Evaluating Potential Contamination in Port Bay

Interim Report

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Evaluating the chemical levels of soil and groundwater at several sites near the tailings ponds in Rockport

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Executive Summary

We measured the levels of several chemicals, as possible indictors of contamination from the tailings ponds near Port Bay, including mercury (Hg), uranium (U), radium-226 (Ra-226), as well as polycyclic aromatic hydrocarbons (PAHs). Soil and groundwater samples (< 1m) were collected at five sites near the tailings ponds in November and December 2022. Hg concentrations in groundwater were below the detection limit (0.0001 mg/L), U concentrations were in the range of < 0.001 – 0.039 mg/L, and Ra-226 concentrations were in the range of 1.19 – 2.06 pCi/L. These levels are generally lower than the EPA drinking water standards, but the U concentration at one site was higher than EPA's Maximum Contaminant Level (MCL, 0.03 mg/L), indicating possible contamination from the ponds. Total concentrations of 16 US EPA PAHs ranged from 73.6 ng/g to 193.2 ng/g in surface and deep soils at the sampling sites. These levels are slightly lower than those reported in adjacent bays sediments, and significantly lower than regions with high petroleum pollution. The composition of PAHs at these sites suggested that incomplete combustion of coal and biomass may be the major contamination source. While these results overall showed a low level of concern in terms of the potential contamination from the tailings ponds, more chemicals such as arsenic and chromium need to be analyzed, and more spatial and temporal coverage is also needed, to gain a comprehensive understanding of the potential contamination to the Port Bay and surrounding areas.

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1. Introduction

In January 2022, an Aransas County Commissioner reached out to the Mission-Aransas NERR regarding long standing community concerns about potential contamination from the Sherwin Alumina storage ponds (i.e., tailings ponds) affecting Port Bay. These concerns were amplified following the release of a YouTube video (www.youtube.com/watch?v=H72F-TnDKps) in December 2021, which suggested that the powerful winds and storm surge associated with Hurricane Harvey may have mobilized contaminants from the tailings ponds into Port Bay, resulting in potential risks to ecological and human health.

Of the various pollutants released during aluminum production from bauxite, Mercury (Hg) and total petroleum hydrocarbons (TPHs) are relevant in the context of risk prioritization (Donoghue et al., 2014; Oral et al., 2019). Radionuclides such as Uranium (U) and Radium (Ra), which can be derived from bauxite (Oral et al., 2019), are also of concern. If environmental media in Port Bay are found to be contaminated, the characterization of these chemicals can provide useful information as to whether the Port Bay is of environmental concern, and whether the source of contamination may be from bauxite residues. Perhaps more importantly, a groundwater characterization study performed by Golder Associates Inc. in 2018 found that U and Ra exceeded action levels in groundwater adjacent to the ponds. Therefore, concentrations of these radionuclides in environmental media in Port Bay can be used as an indicator of bauxite contamination from the nearby tailings ponds, and there is a need for reevaluation.

In addition to radioactive nuclides, the generation of TPH, polycyclic aromatic hydrocarbons (PAHs) in particular, can also occur at different stages of the production of aluminum. For instance, the Hall-Héroult process could lead to production of PAHs from the carbon anodes used in the electrolysis cells (e.g., Kvande and Drabløs, 2014; Mercier et al., 2011). As PAHs are mutagenic and carcinogenic, can bioaccumulate in food chains, and thus eventually impact human health (Eisler, 1987; Kennish, 2002), monitoring their concentrations near the Port Bay regions will provide information on the potential effect of bauxite contamination from the tailings ponds.

While the production and treatment history of the ponds is relatively unknown, qualitative evidence from Google Earth satellite images suggests that the color of the ponds (attributed to bauxite) has been changing over time. Severe weather events can cause seepage, runoff, and complete failure of tailings ponds; thus the 2017 Hurricane Harvey may have been a major catalyst for the dramatic change in color observed in the ponds pre- and post-hurricane. Combined with the proximity of the ponds to Port Bay, the hydrology of the area, and the intensity of the storm surge and winds, it is reasonable to suggest that these color changes may be due to the redistribution of contaminated environmental media from the tailings ponds into nearby waters, soils and sediments. Alternatively, chemicals from the tailings ponds may be leached and percolated to Port Bay through the aquifer and groundwater, as groundwater discharge has long been considered an important pathway to export freshwater, with chemicals, to coastal ocean (Moore, 1996).

Unfortunately, there is a paucity of historical contaminant data for Port Bay, though TCEQ has been intermittently collecting water quality data at the bridge of TX-188 (no sediment data was collected). To our knowledge, there is no other data available for water or sediment in Port Bay to inform conclusions about potential risk. The goal of this project is to evaluate the potential contamination from the tailings ponds to the adjacent groundwater and soil. Specifically, we measured the levels of Hg, U, Ra and TPHs, in groundwater and soil samples from 5 locations near the tailings ponds.

2. Materials and Methods

2.1. Sampling Sites

Soil samples and groundwater samples were collected at 5 sites near the Port Bay in November and December of 2022. Specifically, Sites A (N28°0'49.6", W97°10'32.2") and B (N28°0'54.7", W97°12'9.7"), situated on the roadside in close proximity to the ponds, were visited on November 10, 2022, while Sites C (N28°0'16.1", W97°9'41.4"), D (N27°58'43.4", W97°10'60"), and E (N28°2'52.9", W97°9'29.5"), located along the coastal line of Port Bay (Figure 1), were sampled on December 6, 2022.

At each site, surface (ca. 5 cm) and deep (ca. 1 m deep) soil samples were collected using an auger (AMS Signature Series Soil Augers, Fondriest), placed in zip-loc bags, and transferred into a -20 °C freezer once returned to the lab within the same day. Depending on

the sampling sites, the waiting time for groundwater to partially fill the drilled hole varied from ca. 10 min to over 1 hour. Once the drilled holes were filled with water, triplicate samples of ca. 1.5 L groundwater were drawn using a pre-rinsed syringe into the bottles with preservatives, which were provided and prepared by PACE Analytical, an EPA-certified lab. Soil samples were used for total petroleum hydrocarbon (TPH) analysis at UTMSI. Groundwater samples were sent to PACE Analytical for concentrations of mercury (Hg), and activity levels of Uranium (U) and Radium-226 (Ra-226), within 7 days after collection. Prior to TPH analysis, a fraction of soil samples (ca. 10 g) was freeze-dried for at least 48 hours to remove residual water.

