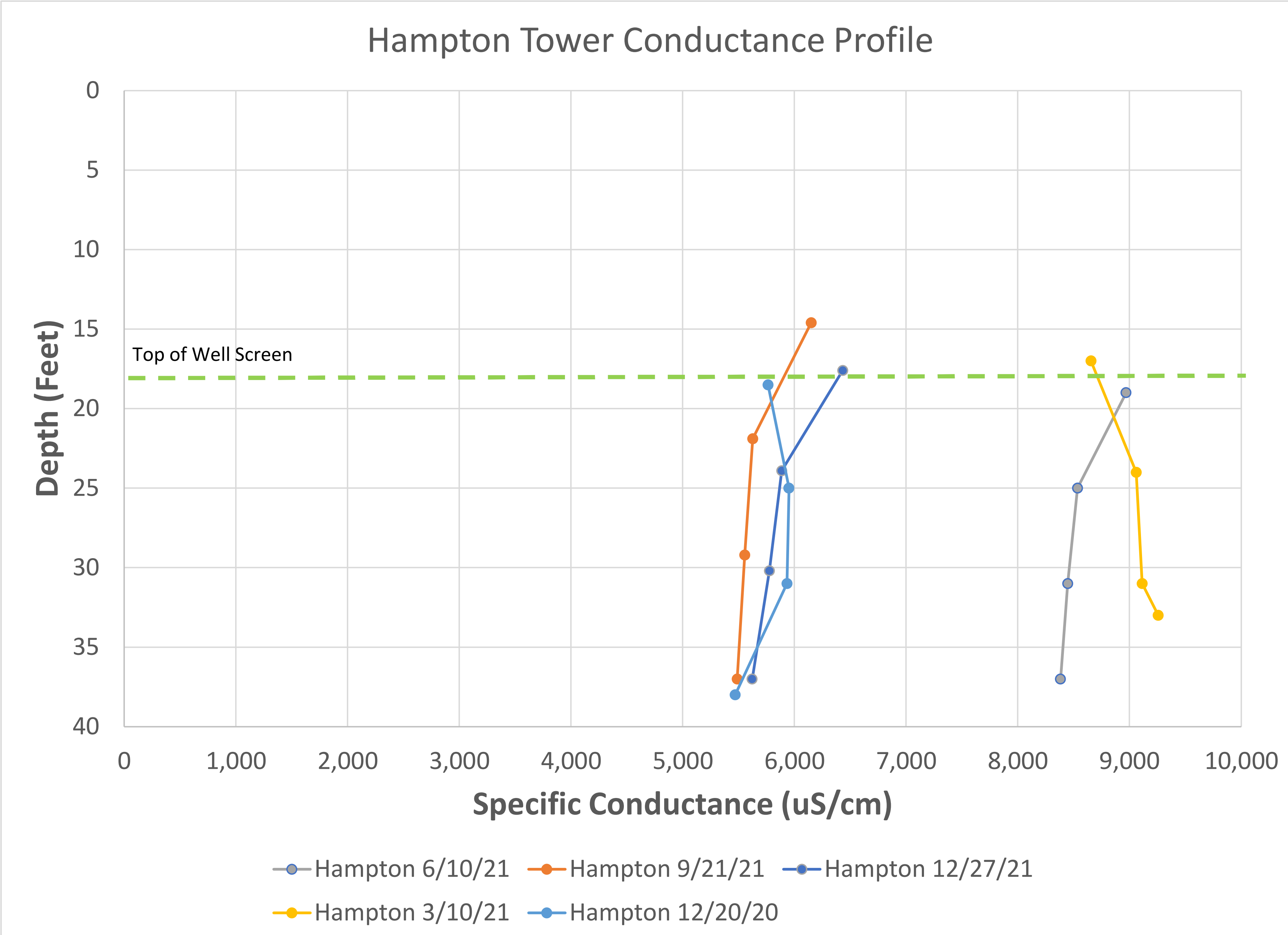
Weeks Landing Conductance Profile
Depth (Feet)
Specific Conductance (uS/cm)
Top of Well Screen
0
5
10
15
20
25
30
35
40
45
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
Weeks 12/21/20
Weeks 3/10/21
Weeks 6/9/21
Weeks 9/20/21
Weeks 12/27/21



Jonesboro Conductance Profile
Top of Well Screen
Depth (Feet)
0
5
10
15
20
25
30
35
40
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
Specific Conductance (uS/cm)
Jonesboro 12/20/20
Jonesboro 3/10/21
Jonesboro 6/9/21
Jonesboro 9/20/21
Jonesboro 12/27/21



Cabbage Grove Conductance Profile
Top of Well Screen
Depth (Feet)
0
5
10
15
20
25
30
35
40
45
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
Specific Conductance (uS/cm)
Cabbage 12/20/20
Cabbage 3/10/21
Cabbage 6/10/21
Cabbage 9/21/21
Cabbage 12/27/21



Hampton Tower Conductance Profile
Depth (Feet)
0
5
10
15
20
25
30
35
40
Top of Well Screen
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
10,000
Specific Conductance (uS/cm)
Hampton 6/10/21
Hampton 9/21/21
Hampton 12/27/21
Hampton 3/10/21
Hampton 12/20/20

APPENDIX D
Statistical Evaluation

Geosyntec consultants

130 Stone Road West
Guelph, Ontario N1G 3Z2
PH: (519) 822-2230
www.geosyntec.com

Memorandum

Date: April 6, 2022

To: Robbie McKinney, SRWMD

From: Matt Gozdor, Lisa D'Agostino, Cathy Crea; Geosyntec Consultants, Inc.

Subject: **Task Work Assignment 19/20-036.004 Coastal Salinity Network Evaluation of Field Sampling and Data Collection Techniques- Task 2**

Geosyntec Consultants, Inc. (Geosyntec) has prepared this memorandum to document our evaluation of data collected by the Suwannee River Water Management District (SRWMD) in the ten groundwater monitoring wells that comprise the coastal salinity network in the referenced Task Work Assignment. This work consisted of preparation of plots and statistical evaluations comparing contemporaneous measurements of conductivity in the field, at the lab, and/or via a transducer. Evaluation of trends via statistical methods for wells with appropriately placed transducers was also conducted.

ACCURACY AND REPRODUCIBILITY IN CONDUCTIVITY MEASUREMENTS

As a reference for the expected range of bias and reproducibility that can be expected in repeated conductivity measurements in different locations and with different conductivity meters, we refer to EPA Method 120.1: Conductance by Conductivity Meter (EPA 1982). The method contains a table outlining the results of an inter-laboratory study of the measurement of conductivity in six synthetic water samples. Among the six water samples, the bias as a percentage of the conductivity measurement ranged from -0.76% to -5.36%. Based on this, we expect measurements by different methods to be within about 5% of each other on average. The relative standard deviations of the measurements as a percentage of the conductivity, ranged from 6.5% to 9.4%. Based on this, we expect that an acceptable range for the percent difference between paired contemporaneous conductivity measurements to be for a large majority (90-95% of measurements) to be within 10%. Given that the lab, field, and transducer measurements are performed using different devices in different environments by different personnel, some low level of difference between the measurements is to be expected.

STATISTICAL EVALUATIONS

The conductivity data collected by the SRWMD in the ten groundwater monitoring wells that comprise the coastal salinity network were analyzed statistically to compare differences in measurement methods. The three comparisons made among the methods were:

1. Field versus laboratory measurements;
2. Transducer versus Field measurements; and

Geosyntec consultants

3. Transducer versus laboratory measurements.

Conductivity data were compared using the following statistical methods:

1. Ratio paired t-test – a test to compare the average ratio of measurements among methods and determine whether average ratio is to be within about 5% of each other on average.
2. Bland-Altman plots – plots to evaluate the agreement (i.e., via percent differences) between quantitative measurements obtained by two different methods.
3. Temporal trend tests – Mann-Kendall and linear regression were using to determine whether conductivity values were increasing, decreasing or stable trends.

For each of the ten monitoring wells, a Bland-Altman plot was prepared, and a ratio paired t-test was performed to examine the differences between the available paired measurements. For the six (6) wells, for which the transducer was placed outside the screened interval or transducer data was unavailable, only the field vs. lab comparison was performed. For the remaining four (4) monitoring wells with transducer data from a transducer placed in the screened interval, all three comparisons were made. For these latter four wells, trend tests were also conducted to determine whether conductivity was increasing, decreasing or showed a stable trend. The table below summarizes these analyses and comparisons for each of the ten monitoring wells.

When transducer data was available, the average of hourly measurements bracketing a field measurement was used for comparison. Occasional extreme outlying transducer measurements were excluded from the averages and replaced with the nearest measurement in the usual range before or after the measurement event as required. These outlying values may be associated with calibration, movement, or adjustment of the transducers.

Well Name	Location ID	Ratio Paired t-test/Bland-Altman Plot	Trend Test	Comparison 1: Field vs. Lab	Comparison 2: Transducer vs. Field	Comparison 3: Transducer vs. Lab
Cabbage Grove Tower	S030424003	X	X	X	X	X
Hampton Tower DOC	S050615002	X	X	X	X	X
Levy Co Comm Fowlers Bluff Refuge	S141305001	X	X	X	X	X
Salem Tower	S080907003	X	X	X	X	X
Foley Steinhat	S090914003	X		X		
GP6 UFA near	S121330002	X		X		
Jonesboro Tower	S091011004	X		X		
Lebanon Tower	S151719004	X		X		
Rosewood Tower	S141429001	X		X		
Three Spot Wayside	S141620007	X		X		

Ratio Paired t-Test and Ratio Plots

The results of the ratio paired t-test are in **Table 1**. The ratio paired t-test was performed by conducting a t-test on the log transformed ratios of paired measurements for comparisons 1 through 3 and constructing a 95% confidence interval around the mean. The results are also presented in ratio plots (Figure 1a and Figure 1b). In these plots, the mean ratio is plotted as a circle and the vertical lines extended from the circle represent the 95% confidence interval on the estimate of mean ratio. If the 95% confidence interval crosses a ratio of 1, corresponding to exactly equal measurements, then the mean ratio is not statistically significantly different from 1 at a 95% confidence level (i.e., the p-value of the test does not conclude a statistically significant difference). The horizonal dashed lines are drawn at 0.95 and 1.05 which represents the expected range in bias (i.e., 5% above and below 1).

Among the six wells with only laboratory and field measurements (**Figure 1a**), the ratio paired t-test indicates that the mean ratio of measurements are not statistically significantly different from 1. In general, the mean ratio and associated 95% confidence are contained within 0.95 and 1.05. This indicates the measurements between field and lab methods are, in general, in good agreement and within the expected range of bias.

Among the four wells that also had transducer data (**Figure 1b**) and method comparison 1 (lab vs. field), the results for of the paired t-test indicates a mean ratio of measurements between are not statistically significantly different from, except for S030424003 (Cabbage Grove Tower). For this one well, the 95% confidence interval for the mean ratio is slightly above one ranging from 1.001 to 1.035 and is not practically different from 1. In general, the mean ratio and associated 95% confidence intervals touch are contained within 0.95 and 1.05, except for S080907003 (Salem Tower). For this one well, the lab measurements include some conductivity values that are significantly above any of the field or transducer measurement, which could be indicative of lab errors. However, Among the other three wells, the measurements between field and lab methods are, in general, in good agreement and within the expected range of bias.

For method comparisons 2 and 3 (**Figure 1b**), or transducer vs. field and transducer vs. laboratory comparisons, the mean ratios for two of the four wells (S030424003 [Cabbage Grove Tower] and S050615002 [Hampton Tower DOC]) are within the range of 0.95 to 1.05, i.e., expected range of 5% bias. For these two wells, the mean transducer to field and transducer to lab ratios are not significantly different from 1, except for transducer to field at S030424003 (Cabbage Grove Tower).

The results for method comparisons 2 and 3 at the other two wells (S141305001 [Levy Co Comm Fowlers Bluff Refuge] and S080907003 [Salem Tower]) show different levels of agreement (**Figure 1b**). At S141305001 (Levy Co Comm Fowlers Bluff Refuge), the mean ratios are slightly greater than 1.05 and the 95% confidence intervals on the means include 1.05, so the mean ratios are not significantly outside the 0.95 to 1.05 range. This indicates that the mean ratio is not entirely outside the expected range of bias, but there is a slight positive bias for method comparisons 2 and 3.

For S080907003 (Salem Tower), the mean transducer to field and lab to field ratios have 95% confidence intervals outside the 0.95 to 1.05 range, with mean ratios greater than 1.2 (**Figure 1b**). This indicates a significant positive bias in conductivity measurements with the transducer in this well. There may be issues with field sampling procedures, transducer deployment, and/or transducer calibration that contribute to this bias.

Bland-Altman Plots

The Bland-Altman plot is a method for evaluating the agreement between quantitative measurements obtained by two different methods. The plot consists of the mean of paired measurements along the x-axis with the percent difference between the measurement calculated in a directional manner along the y-axis. One specific method is always subtracted from the other when calculating the difference, which is then divided by the mean of the measurements and converted to a percentage. Horizontal lines are plotted at the mean percent difference and at the limits of the agreement interval in which 95% of normally distributed, paired measurements would be expected to fall. Bland-Altman plots for each of the ten groundwater monitoring wells are provided in **Figure 2a** to **Figure 2j** and a summary of the Bland-Altman statistics provided in **Table 2**.

For the six groundwater monitoring wells, with only field and laboratory measurements to compare, the mean percent differences were all within the target range or +/- 5% and ranged from -1% to 2%, while the limits of agreement within which 95% of normally distributed measurements would be expected to fall were generally around the +/- 10% range with lower limits of agreement ranged from -6% to -11% and upper limits of agreement ranging from 9% to 13% and 51 of 52 measurements (96%) falling within +/-10% difference (**Figure 2a** to **Figure 2f**). Similar to the results of the ratio tests, this indicates good agreement between the lab and field measurements of conductivity for these six groundwater monitoring wells.

For the four wells that also had transducer data, Bland-Altman plots were generated for the three method comparisons (**Figure 2g to Figure 2j**). For groundwater monitoring well S030424003 (Cabbage Grove Tower), agreement between all three methods of conductivity measurement was generally good, with mean percent differences ranging from 2% (transducer vs. lab) to 5% (transducer vs. field), lower limits of agreement between -6% and -3%, and upper limits of agreement between 8% and 13% (**Figure 2g**). All the measurements examined were within +/-10% difference, including at least 9 measurements for each pair of methods. There is good agreement between field-measured, transducer-measured, and laboratory-measured conductivity.

For groundwater monitoring well S050615002 (Hampton Tower DOC), the mean percent differences were within the acceptable range of +/- 5% ranging from -5% to 4%, but there was more variability in the measurements with the lower limits of agreement ranging from -26% to -

21% and the upper limits of agreement ranging from 16% to 29% (**Figure 2h**). The variability in the lab measurements vs. the field measurements was caused by one outlying laboratory measurement, which was higher than all the field and transducer measurements, while the remaining measurements were within +/- 10%. The comparisons to transducer measurements each had at least 3 measurements out of 9 to 10 measurements outside the +/- 10% target range. This indicates that agreement is, in general, close to the expected ranges, but there was more variability in transducer measurements at this well.

For groundwater monitoring well S141305001 (Levy Co Comm Fowlers Bluff Refuge), the mean percent differences range from 1% (for lab vs. field) to 8% (for transducer vs. field) in **Figure 2i**. The mean percent differences are beyond +/- 5% for comparisons involving the transducer at 6% (for transducer vs. lab) and 8%. The limits of agreement are also well beyond +/- 10% for transducer vs. field at -3% to 19% with 2 out of 6 measurements beyond 10% difference. This suggests that there is a small positive bias to transducer measurements at this well.

For groundwater monitoring well S080907003 (Salem Tower), the mean percent differences are outside the +/- 5% range with lab vs. field at 6%, transducer vs. field at 20%, and transducer vs. lab at 22% (**Figure 2j**). These values indicate that the transducer measurements have a significant positive bias and are systematically about 20% higher than field and laboratory measurements. There may be problems with field sampling procedures, transducer setup, and/or transducer calibration that contribute to this bias. The laboratory data contains one extreme outlier for this location with a conductivity above any recorded in field samples or with the transducer and one less extreme outlier that contribute to wide limits of agreement between -40% and 51% for this location for lab vs. field.

ANALYSIS FOR TRENDS

Trends in conductivity at the four locations with transducer data were investigated using data from each of the three measurement approaches separately using the Mann-Kendall test for trend and by fitting a linear model to the conductivity data. A period of abnormally variable measurements due to a transducer malfunction was removed from August to September 2021 for S141305001 (Levy Co Comm Fowlers Bluff Refuge. This transducer was replaced in September 2021.

Mann-Kendall Analysis

The Mann-Kendall test for trend returned the following results for the four locations (**Table 1**):

- S030424003 (Cabbage Grove Tower): Stable for field and lab; and increasing for transducer measurements.
- S050615002 (Hampton Tower DOC): Probably decreasing for field; stable for lab; and decreasing for transducer measurements.

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- S141305001 (Levy Co Comm Fowlers Bluff Refuge): Stable for field; no trend for lab; and decreasing for transducer measurements.
- S080907003 (Salem Tower): Decreasing for field and lab; and increasing for transducer measurements.

These results are not consistent for the different measurement methods for each location. This is likely because the Mann-Kendall test is not suited to the transducer data, which displays cyclical increases and decreases of undetermined origin (**Figure 3a** to **Figure 3d**).

Linear Trend Lines

The time series of conductivity measurements by each of the three methods at the four locations with properly placed transducer data are plotted in **Figure 3a** to **Figure 3d** with the linear regression trend lines and 95% confidence intervals plotted. The linear models for conductivity over time all have R^2 values of 0.34 or less indicating that at most 34% of the variability in conductivity is explained by time (**Table 3**). For continuous transducer data, the maximum R^2 is 0.10. Visual inspection of the data in **Figure 3a** to **Figure 3d** does not reveal clear trends in conductivity over time. More data is required to observe more cyclical variations in conductivity in the transducer data and ascertain whether there is evidence in significant changes in conductivity.

CONCLUSIONS AND RECOMMENDATIONS

In most cases good agreement was found between laboratory and field measurements of conductivity, although there were a few outlying laboratory measurements in poor agreement with the field measurements at Hampton Tower DOC (S050615002) and Salem Tower (S080907003). Where these substantially different results occur (e.g., >20% difference), a procedure is needed for resampling and/or to address these results with the laboratory.

The agreements of transducer results with field and laboratory measurements of conductivity varied between the transducer locations. Good agreement was observed for all measurements at Cabbage Grove Tower (S030424003) and this transducer appears to be providing reliable conductivity measurements. The transducer at Hampton Tower DOC was in good agreement with the laboratory and field measurements on average, although variability was greater than ideal as evidenced by wider limits of agreement substantially beyond +/- 10%. At Levy Co Comm Fowlers Bluff Refuge (S141305001), a slight positive bias beyond 5% was observed compared to laboratory and field measurements. For Salem Tower, the transducer introduced a substantial (~20% on average) positive bias in conductivity measurements compared to the laboratory and field measurements. This bias at Salem Tower is substantial and could be related to substantially different locations for the transducer and pump inlet within the groundwater monitoring well or issues with the calibration of the transducer.

The transducer data was not well suited to Mann-Kendall analysis or fitting a linear regression due to frequent fluctuations to higher and lower conductivity. Therefore, a longer time series of data is needed to ascertain if there are overall increasing or decreasing trends.

Encl.

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- Table 1: Results of Paired Ratio t-tests
- Table 2: Results of Bland-Altman Analyses
- Table 3: Results of Trend Analyses

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- Figure 1a: Plot of Average Ratio of Laboratory Measurements to Field Measurements
- Figure 1b: Plot of Average Ratio of Three Conductivity Measurement Methods
- Figure 2a: Bland-Altman Plot of Laboratory and Field Conductivity Measurements at Foley Seinhatchee
- Figure 2b: Bland-Altman Plot of Laboratory and Field Conductivity Measurements at GP6 UFA near Weeks
- Figure 2c: Bland-Altman Plot of Laboratory and Field Conductivity Measurements at Jonesboro Tower
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- Figure 2i: Bland-Altman Plot of Conductivity Measurements at Levy Co Comm Fowlers Bluff Refuge
- Figure 2j: Bland-Altman Plot of Conductivity Measurements at Salem Tower
- Figure 3a: Time Series of Conductivity Measurements at Cabbage Grove Tower
- Figure 3b: Time Series of Conductivity Measurements at Hampton Tower

DOC
Figure 3c: Time Series of Conductivity Measurements at Levy Co Comm
Fowlers Bluff Refuge
Figure 3d: Time Series of Conductivity Measurements at Salem Tower

Tables

TABLE 1: RESULTS OF RATIO PAIRED T-TESTS
Coastal Salinity Network
SRWMD

Location Name	Location ID	Comparison Ratio	Number of Paired Samples	Average Ratio	95% LCL on Mean Ratio	95% UCL on Mean Ratio	Ratio Paired t-test p-value	Ratio Signficantly Different Than 1[1]	Mean Ratio Significantly Outside 0.95 to 1.05[2]	Ratios are Lognormally Distributed[3]
Foley Seinhatchee	S090914003	Lab to Field	8	1.02	0.98	1.05	0.259	No	No	Yes
GP6 UFA near Weeks	S121330002	Lab to Field	7	1.01	0.97	1.06	0.465	No	No	Yes
Jonesboro Tower	S091011004	Lab to Field	8	1.00	0.96	1.04	0.806	No	No	Yes
Lebanon Tower	S151719004	Lab to Field	15	0.99	0.96	1.02	0.387	No	No	Yes
Rosewood Tower	S141429001	Lab to Field	8	1.02	0.98	1.06	0.197	No	No	Yes
Three Spot Wayside Park	S141620007	Lab to Field	7	1.02	0.97	1.08	0.312	No	No	Yes
Cabbage Grove Tower	S030424003	Lab to Field	10	1.04	1.00	1.07	0.043	Yes	No	Yes
	S030424003	Transducer to Field	9	1.05	1.02	1.08	0.007	Yes	No	Yes
	S030424003	Transducer to Lab	10	1.02	0.99	1.04	0.113	No	No	No
Hampton Tower DOC	S050615002	Lab to Field	14	1.04	0.97	1.12	0.260	No	No	No
	S050615002	Transducer to Field	9	0.97	0.89	1.05	0.382	No	No	Yes
	S050615002	Transducer to Lab	10	0.95	0.88	1.03	0.166	No	No	Yes
Levy Co Comm Fowlers Bluff Refuge	S141305001	Lab to Field	8	1.01	0.97	1.05	0.633	No	No	Yes
	S141305001	Transducer to Field	6	1.08	1.02	1.15	0.020	Yes	No	Yes
	S141305001	Transducer to Lab	7	1.06	1.04	1.08	0.001	Yes	No	Yes
Salem Tower	S080907003	Lab to Field	15	1.06	0.93	1.22	0.356	No	No	No
	S080907003	Transducer to Field	10	1.22	1.17	1.28	0.000	Yes	Yes	Yes
	S080907003	Transducer to Lab	11	1.25	1.16	1.34	0.000	Yes	Yes	No

Notes:

1. The ratio is signficicantly different from 1 if the p-value of the ratio paired t-test is <=0.05.
2. The mean ratio significantly outside the range from 0.95 to 1.05 is no part of the 95% conficence interval is within that range.
3. The ratios are lognormally distributed if the p-value of the Shapiro-Wilk test on the log transformed ratios is greater than 0.05.