2.2.Analytical Methods

2.2.1. TPH extraction and analysis

TPH, including both polyaromatic hydrocarbons (PAHs) and *n*-alkanes, from soil samples were analyzed following the protocol of Wang et al. (2012). Briefly, approximately 5 g of freeze-dried soil samples were extracted with an accelerated solvent extraction (ASE300, DIONEX, USA) using a mixture of acetone and dichloromethane (2000 mL; 1:1 v/v). Deuterated hexadecane (Hex-d_{34}) and phenanthrene (Phe-d_{10}) were spiked into each sample as internal standards to calculate the recovery rates. The extraction cells were heated to 100 °C until the pressure of 10 MPa was reached. The static time was 5 min, with a flush volume of 60%, and a purge time of 90 s. The final volume of the extract was approximately 30 – 40 mL and was further concentrated with methylene chloride (DCM) to 2 mL by gently blowing the samples with N_2 gas.

Both PAHs and *n*-alkanes were analyzed using gas chromatography coupled with a mass spectrometer (GC-MS; Shimadzu, GCMS-QP2020). A siloxane-based column (SH-Rxi-5Sil; 30 m × 0.25 mm i.d., film thickness 0.25 μm) was used. For PAHs, 16 priority PAHs listed by the US EPA were measured under selective ion monitoring mode (SIM), including naphthalene (Nap), acenaphthene (Ace), acenaphthylene (Acy), fluorene (Flu), phenanthrene (Phe), anthracene (Ant), fluoranthene (Flua), pyrene (Pyr), benzo[a]anthracene (BaA), chrysene (Chr), benzo[b]fluoranthene (BbF), benzo[k,j]fluoranthene (BkF), benzo[a]pyrene (BaP), indeno[1-3]pyrene (InP), dibenzo[a,h]anthracene (DBA), and benzo[ghi]perylene (BgP). Helium (He) was used as carrier gas at a column flow rate of 2 mL min^{-1}, and a split ratio of 10 under linear velocity mode. The oven temperature was held

at 40 °C for 1 min, increased to 240 °C at a rate of 10 °C min^{-1}, then increased to 280 °C at a rate of 4 °C min^{-1} and held for 10 min, and finally increased to 320 °C at a rate of 10 °C min^{-1} and held for 5 min. The injection and ion source temperatures are set to be 250 °C and 260 °C, respectively. The injection volume was 1 μL.

The *n*-alkanes with carbon number ranging from 8 to 39 (C_8–C_{39}) were monitored by the GC-MS under full scan mode with mass/charge ratios of 59. Helium was used as a carrier gas with a column flow rate of 2 mL min^{-1}, and the split ratio was 15 under linear velocity mode. The oven temperature was held at 50 °C for 1 min, increased to 280 °C at a rate of 8 °C min^{-1} and held for 36 min, and then further increased to 320 °C at a rate of 10 °C min^{-1}. The injection and ion source temperatures are set to be 325 °C and 250 °C, respectively. The injection volume was 1 μL.

For quality assurance/quality control (QA/QC), a method blank was analyzed by the same procedure as the samples to determine any background contamination, and neither PAHs nor *n*-alkanes were detected. The average recovery rate was 103% for PAHs and 116% for *n*-alkanes based on spiked internal standards (Phe-d_{10} and Hex-d_{34}; n=20).

2.2.2. Hg, U, and Ra-226 analyses

Groundwater samples were submitted to PACE lab to analyze mercury (Hg), Uranium (U), and Radium-226 (Ra-226). To be brief, the EPA method 7470A was used for Hg analysis (https://www.epa.gov/sites/default/files/2015-07/documents/epa-7470a.pdf). The EPA method D5174 was used for U analysis (https://www.epa.gov/dwanalyticalmethods/approved-drinking-water-analytical-methods), and the Standard Method 7500-Ra B (https://www.nemi.gov/methods/method_summary/7616/) was used for Ra-226 analysis.

Detection limit is 0.0001 mg/L for Hg analysis, 0.001 mg/L for U, and less than 0.09 pCi/L for Ra-226.

2.3.Statistical Analysis

Statistical analyses, including t test and analysis of variance (ANOVA), were conducted in Excel. Principal component analysis (PCA), which is a multivariate regression analysis examining compositional differences among samples, was conducted using R (version 4.2.3). Concentrations of each parameter (e.g., Hg, U, Ra-226, and different PAHs)

were standardized by subtracting the means and dividing by the standard deviations before PCA.

3. Results

3.1. Hg, U, and Ra-226 results in groundwater

Concentrations of Hg in the groundwater were below detection limit (< 0.0001 mg/L) at all 5 sites (Table 1). U concentrations ranged from below detection limit (< 0.001 mg/L) at Site D to ca. 0.039 mg/L at Site B, and were significantly different among the sites (ANOVA; $p = 0.02$). Subsequent t-test further confirmed that the U concentration at Site B was significantly higher than that at Site D ($p = 0.04$) and Site E ($p = 0.05$), and U concentration at Site C was significantly higher than that at Site D ($p = 0.01$).

Similar to U, the highest level of Ra-226 was found at Site B, with a range from 1.19 pCi/L at Sites C and E to 2.06 pCi/L at Site B. However, there were no differences in Ra-226 level among the 5 sites (ANOVA, $p = 0.80$).

The U concentrations measured at the 5 sites are lower than the EPA's Maximum Contaminant Level (MCL) of 0.03 mg/L for drinking water, except for Site B at a concentration of 0.039 mg/L. However, it should be noted that the EPA MCL standard applies specifically to drinking water and not necessarily to groundwater. The Ra-226 levels at all sampling sites were below EPA's MCL of 5 pCi/L.

3.2. TPH results in soil

Concentrations of PAHs in surface soil ranged from 73.6 ng/g dried soil at Site A to 140.6 ng/g at Site D. Concentrations of PAHs in deep soil (ca. 1 m deep) were generally higher than those in surface soil, ranging from 77.5 ppb at Site D to 148.5 ppb at Site B (Table 2; Figure 2). There was no difference among all surface samples (ANOVA, $p = 0.1$). However, the PAH concentration in the deep soil at Site C was lower than that at Site B ($p = 0.03$) and Site D ($p = 0.04$).

PAHs are often grouped according to their molecular weights or number of aromatic rings, those with 2 or 3 rings as low molecular weight (LMW) ones and 4 or above as high molecular weight (HMW) ones. PAHs in the soil samples were dominated by LMW PAHs, particularly phenanthrene and anthracene, accounting for ca. 65 – 100% of total PAHs. In contrast, HMW only constituted a minor fraction of total PAHs (0 – 35%). Fluoranthene and pyrene were the only detectable PAHs from the soil samples.

The concentrations of *n*-alkanes in surface soil ranged from 4184.8 ppb at Site B to 5981.2 ppb at Site D. Similar to PAHs, concentrations of *n*-alkanes were higher in deep soil than those in surface, ranging from 4562.3 ppb at Site C to 8145.1 ppb at Site E (Table 3; Figure 3). *n*-Alkanes were dominated by the ones with a carbon number ranging from 21 to 29.