LCL- lower confidence limit

UCL- upper confidence limit

TABLE 2: RESULTS OF BLAND-ALTMAN ANALYSIS
Coastal Salinity Network
SRWMD

Location Name	Location ID	Comparison	Number of Paired Samples	Mean Percent Difference (%)[1]	Lower Limit of Agreement (%)[2]	Upper Limit of Agreement (%)[3]
Foley Seinhatchee	S090914003	Lab vs. Field	8	2	-6	9
GP6 UFA near Weeks	S121330002	Lab vs. Field	7	1	-8	11
Jonesboro Tower	S091011004	Lab vs. Field	8	0	-10	9
Lebanon Tower	S151719004	Lab vs. Field	15	-1	-11	9
Rosewood Tower	S141429001	Lab vs. Field	8	2	-7	11
Three Spot Wayside Park	S141620007	Lab vs. Field	7	2	-9	13
Cabbage Grove Tower	S030424003	Lab vs. Field	10	3	-6	13
Cabbage Grove Tower	S030424003	Transducer vs. Field	9	5	-3	13
Cabbage Grove Tower	S030424003	Transducer vs. Lab	10	2	-4	8
Hampton Tower DOC	S050615002	Lab vs. Field	14	4	-21	29
Hampton Tower DOC	S050615002	Transducer vs. Field	9	-3	-25	18
Hampton Tower DOC	S050615002	Transducer vs. Lab	10	-5	-26	16
Levy Co Comm Fowlers Bluff Refuge	S141305001	Lab vs. Field	8	1	-8	10
Levy Co Comm Fowlers Bluff Refuge	S141305001	Transducer vs. Field	6	8	-3	19
Levy Co Comm Fowlers Bluff Refuge	S141305001	Transducer vs. Lab	7	6	1	10
Salem Tower	S080907003	Lab vs. Field	15	6	-40	51
Salem Tower	S080907003	Transducer vs. Field	10	20	8	32
Salem Tower	S080907003	Transducer vs. Lab	11	22	1	43

Notes:

1. Percent differences is calculated as the measurement with the method listed first in the comparison minus the measurement by the method listed second, divided by the average of the two. Therefore, positive percent difference indicates that the measurement by the method listed first was greater.
2. The lower limit of agreement is the mean percent difference minus 1.96 times the standard deviation of percent differences.
3. The upper limit of agreement is the mean percent difference plus 1.96 times the standard deviation of percent differences.
4. The limits of agreement are the bounds within which 95% of normally distributed percent differences would be expected to fall.

TABLE 3: RESULTS OF TREND ANALYSES
Coastal Salinity Network
SRWMD

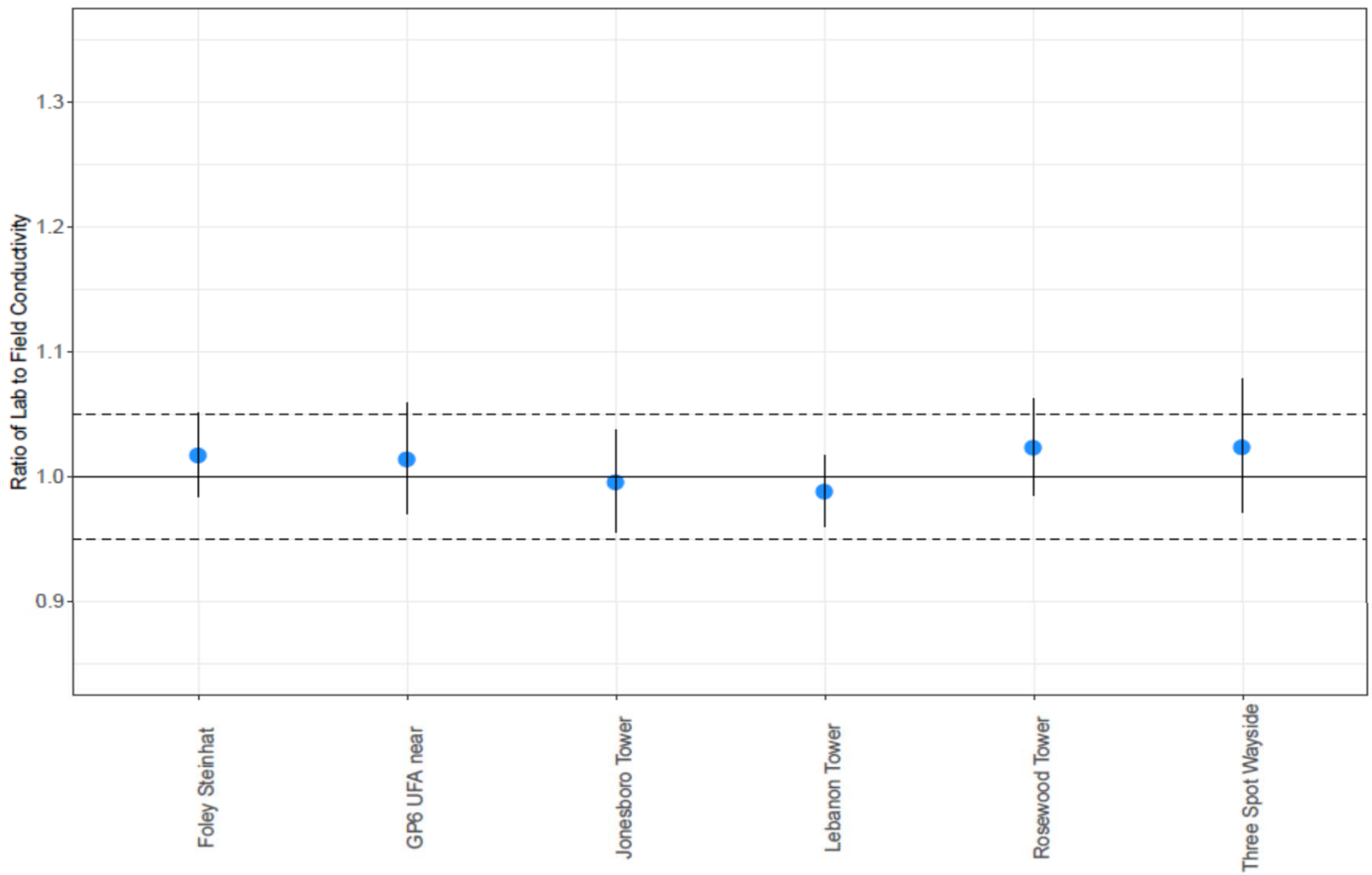
				Linear Regression					Mann-Kendall Test			
Well Name	**Location ID**	**Measurement Method**	**Number of Measurements**	**Change in Conductivity (µS/cm·year)**	**Change in Conductivity Standard Error (µS/cm·year)**	**Slope p-value**	**R^2**	**Linear Model Significant[1]**	**Mann-Kendall (S)**	**Mann-Kendall p-value**	**Confidence in Trend**	**Mann-Kendall Trend[2]**
Cabbage Grove Tower	S030424003	Field	10	-0.7	6.0	0.905	0.002	No	-1	0.500	0.500	Stable
Cabbage Grove Tower	S030424003	Lab	11	-4.1	5.6	0.483	0.056	No	-8	0.292	0.708	Stable
Cabbage Grove Tower	S030424003	Transducer	24,335	9.4	0.3	0.000	0.047	No	39990632	0.000	1.000	Increasing
Hampton Tower DOC	S050615002	Field	14	-5.8	3.1	0.086	0.225	No	-28	0.069	0.931	Probably Decreasing
Hampton Tower DOC	S050615002	Lab	68	0.04	1.52	0.979	0.000	No	-49	0.400	0.600	Stable
Hampton Tower DOC	S050615002	Transducer	24,372	-18.2	0.3	0.000	0.104	No	-80877488	0.000	1.000	Decreasing
Levy Co Comm Fowlers Bluff Refuge	S141305001	Field	8	-8	12	0.531	0.069	No	-2	0.452	0.548	Stable
Levy Co Comm Fowlers Bluff Refuge	S141305001	Lab	9	1.1	7.4	0.891	0.003	No	3	(0.381, 0.46)	(0.54, 0.619)	No Trend
Levy Co Comm Fowlers Bluff Refuge	S141305001	Transducer	15,782	-9.8	0.4	0.000	0.038	No	-13619931	0.000	1.000	Decreasing
Salem Tower	S080907003	Field	15	-6.3	2.4	0.023	0.339	No	-40	0.027	0.973	Decreasing
Salem Tower	S080907003	Lab	58	-1.2	1.7	0.502	0.008	No	-423	0.002	0.998	Decreasing
Salem Tower	S080907003	Transducer	23,493	5.1	0.3	0.000	0.015	No	12832656	0.000	1.000	Increasing

Notes:

1. The linear model is considered to be significant in the p value is less than 0.05 and the r squared is greater than 0.5.
2. The Mann-Kendall trend is chosen based on the following decision matrix, where the COV is the coefficient of variation, which is the ratio of the sample standard deviation to the sample mean:

Mann-Kendall Statistic (S)	**Confidence in Trend**	**Concentration Trend**
S>0	>95%	Increasing
S>0	90% - 95%	Probably Increasing
S>0	<90%	No Trend
S≤0	<90% and COV≥1	No Trend
S≤0	<90% and COV<1	Stable
S<0	90% - 95%	Probably Decreasing
S<0	95%	Decreasing

Figures



Notes:
1. Dot represents the average ratio of laboratory conductivity to field conductivity in paired measurements of water from the same date and time.
2. Vertical lines around the dots represent the 95% confidence interval around the mean ratio of conductivity measurements constructed using a lognormal distribution.
3. Dashed lines at ratios of 0.95 and 1.05 represent the target 5% range for acceptable bias in conductivity results based on the interlaboratory study in EPA method 120.1.

Plot of Average Ratio of Laboratory Measurements to Field Measurements

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Figure **1a**

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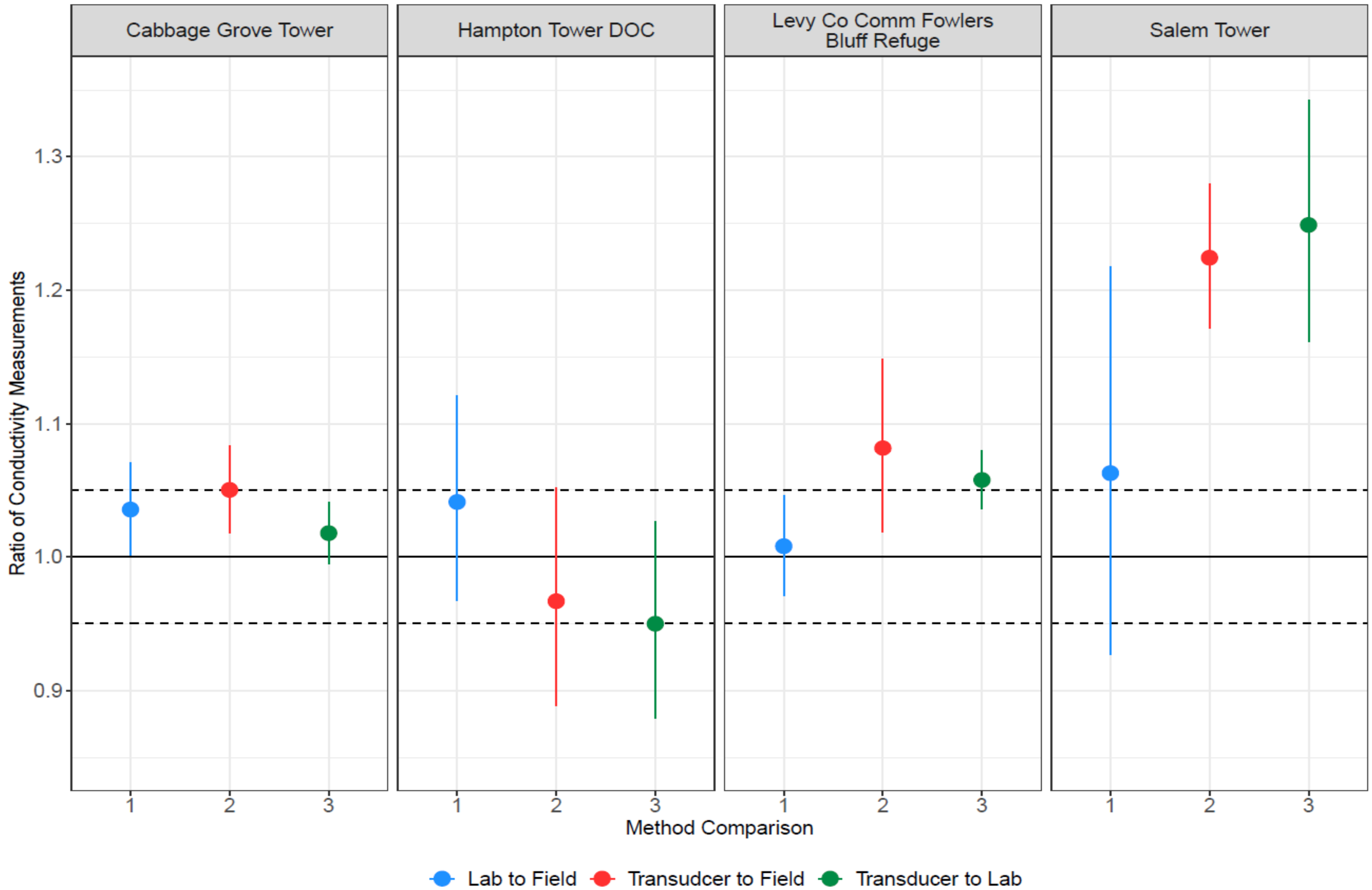

Notes:
1. Dot represents the average ratio of paired conductivity measurements of water from the same date and time.
2. Vertical lines around points represent the 95% confidence interval around the mean ratio of conductivity measurements constructed using a lognormal distribution.
3. Average conductivity from two bracketing hourly readings is used to the transducer conductivity, excluding extreme outliers.
4. Dashed lines at ratios of 0.95 and 1.05 represent the target 5% range for acceptable bias in conductivity results based on the interlaboratory study in EPA method 120.1.

Plot of Average Ratio of Three Conductivity Measurement Methods		Figure 1b
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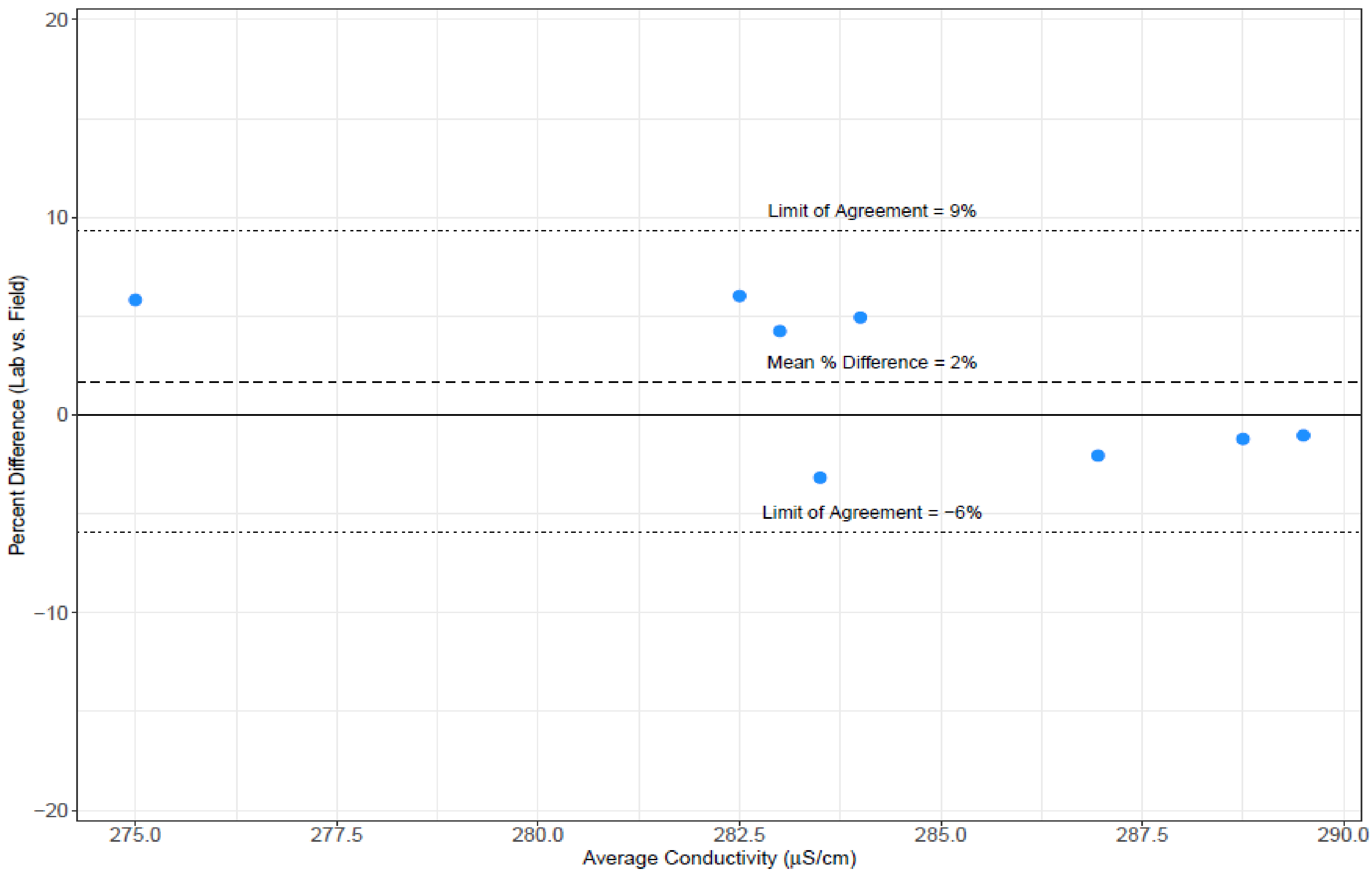

Notes:
1. Percent difference is calucluated as the laboratory measurement minus the field measurement divided by the average of the two.
2. Limits of agreement represent the bounds within which 95% of normally distributed percent differences would be expected to fall.

µS/cm - micro-Siemens per centimeter

Bland-Altman Plot of Laboratory and Field Conductivity Measurements at S090914003 (Foley Seinhatchee)

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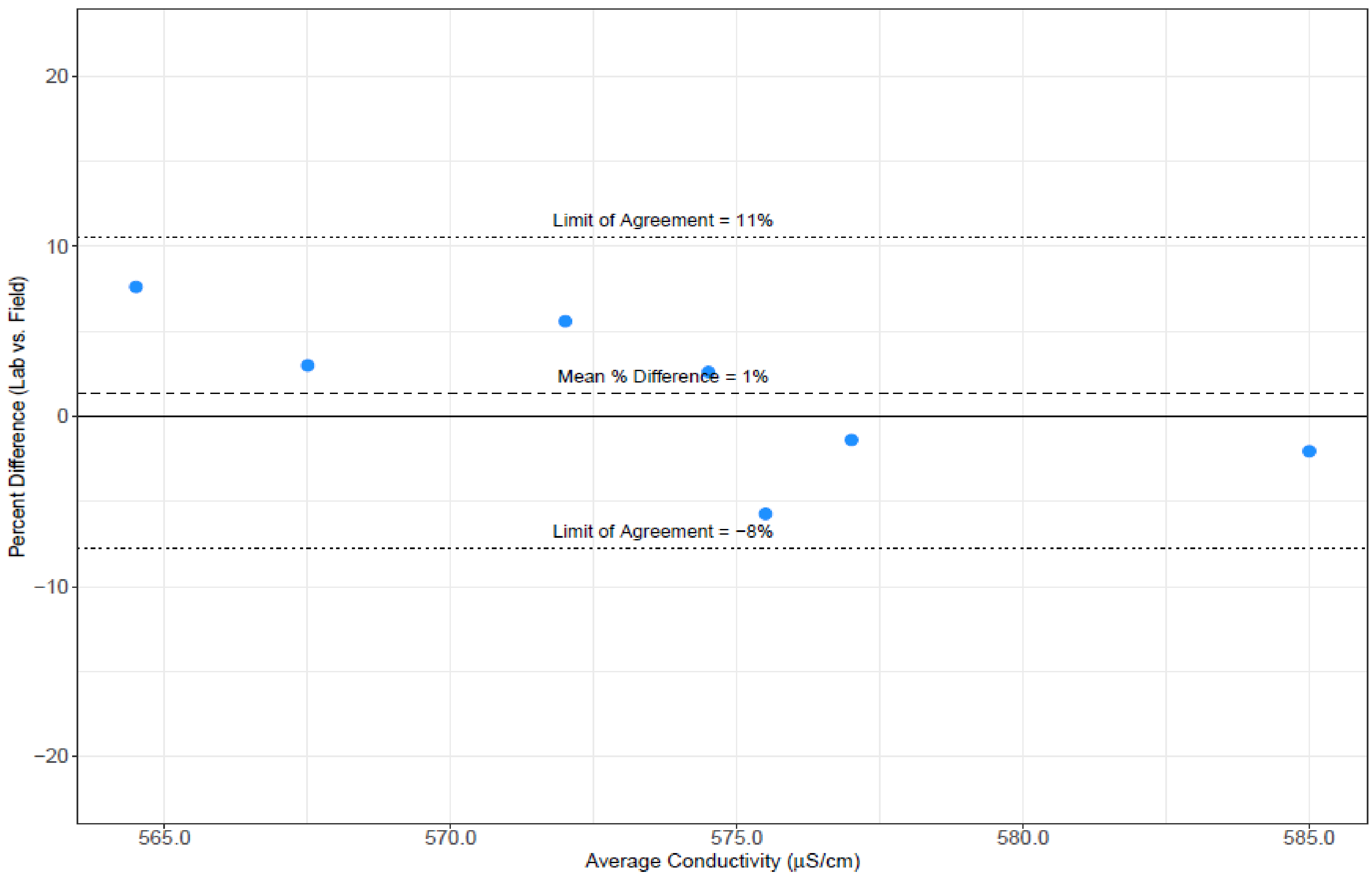
April 2022

Figure 2a



Notes:

1. Percent difference is calucluated as the laboratory measurement minus the field measurement divided by the average of the two.
2. Limits of agreement represent the bounds within which 95% of normally distributed percent differences would be expected to fall.

µS/cm - micro-Siemens per centimeter

Bland-Altman Plot of Laboratory and Field Conductivity Measurements at S121330002 (GP6 UFA near Weeks)