4. Discussion

Uranium (U) is a naturally occurring radioactive element that existed when the Earth was born, or primordial. The Ra-226 is one element in the U-238 decay series, a decay product of thorium-230 (Th-230) and has a half-life of 1600 years. U and Ra-226 exist naturally and are soluble, but their concentrations in groundwater may depend on the types or ages of specific minerals. The U and Ra-226 measured from the groundwater at the five sampling sites were below the EPA MCL for drinking water. This result indicated that the groundwater quality is within acceptable limits in the aspect of these two chemicals.

To compare with published results, the Ra-226 levels measured in this work are within the reported range (1.2 - 11.4 pCi/L) in drinking water from five aquifers (Hickory, Gulf Coast, Dockum, Edwards-Trinity and Ogallala aquifers) in Texas (Landsberger and George, 2013), as well as in other regions (e.g., 0.05 - 13.3 pCi/L in Brazil, Almeida et al., 2004; generally 1 - 5 pCi/L in US, Michel and Jordana, 1987). In addition, the Ra-226 levels from this work agree with the 2019 Preliminary Groundwater Assessment Report (0 - 3.1 pCi/L) near the Port Bay region (Texas Commission on Environmental Quality, 2019). Concentrations of U from this work (< 0.001 - 0.039 mg/L) agree with the reported values in water wells of the Edwards-Trinity aquifer in Texas (< 0.001 - 0.154 mg/L, Hudak, 2018), as well as in the High Plains (HP) and Central Valley (CV) aquifers of US (mean concentration of ca. 0.01 mg/L, Nolan and Weber, 2015). The 2019 Preliminary Groundwater Assessment Report reported a U level of 0.0033 - 0.27 mg/L, with most sampled wells exceeding the MCL (Texas Commission on Environmental Quality, 2019). The results from this work are at the lower end of the range. However, U concentration at Site B was slightly higher than the MCL threshold of 0.03 mg/L, which warrants further attention.

TPHs, particularly PAHs, in the solid phase of the aquifer at the 5 sites were found to be at similar level as what were previously measured from other local bays, such as Corpus Christi, Mission-Aransas, and Matagorda bays (unpublished data in Liu Lab; Liu et al.,

2011). PAHs concentrations at the study sites were also comparable to those measured in the surface sediments from Gulf of Mexico (e.g., Wade et al., 2008). The reported concentrations in this study were also in the range, even though at the lower end, of soils collected over a much larger scale. A meta-study showed a range of 4.8 to 186000 ng/g of total PAHs in soils across the globe, with a rough mean of ca. 200 ng/g in the North American prairie regions (Wilcke, 2007). The dominance of naphthalene and phenanthrene in this study (Figure 2) is consistent with the findings of significant contributions of naphthalene and phenanthrene when total PAHs are relatively low (Wilcke, 2007).

In contrast, PAHs from soil samples in this work were roughly an order of magnitude lower than the surface sediment from Galveston bay (over 2000 ng/g, Santschi et al., 2001), a potentially heavily polluted water body. The nature of the sample (i.e., soil samples vs. sediment samples), as well as sampling locations (i.e., light-traffic roadside vs. highly industrialized seaport), may be the major causes of the observed discrepancies. For example, soil from deeper layers may have less exposure of PAHs deposition from the air, while sediments often receive such pollutants from air deposition through the water column (often in particulate forms), or direct contamination through petroleum or gasoline/diesel combustion due to shipping traffic.

Statistical analyses further revealed the compositional differences among sampling sites. Specifically, principal component analysis (PCA) is often used to distinguish compositional patterns among environment samples, particularly when many chemical parameters are available for the samples (e.g., Xue et al., 2011; Yunker et al., 1995). In the present work, the PCA based on the measured Hg, U, and Ra-226 shows that Site B is distinctly different from all the other sites, with much higher Ra-226 and U values (Figure 4). Considering that Site B is closer to the pond than the other 4 sites (Figure 1), Ra-226 and U levels at Site B indeed may have been influenced by the tailings ponds, although other possible sources (e.g., U naturally exists in soils and sediments) cannot be fully excluded. More spatial coverage is also needed to confirm this.

The PAH composition was also analyzed using PCA. With principal component 1 (PC 1) explaining over 43% of the variance, and the other 33% of the variance attributed to PC 2, the 5 sites are rather similar in terms of their PAH composition, as the major difference is between surface and deep samples (Figure 5). Higher levels of PAHs, high molecular

weight PAHs in particular, may be better preserved in deep soil samples due to either the blockage of sunlight that can photo-transform PAHs, or the abundance of clay minerals that HMW PAHs preferentially adsorb to (e.g., Zhao et al., 2023; Figures 2 and 5). Nevertheless, the similar PAHs concentrations and compositions among different sampling sites suggest that the influence from the tailings pond on PAHs may be minimal, if any. The lower levels of PAHs at these sites, when compared to adjacent regions, also point to the limited influence of tailings ponds in PAHs.

The composition of PAHs can be used to derive the contamination sources. For instance, the ratios of Ant to Ant + Phe and Flu to Flu + Pyr can help differentiate the sources of PAHs. An Ant to Ant + Phe ratio greater than 0.1 indicates that PAHs are sourced from incomplete combustion, while ratio smaller than 0.1 suggests sources of petroleum products (e.g., spilled oil; Wang et al., 2012; Yunker et al., 2002). Similarly, whether PAHs are originated from oil source, coal and biomass burning, or incomplete combustion of oil products can be determined by the Flu to Flu + Pyr ratio, with less than 0.4 indicating an oil source, exceeding 0.5 indicating coal and biomass burning, and between 0.4 and 0.5 indicating incomplete combustion of oil products. The high Ant to Ant + Phe ratios detected at the sampling sites in this work suggest that PAHs were generally from incomplete combustion. Together with the Flu to Flu + Pyr ratio, the results suggest that oil source or incomplete coal and biomass burning potentially may have a major effect on PAHs in the sampled soils (Figure 6), which could be a result of aluminum production from bauxite (e.g., Busetti et al., 2014; Oral et al., 2019), but could also originate from normal activities (e.g., cars, boats, etc.). Therefore, the composition of PAHs in the sampling sites did not provide a decisive linkage to the tailings ponds.