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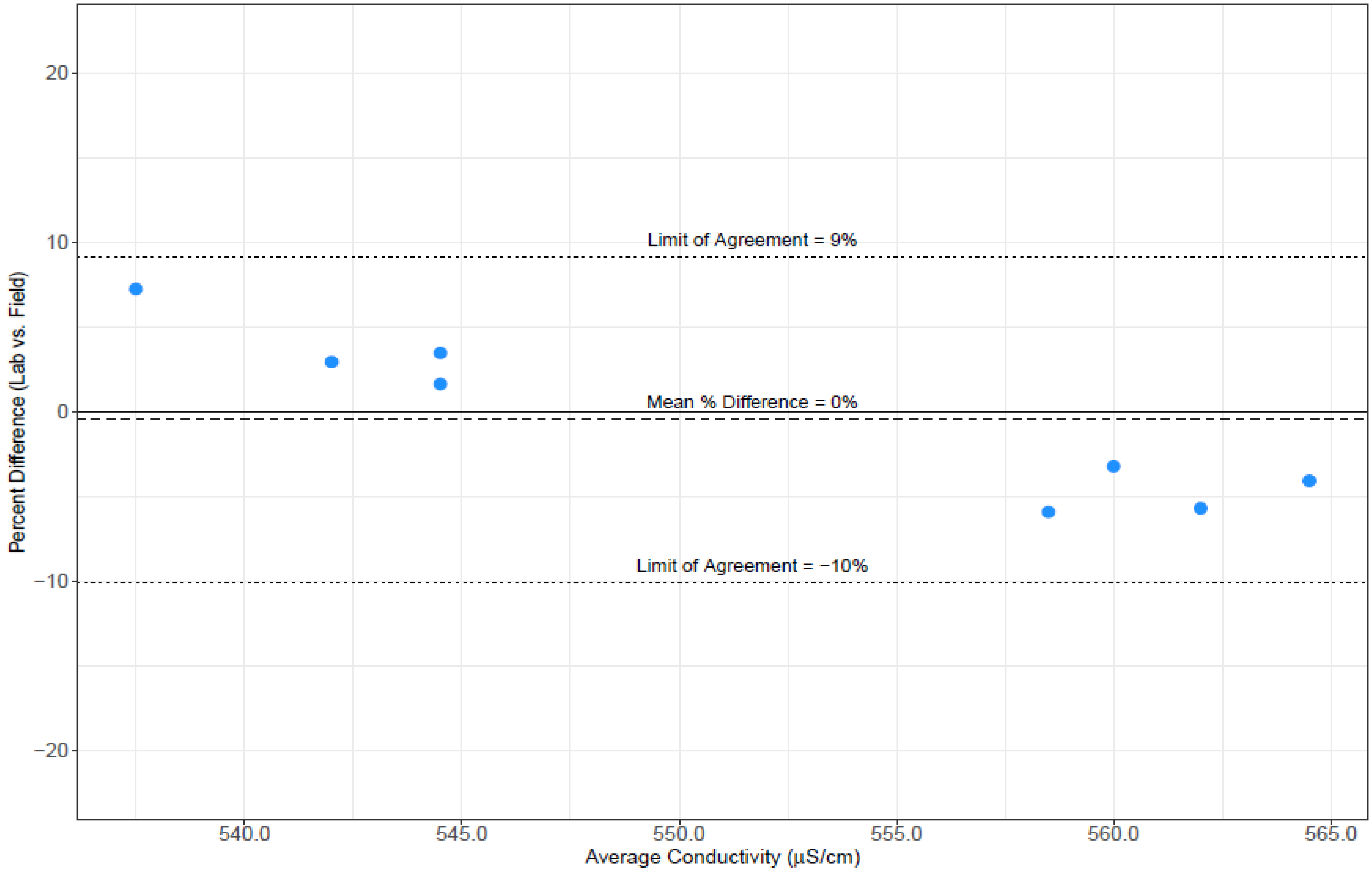
Figure 2b



Notes:

1. Percent difference is calucluated as the laboratory measurement minus the field measurement divided by the average of the two.
2. Limits of agreement represent the bounds within which 95% of normally distributed percent differences would be expected to fall.

µS/cm - micro-Siemens per centimeter

Bland-Altman Plot of Laboratory and Field Conductivity Measurements at S091011004 (Jonesboro Tower)

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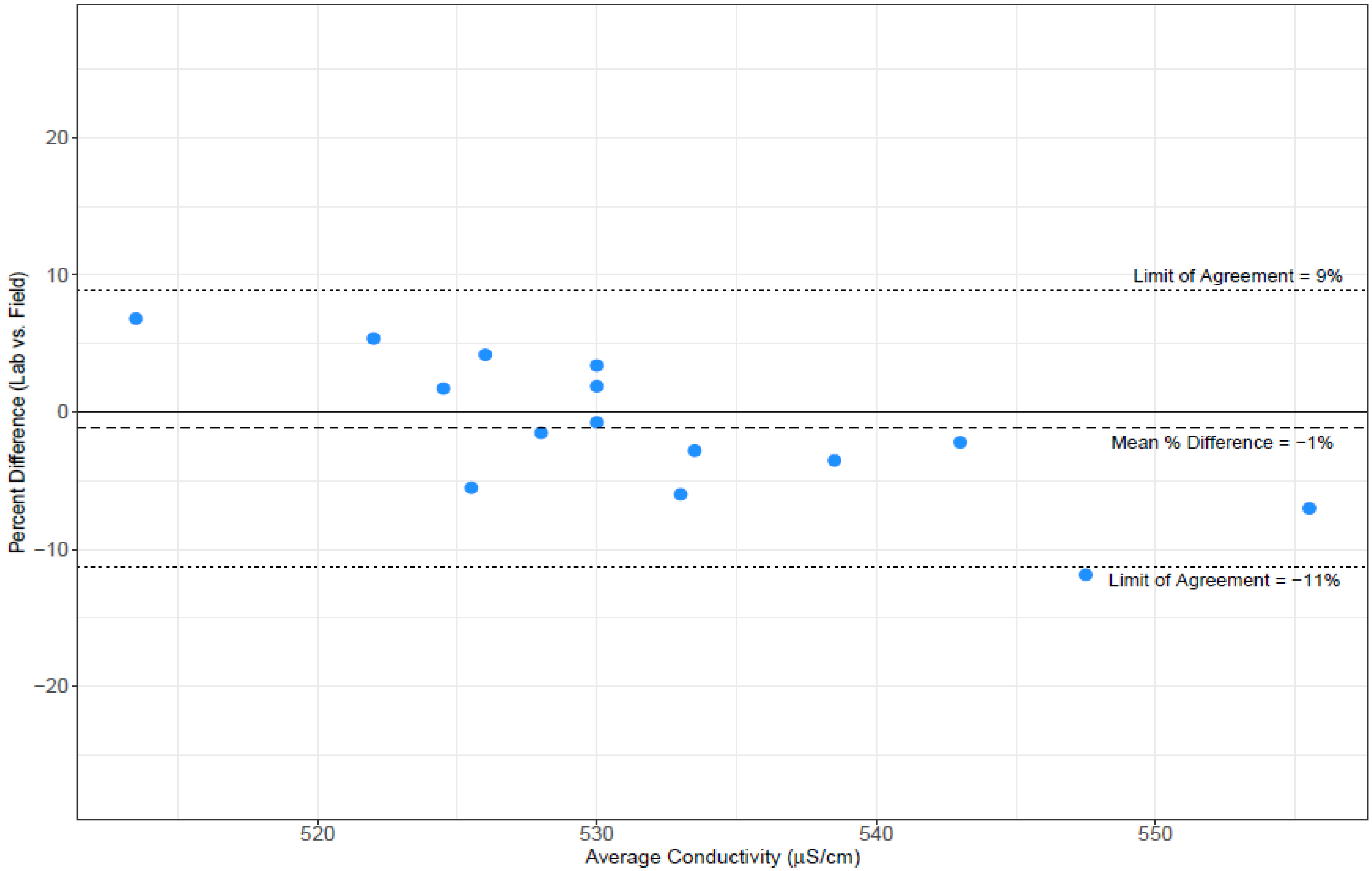
Figure 2c



Notes:

1. Percent difference is calucluated as the laboratory measurement minus the field measurement divided by the average of the two.
2. Limits of agreement represent the bounds within which 95% of normally distributed percent differences would be expected to fall.

µS/cm - micro-Siemens per centimeter

Bland-Altman Plot of Laboratory and Field Conductivity Measurements at S151719004 (Lebanon Tower)

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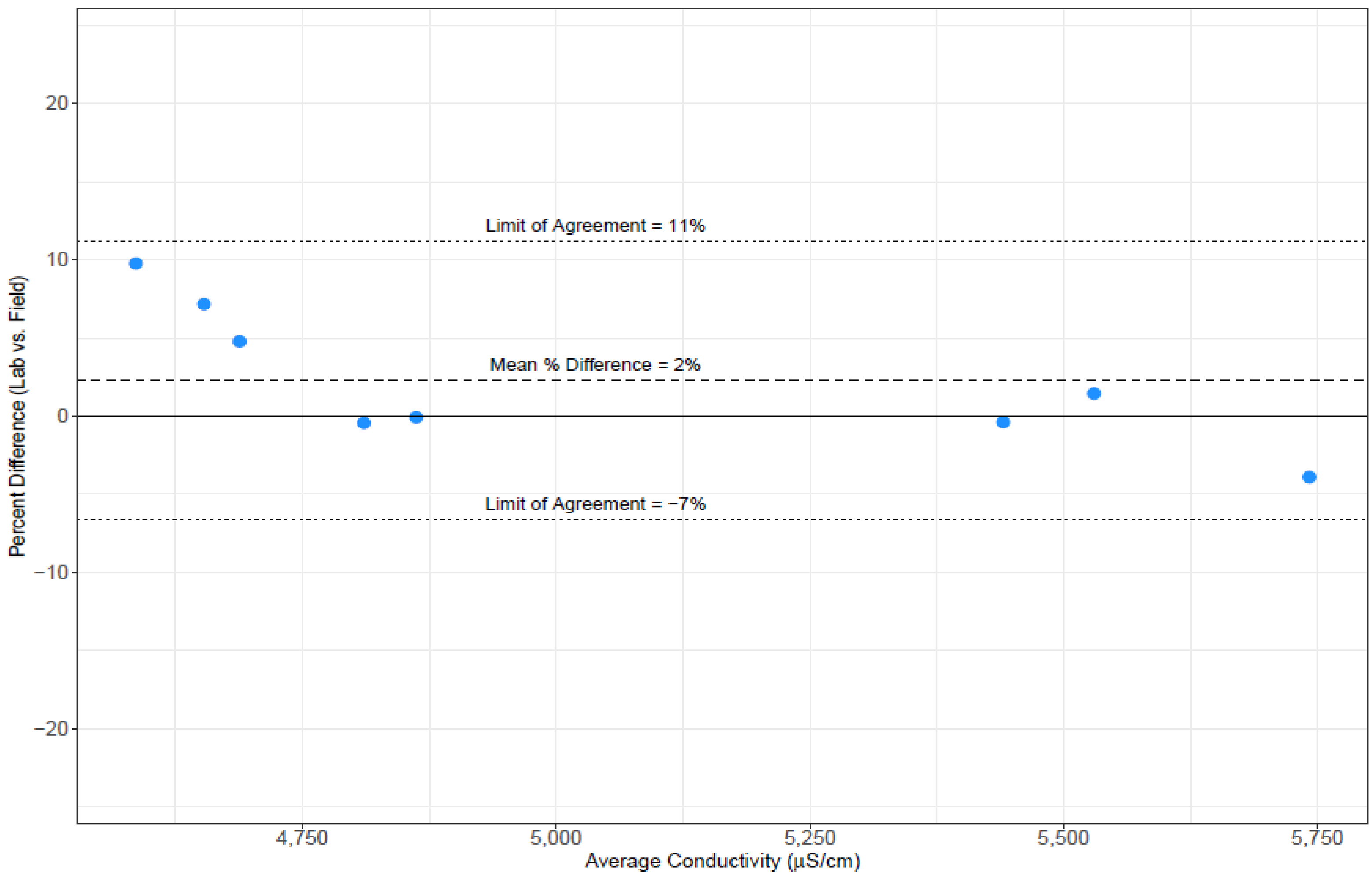
Figure 2d



Notes:

1. Percent difference is calucluated as the laboratory measurement minus the field measurement divided by the average of the two.
2. Limits of agreement represent the bounds within which 95% of normally distributed percent differences would be expected to fall.

µS/cm - micro-Siemens per centimeter

Bland-Altman Plot of Laboratory and Field Conductivity Measurements at S141429001 (Rosewood Tower)

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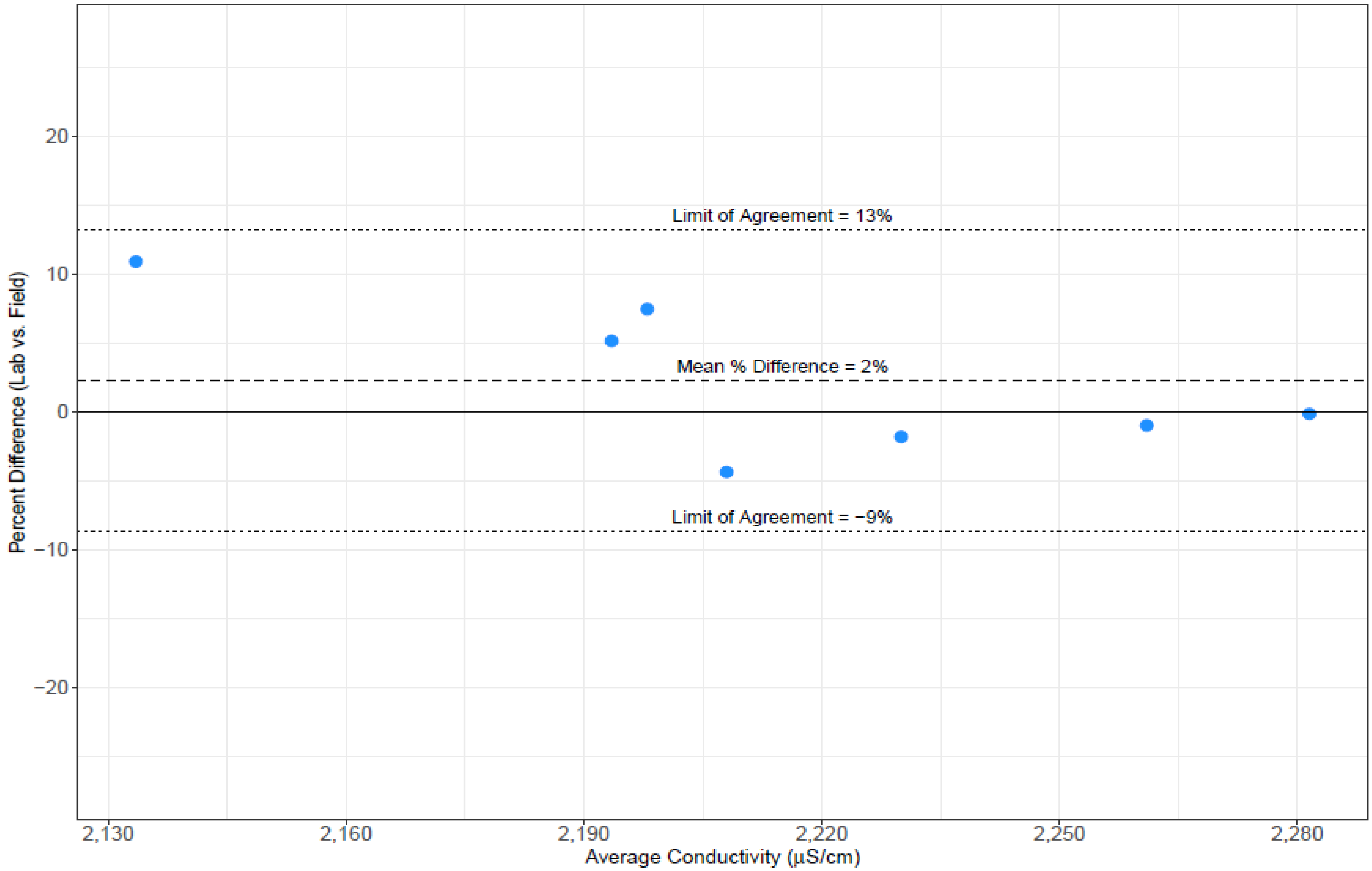
Figure 2e



Notes:
1. Percent difference is calucluated as the laboratory measurement minus the field measurement divided by the average of the two.
2. Limits of agreement represent the bounds within which 95% of normally distributed percent differences would be expected to fall.

µS/cm - micro-Siemens per centimeter

Bland-Altman Plot of Laboratory and Field Conductivity Measurements at S141620007 (Three Spot Wayside Park)

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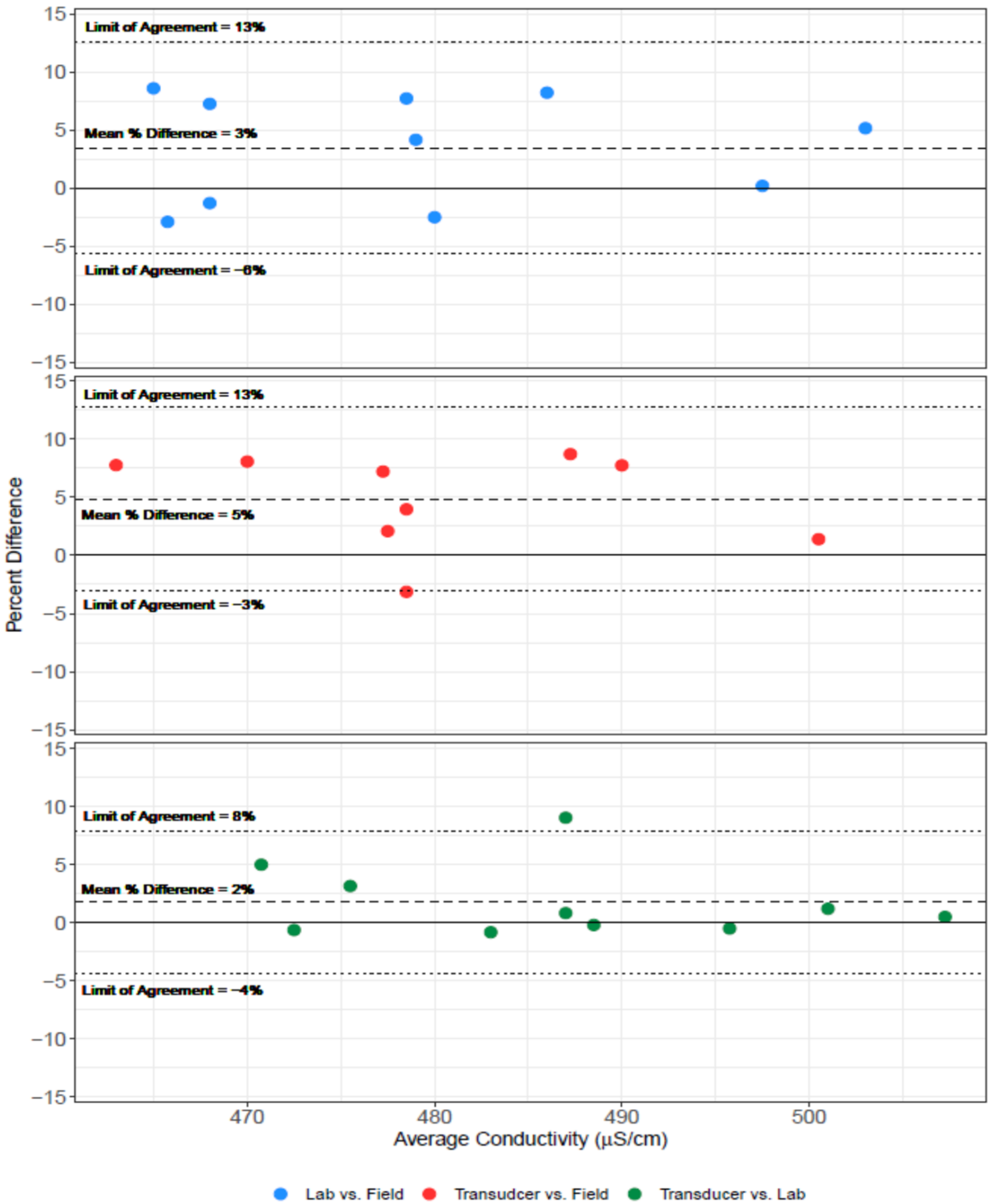
Figure 2f



Notes:
1. Percent difference is caluclulated as the first measurement type listed minus the second measurement type listed divided by the average of the two.
2. Limits of agreement represent the bounds within which 95% of normally distributed percent differences would be expected to fall.
µS/cm - micro-Siemens per centimeter

Bland-Altman Plot of Conductivity Measurements at S030424003 (Cabbage Grove Tower)

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Figure 2g

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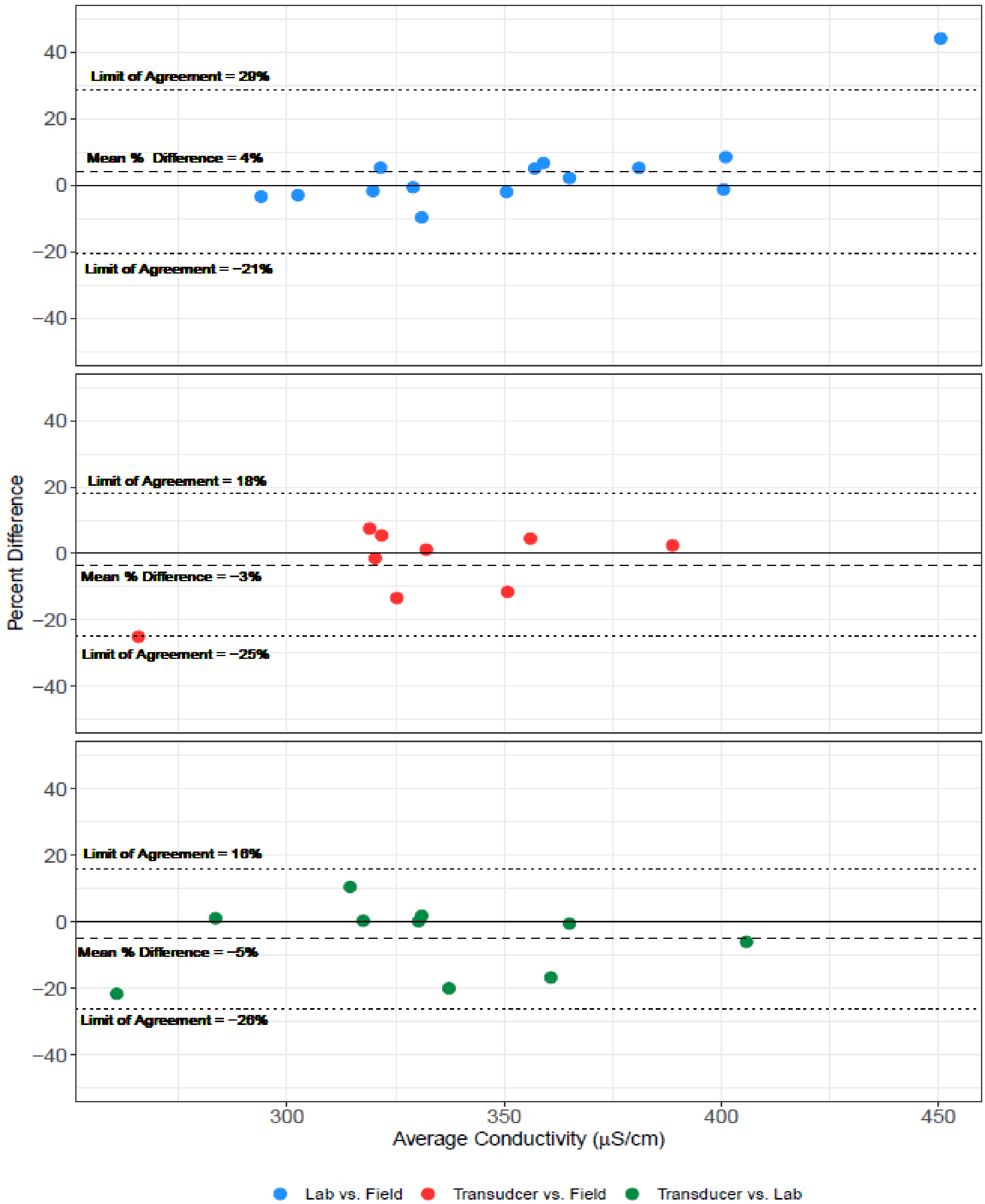

Notes:
1. Percent difference is calucluated as the first measurement type listed minus the second measurement type listed divided by the average of the two.
2. Limits of agreement represent the bounds within which 95% of normally distributed percent differences would be expected to fall.