5. Conclusion

Our study showed that the concentrations of Hg (below detection limit of 0.0001 mg/L), U (< 0.001 - 0.039 mg/L), and Ra-226 (1.19 - 2.06 pCi/L) in the groundwater of the 5 sampling sites were generally lower than the EPA drinking water standards, suggesting an acceptable quality of groundwater. However, one sampling site closest to the tailings pond did show a higher level of contamination, suggesting the potential impact could not be excluded. Total concentrations of 16 US EPA PAHs 73.6 - 193.2 ng/g in surface and deep

soil samples. This concentration range is lower than previously reported PAHs level in local bay sediments and is significantly lower than regions with high petroleum pollution. While the compositions of PAHs in these sediments suggest incomplete combustion of coal and biomass may be the major source, more temporal and spatial coverages of the sampling stations would provide more information regarding the origins of the PAHs. Ancillary chemical parameters such as organic carbon contents, nutrient levels, as well as grain size distribution can also help to decipher the geochemical behaviors of the contaminants. Future work includes monitoring the contamination levels of waters and sediments in the Port Bay, which should offer further insights into sources of contamination. Other elements including chromium and arsenic will also be measured to be more comprehensive on the list of contaminants in Port Bay. These relevant data will be reported in the final report of this project, which is expected to be completed in March 2024.

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Table 1. Hg, Ra-226, and U concentrations in the groundwater from the 5 sites.

Sites	Hg (mg/L)	Ra-226 (pCi/L)	Uranium (mg/L)
Soil Site A	<0.0001	1.254 ± 0.465	0.015 ± 0.023
Soil Site B	<0.0001	2.062 ± 2.173	0.039 ± 0.015
Soil Site C	<0.0001	1.193 ± 0.803	0.011 ± 0.002
Soil Site D	<0.0001	1.940 ± 1.155	<0.001
Soil Site E	<0.0001	1.190 ± 0.125	0.004 ± 0.004

Table 2. Concentrations of PAHs at different sites. Unit: ppb or ng/g dried weight sediment. Surface refers to the depth of 0.05m, while deep refers to~1m.

PAHs (ppb)	Site A Surface	Site A Deep	Site B Surface	Site B Deep	Site C Surface	Site C Deep	Site D Surface	Site D Deep	Site E Surface	Site E Deep
Naphthalene	7.3 ± 10.3	13.5 ± 19.0	7.0 ± 9.9	26.4 ± 0.8	18.7 ± 0.2	7.6 ± 10.7	21.1 ± 0.6	24.7 ± 0.1	15.3 ± 0.2	16.0 ± 0.0
Acenaphthylene	0 ± 0	0 ± 0	7.1 ± 10.1	0 ± 0	9.1 ± 12.9	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
Acenaphthene	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
Fluorene	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
Phenanthrene	30.8 ± 0.9	55.5 ± 4.3	32.8 ± 0.3	57.9 ± 2.8	20.8 ± 29.5	33.3 ± 0.1	32.9 ± 1.1	48.9 ± 0.3	33.8 ± 0.9	34 ± 0.8
Anthracene	35.6 ± 0.3	61.6 ± 3.7	35.6 ± 0.2	64.2 ± 3.1	44.5 ± 0.1	36.6 ± 0.1	38.0 ± 2.2	53.6 ± 1.6	37.6 ± 1.1	37.7 ± 0.8
Fluoranthene	0 ± 0	0 ± 0	12.3 ± 17.3	0 ± 0	0 ± 0	0 ± 0	27.5 ± 1.0	38.3 ± 1.1	0 ± 0	26.5 ± 1.0
Pyrene	0 ± 0	0 ± 0	20.5 ± 0.2	0 ± 0	0 ± 0	0 ± 0	21.1 ± 0.6	31.7 ± 0.0	0 ± 0	11.1 ± 15.7
Benz[a]anthracene	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
Chrysene	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
Benzo[b]fluoranthene	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
Benzo[k]fluoranthene	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
Benzo[a]pyrene	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
Indeno[1,2,3-cd]fluoranthene	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
Dibenz[a,h]anthracene	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
Benzo[ghi]perylene	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0

Table 3. Concentrations of *n*-Alkanes at the 5 sites. Unit: ppb or ng/g dried weight sediment. Surface refers to the depth of 0.05m, while deep refers to~1m.

n-Alkanes (ppb)	Site A Surface	Site A Deep	Site B Surface	Site B Deep	Site C Surface	Site C Deep	Site D Surface	Site D Deep	Site E Surface	Site E Deep
C8	0 ± 0	63.6 ± 4.7	27.8 ± 39.3	37.8 ± 53.4	65.3 ± 5.5	25 ± 0.6	64.3 ± 2.3	63.1 ± 5.6	0 ± 0	45.5 ± 2.6
C9	64.0 ± 4.1	74.8 ± 3.4	48.7 ± 4.0	83.9 ± 2.7	60.9 ± 9.5	44.6 ± 0.0	62.1 ± 1.4	76.7 ± 9.9	0 ± 0	68.8 ± 2.7
C10	83.3 ± 1.8	89.3 ± 2.7	53.0 ± 1.3	94.8 ± 7.8	73.9 ± 4.1	60.2 ± 2.5	63.2 ± 3.7	46.0 ± 65.1	0 ± 0	77 ± 0.6
C11	125.4 ± 4.8	127.8 ± 32.9	84.2 ± 4.1	126.7 ± 3.1	100.3 ± 3.4	95.7 ± 5.6	73.8 ± 5.7	127.5 ± 9.1	46.1 ± 65.2	98.1 ± 6.8
C12	137.1 ± 0.8	151.5 ± 15.3	132.1 ± 0.5	158.8 ± 3.4	133.4 ± 3.7	108.8 ± 1.9	92.8 ± 2.6	160.2 ± 7.9	0 ± 0	131.9 ± 8.9
C13	180.4 ± 1.8	182.1 ± 27.8	117.6 ± 3.9	179.7 ± 6.5	144.5 ± 11.1	127.0 ± 0.5	122.3 ± 1.5	194.3 ± 13.0	0 ± 0	0 ± 0
C14	203.8 ± 5.1	218.3 ± 17.3	238.9 ± 0.7	226.3 ± 10.8	218.5 ± 7.4	162.7 ± 5.2	141.0 ± 9.2	236.2 ± 4.6	180.9 ± 5.4	204.8 ± 8.0
C15	97.4 ± 137.8	122.1 ± 172.6	141.1 ± 6.5	106.8 ± 151.0	184.7 ± 11.1	83.1 ± 117.5	137.3 ± 5.5	124.6 ± 176.2	97.6 ± 138.1	187.7 ± 9.3
C16	216.4 ± 2.9	234.7 ± 24	289.2 ± 14.0	260.3 ± 10.1	236.7 ± 3.6	180.6 ± 0.6	173.3 ± 0.8	282.3 ± 11.6	210.1 ± 5.6	242.7 ± 2.8
C17	291.6 ± 101.5	155.7 ± 220.2	167.8 ± 0.4	351.3 ± 152.4	258.5 ± 11.8	188.7 ± 3.4	175.6 ± 0.7	295.7 ± 6.0	225.2 ± 7.7	217.5 ± 10.1
C18	244.1 ± 0.5	271.7 ± 26.1	249.6 ± 5.5	284.3 ± 20.0	239.6 ± 17.4	199.5 ± 0.5	170.3 ± 16.3	314.7 ± 3.6	240.2 ± 5.0	250 ± 6.1
C19	0 ± 0	0 ± 0	78.8 ± 111.4	144.8 ± 204.8	221 ± 8.5	307.1 ± 0.8	175.8 ± 3.1	0 ± 0	0 ± 0	0 ± 0
C20	0 ± 0	0 ± 0	182.7 ± 7.3	300.5 ± 15.6	118.3 ± 167.3	0 ± 0	187.6 ± 12.2	0 ± 0	0 ± 0	260.7 ± 1.1
C21	0 ± 0	319.6 ± 31.8	194.4 ± 0.7	148.3 ± 209.7	242.2 ± 8.9	114.7 ± 162.2	198.0 ± 9.0	351.3 ± 9.1	279.5 ± 21.9	270.5 ± 0.7
C22	297.4 ± 0.8	354.6 ± 38.3	192.4 ± 7.2	158.9 ± 224.7	256.0 ± 13.4	239.6 ± 5.2	237.6 ± 17.9	369.9 ± 6.2	307.0 ± 18.3	335.9 ± 13.7
C23	341.4 ± 7.4	406.2 ± 42.3	213.1 ± 5.7	360.1 ± 23.9	304.4 ± 16.5	270.4 ± 1.9	320.2 ± 18.6	459.1 ± 9.8	352.3 ± 13.7	429.5 ± 33.0
C24	431.4 ± 26.2	505.7 ± 45.5	260.2 ± 14	406.6 ± 41.2	354.5 ± 14.8	322.6 ± 12.4	486.7 ± 10.6	606.3 ± 16.3	444.6 ± 15.5	665.3 ± 31.8
C25	464.9 ± 35.5	600.0 ± 51.2	276.1 ± 15.9	426.1 ± 19.4	392.3 ± 31.7	349.6 ± 18.1	603.6 ± 10.2	687.0 ± 12.1	490.2 ± 4.7	840.4 ± 46.0
C26	485.6 ± 35.6	630.3 ± 51.4	288.5 ± 13.5	440.2 ± 23.1	401.9 ± 24.2	376.7 ± 7.4	623.2 ± 36.3	702.3 ± 67.5	541.4 ± 52.3	846.7 ± 24.9