Bland-Altman Plot of Conductivity Measurements at S050615002 (Hampton Tower DOC)

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Figure 2h

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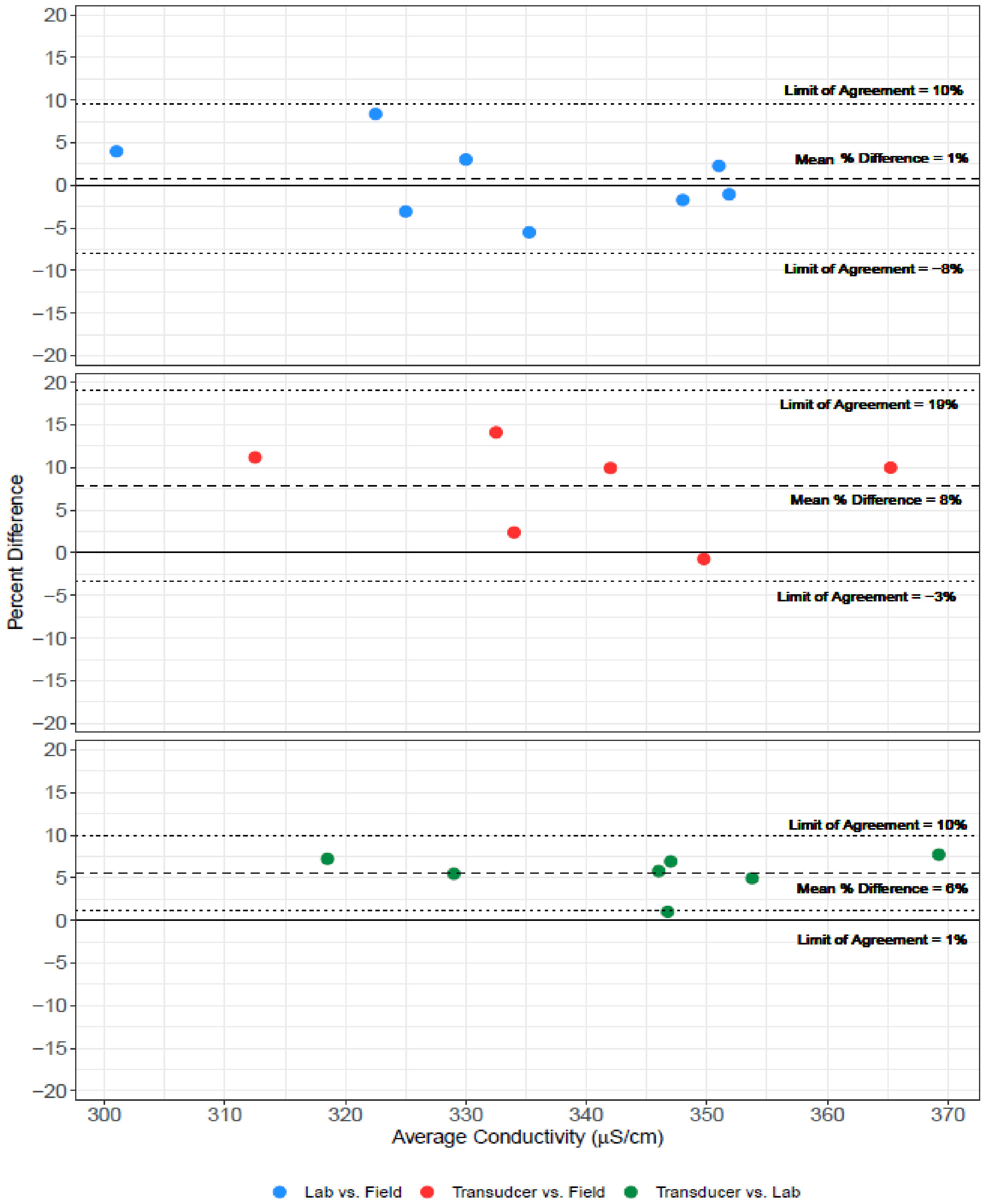

Notes:

1. Percent difference is calucluated as the first measurement type listed minus the second measurement type listed divided by the average of the two.
2. Limits of agreement represent the bounds within which 95% of normally distributed percent differences would be expected to fall.

Bland-Altman Plot of Conductivity Measurements at S141305001 (Levy Co Comm Fowlers Bluff Refuge)

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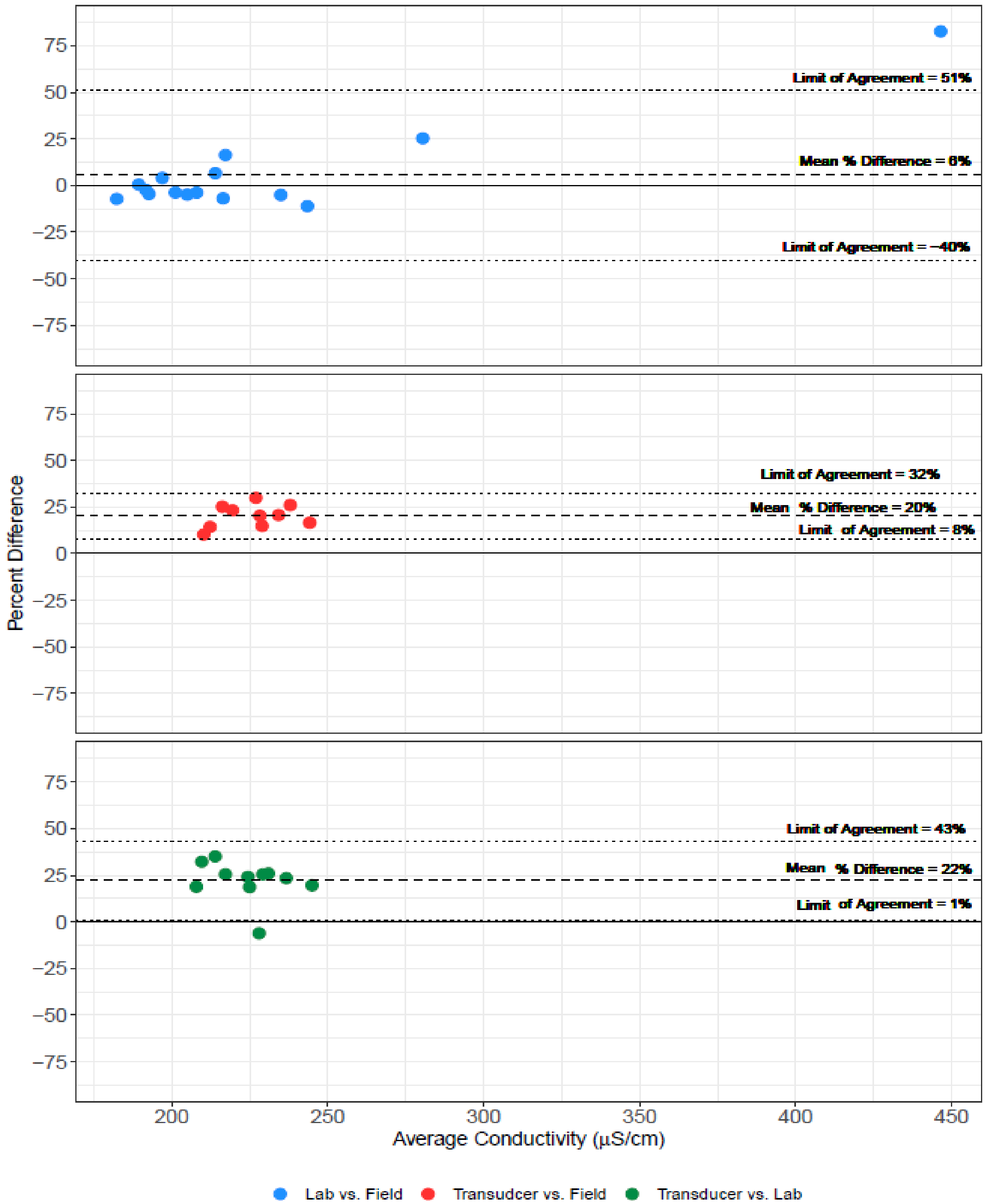
Figure 2i

internal info: path, date revised, author.xls

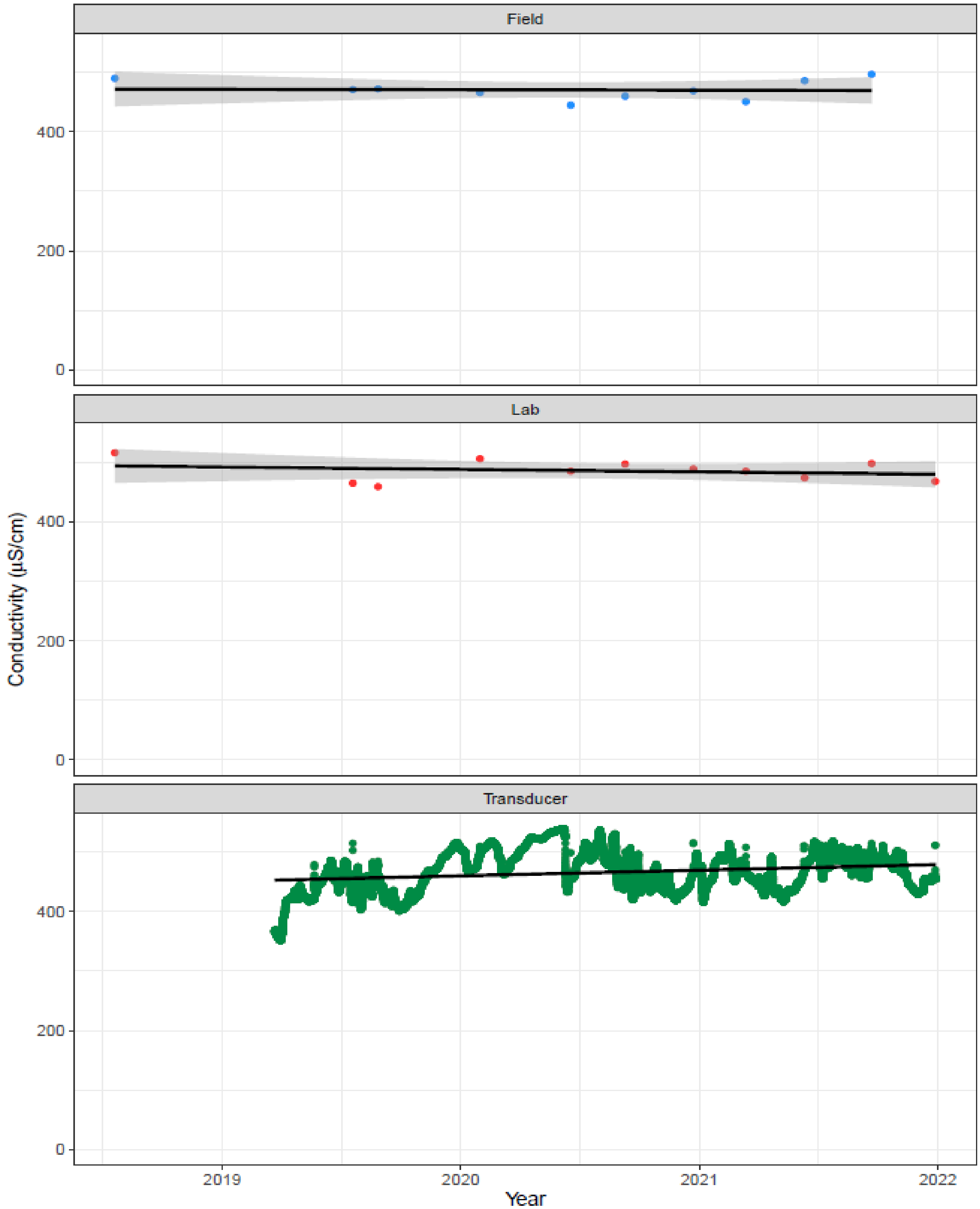


Notes:

1. Percent difference is calucluated as the first measurement type listed minus the second measurement type listed divided by the average of the two.
2. Limits of agreement represent the bounds within which 95% of normally distributed percent differences would be expected to fall.

Bland-Altman Plot of Conductivity Measurements at S080907003 (Salem Tower)		
Geosyntec consultants		Figure 2j
Tampa, FL	April 2022	

internal info: path, date revised, author.xls



Notes:
1. Lines represent linear fits to the data and shaded areas are 95% confidence intervals.