Continued

n-Alkanes (ppb)	Site A Surface	Site A Deep	Site B Surface	Site B Deep	Site C Surface	Site C Deep	Site D Surface	Site D Deep	Site E Surface	Site E Deep
C27	453.6 ± 23.3	578.1 ± 19.8	267.4 ± 13.5	433.8 ± 27.5	404.3 ± 20.9	356.0 ± 19.2	545.9 ± 22.3	626.5 ± 75.2	495.2 ± 0.3	730.8 ± 63.4
C28	410.9 ± 11.2	495 ± 29.2	238.1 ± 2.6	399.8 ± 7.1	360.7 ± 9.4	328.3 ± 8.3	430.2 ± 9.8	548 ± 6.9	450.6 ± 17	578.4 ± 20.1
C29	395.0 ± 10.9	471.1 ± 54.9	235.6 ± 10	406.4 ± 21.9	335.4 ± 44.1	318 ± 12.9	348.5 ± 9.8	510.5 ± 42.9	410.1 ± 34.1	462.7 ± 7.9
C30	374.9 ± 2.7	429.4 ± 36.6	0 ± 0	0 ± 0	326 ± 30.3	303.2 ± 8.6	266.9 ± 31.8	471.2 ± 9.3	189.1 ± 267.4	380.9 ± 20.0
C31	0 ± 0	240.6 ± 340.3	0 ± 0	234.3 ± 331.3	157.6 ± 222.9	0 ± 0	281.1 ± 1.8	236.2 ± 334.0	374.6 ± 5.2	365.9 ± 5.1
C32	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	201.9 ± 285.6	0 ± 0
C33	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
C34	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
C35	0 ± 0	0 ± 0	207.8 ± 293.8	0 ± 0	292.2 ± 413.3	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
C36	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
C37	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	324.6 ± 459.0	0 ± 0
C38	390.8 ± 552.7	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0
C39	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	453.3 ± 641.1