µS/cm - micro-Siemens per centimeter

Time Series of Conductivity Measurements at S030424003 (Cabbage Grove Tower)

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Figure 3a

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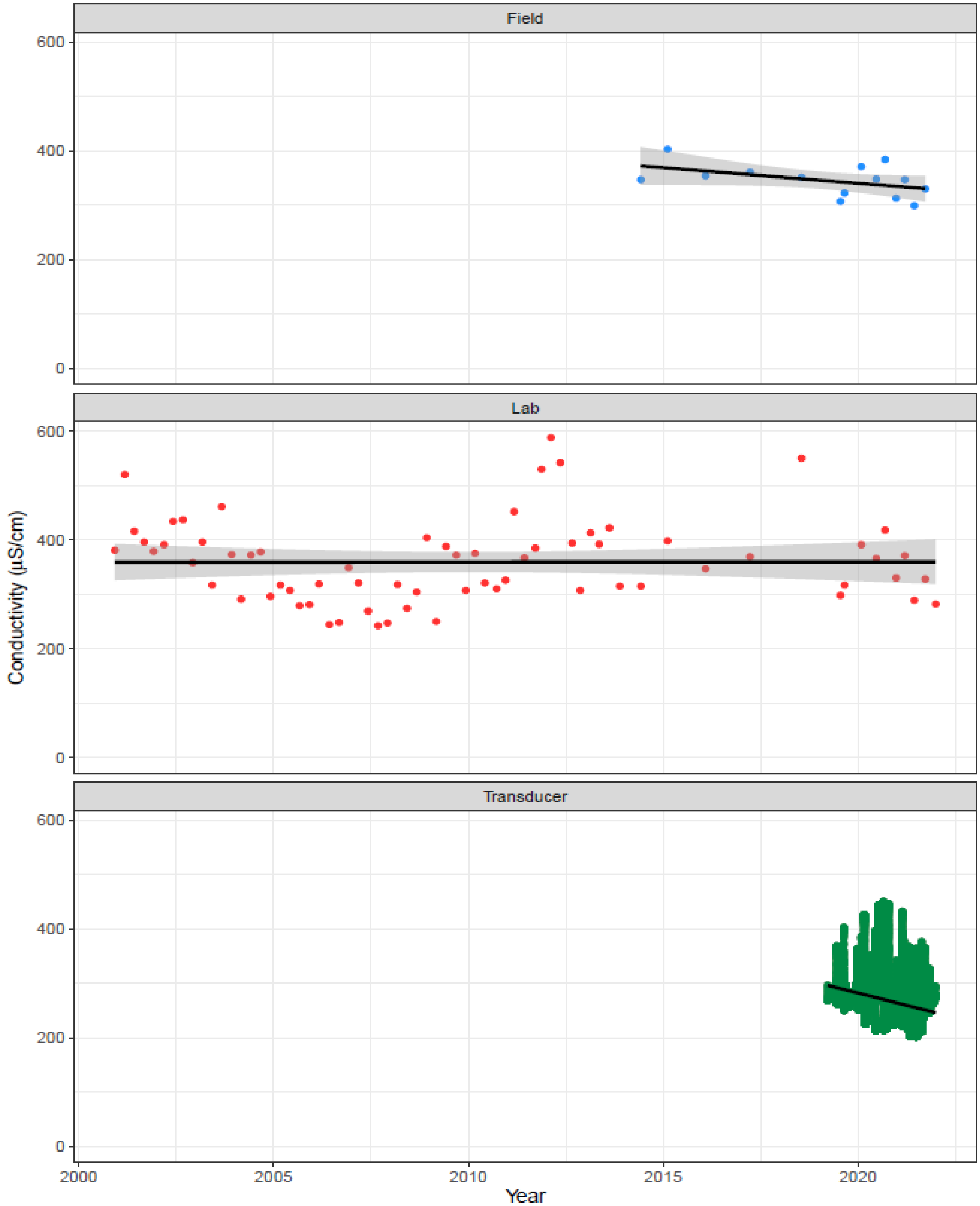

Notes:
1. Lines represent linear fits to the data and shaded areas are 95% confidence intervals.

µS/cm - micro-Siemens per centimeter

Time Series of Conductivity Measurements at S050615002 (Hampton Tower DOC)

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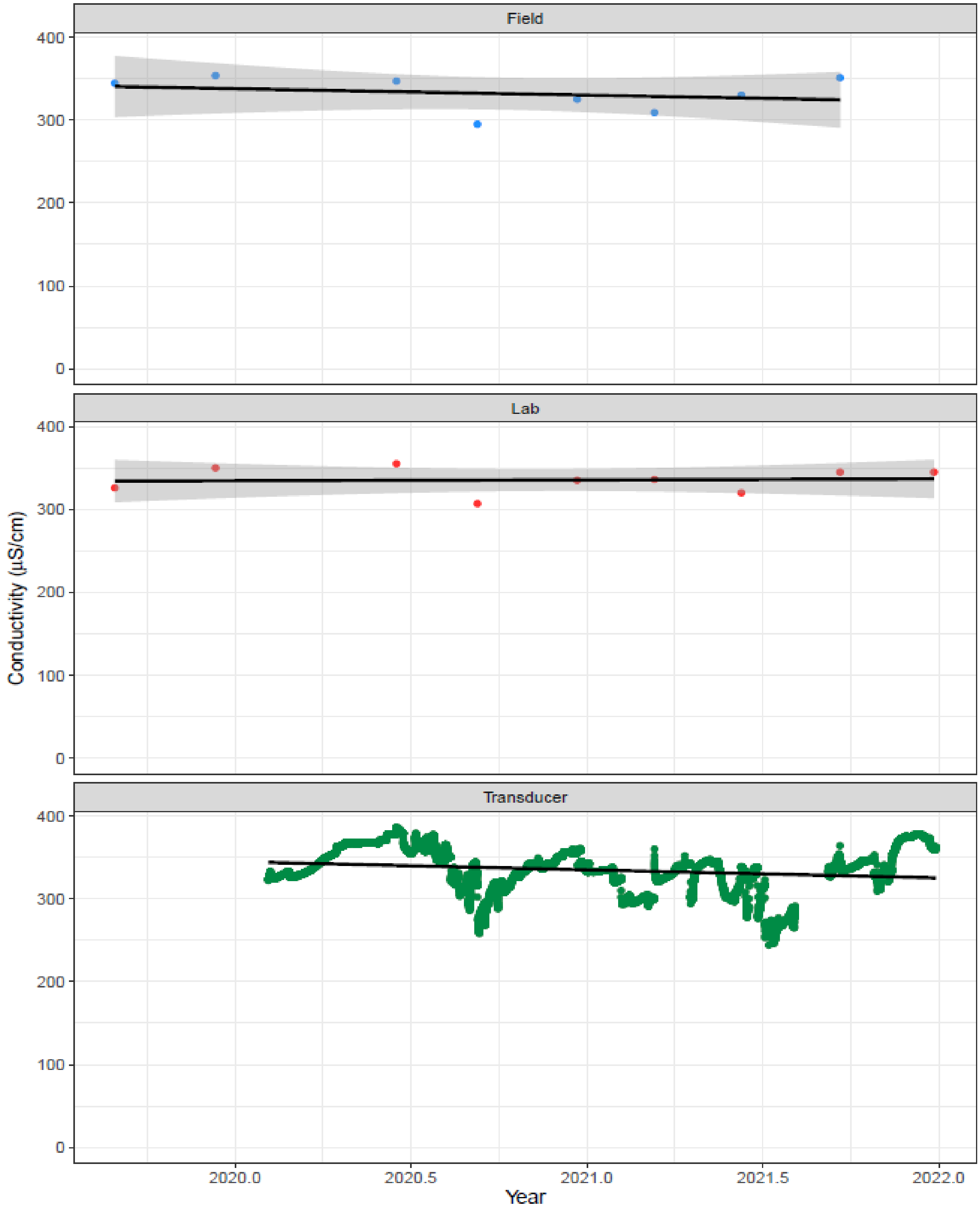
Figure 3b

Tampa, FL | April 2022



Notes:
1. Lines represent linear fits to the data and shaded areas are 95% confidence intervals.

µS/cm - micro-Siemens per centimeter

Time Series of Conductivity Measurements at S141305001 (Levy Co Comm Fowlers Bluff Refuge)

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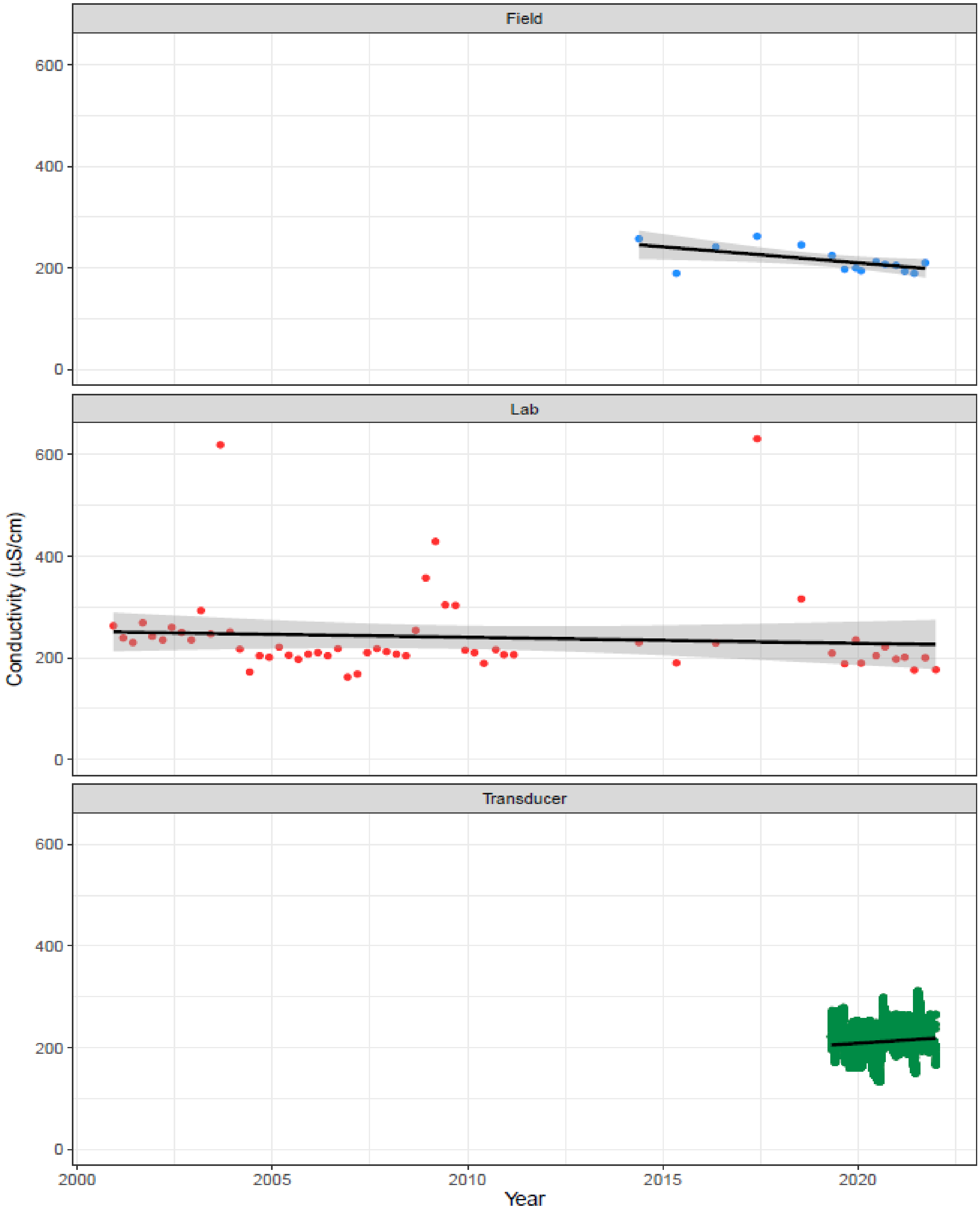
Figure 3c



Notes:
1. Lines represent linear fits to the data and shaded areas are 95% confidence intervals.

µS/cm - micro-Siemens per centimeter

Time Series of Conductivity Measurements at S080907003 (Salem Tower)

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Figure 3d

internal info: path, date revised, author.xls