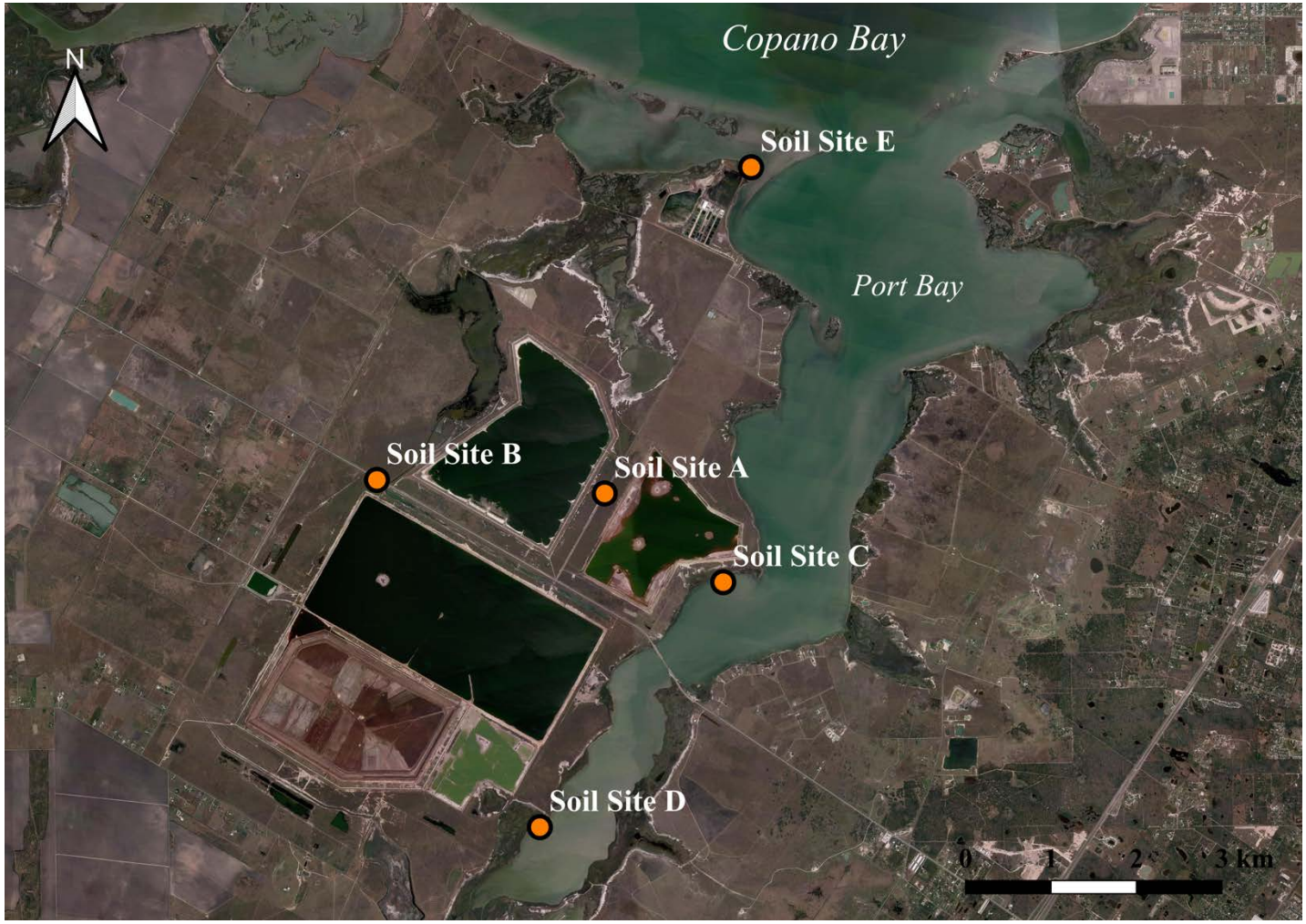


Figure 1. Sampling sites near the tailings ponds Port Bay area, Rockport, TX.

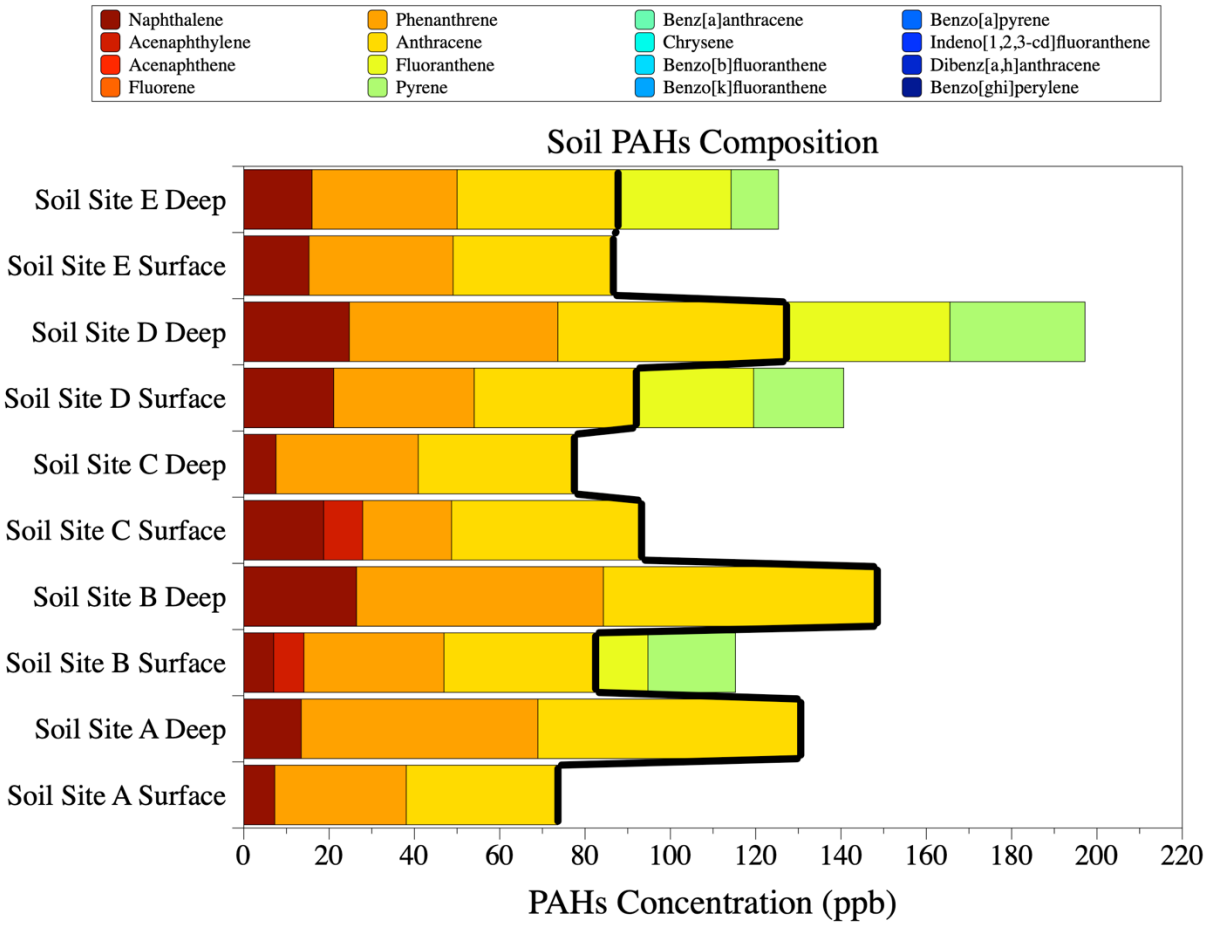


Figure 2. PAH concentrations and compositions at the 5 sampling sites near the tailings ponds. PAHs to the left of the black line are low molecular weight ones, while those to the right of the black line are high molecular weight ones.

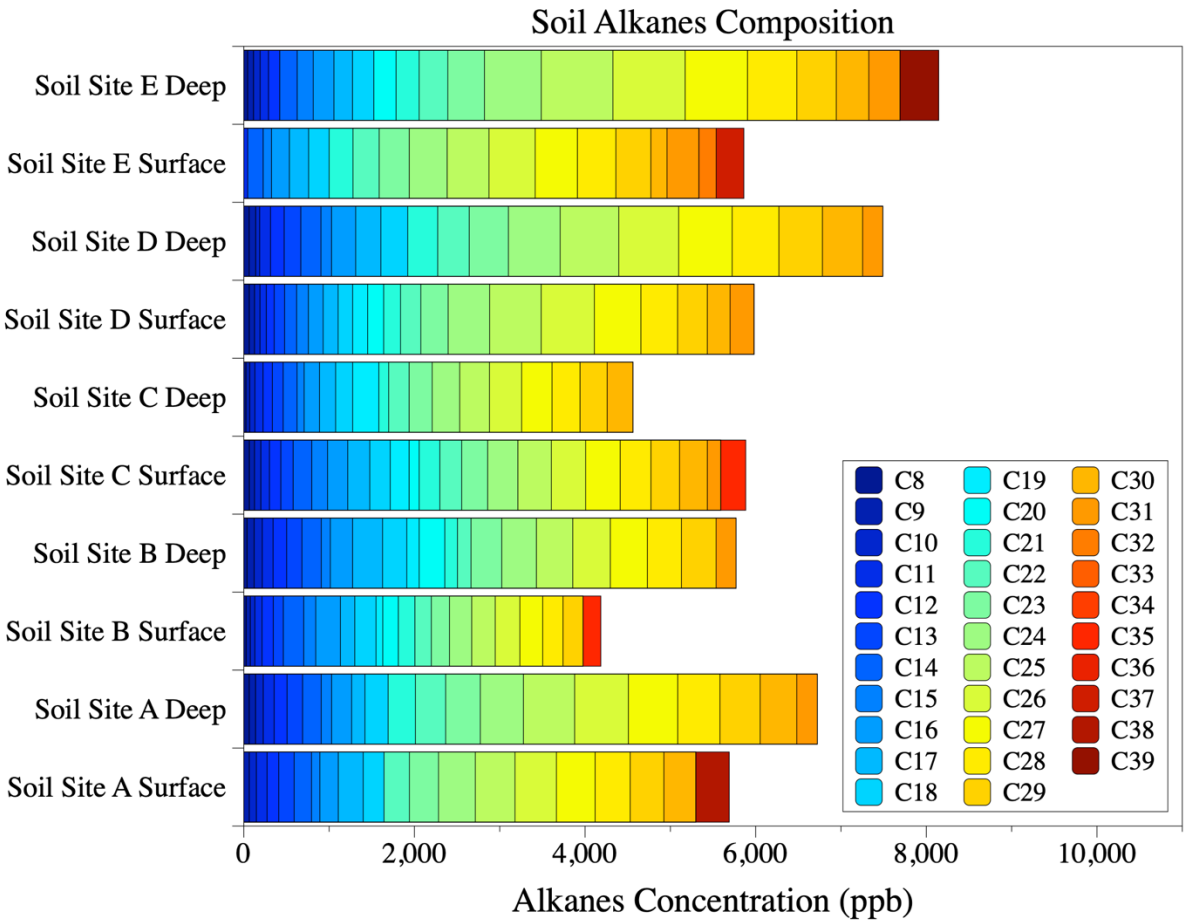


Figure 3. *n*-Alkanes concentrations and compositions of samples from the 5 sites near the tailings ponds.

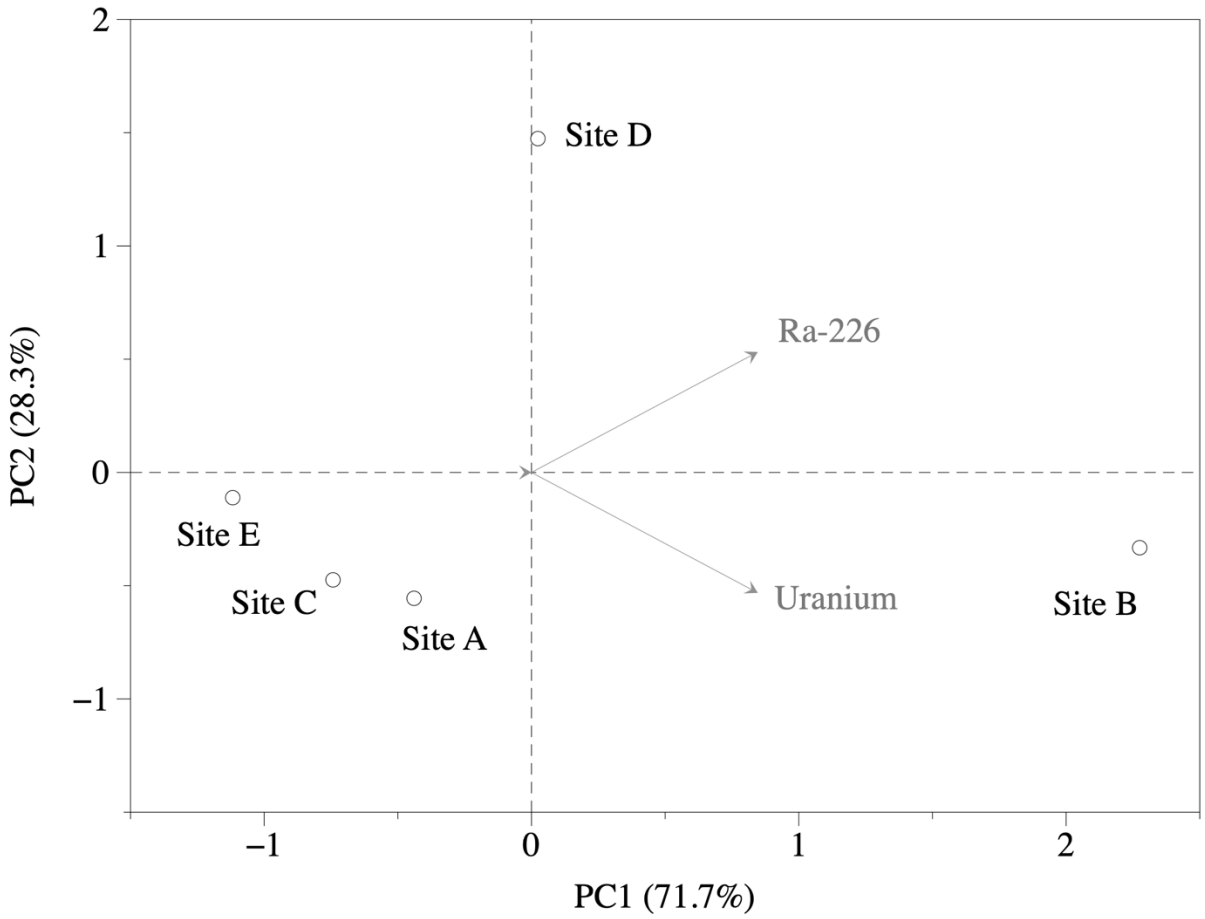


Figure 4. Principal component analysis (PCA) based on measured U and Ra-226 values.

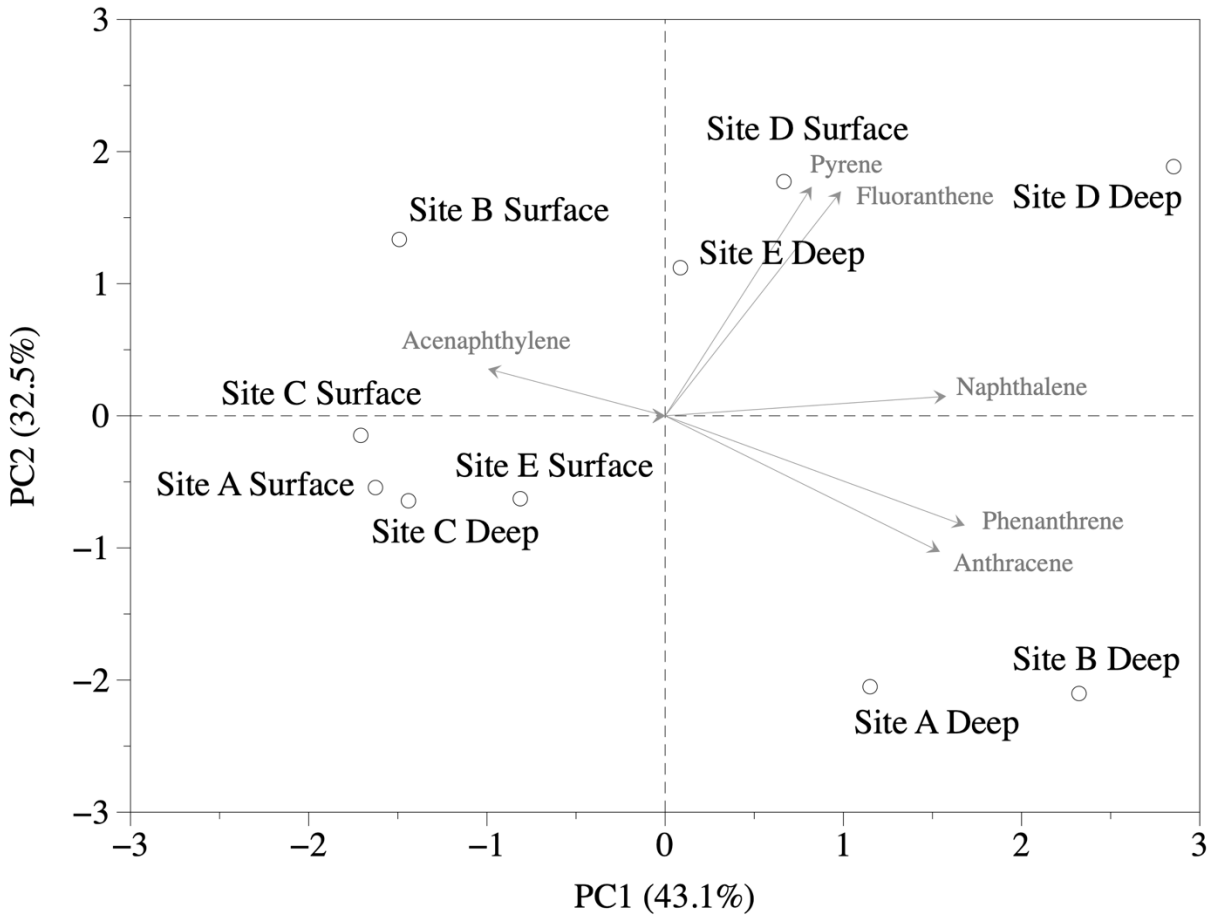


Figure 5. Principal component analysis (PCA) based on the composition of PAHs, with PC 1 explaining 43.1% of the variance, and PC2 32.5% of the rest.

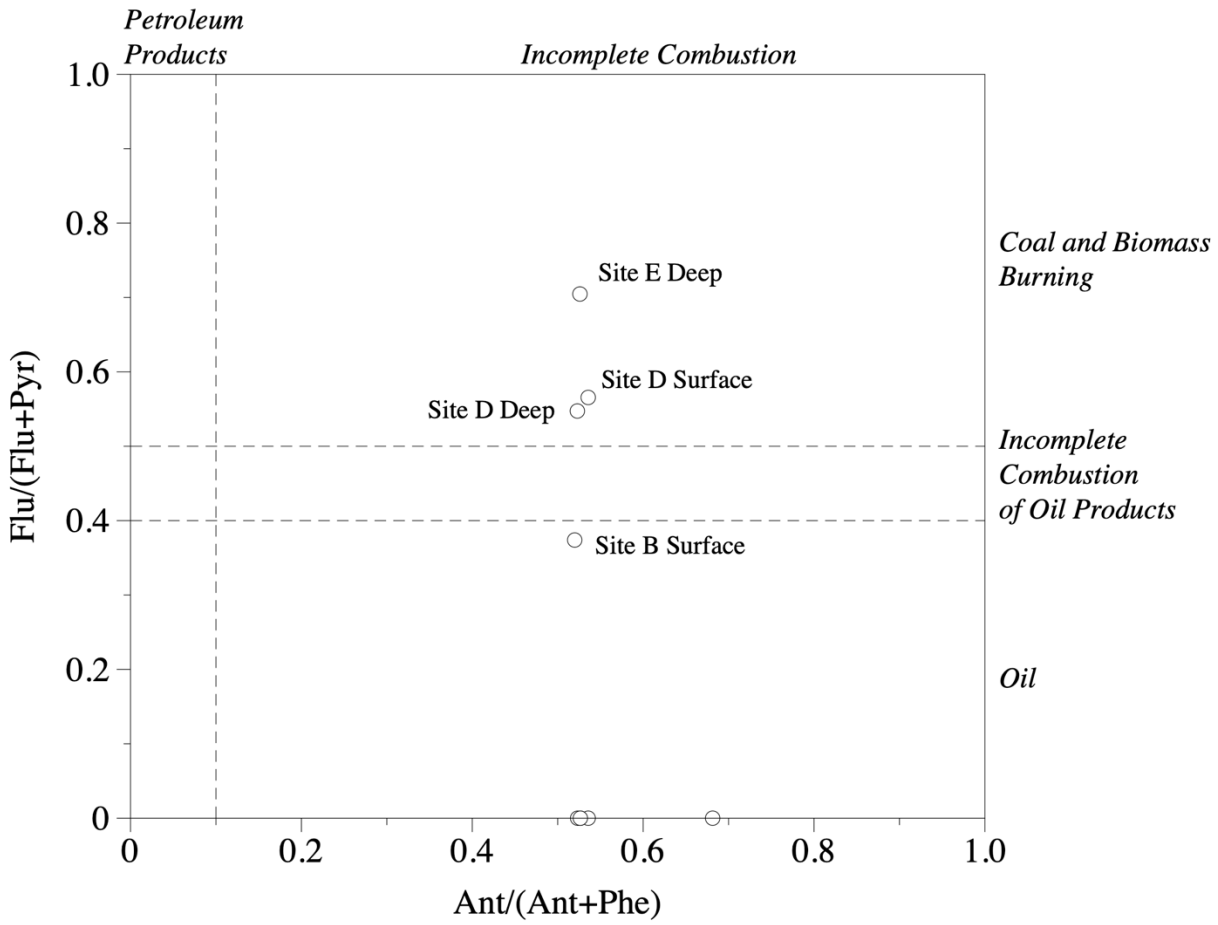


Figure 6. Diagnostics for distinguishing possible sources of PAHs.

ANALYTICAL REPORT

December 16, 2022

UTMSI - University of TX Marine Science

Sample Delivery Group: L1566481

Samples Received: 12/10/2022

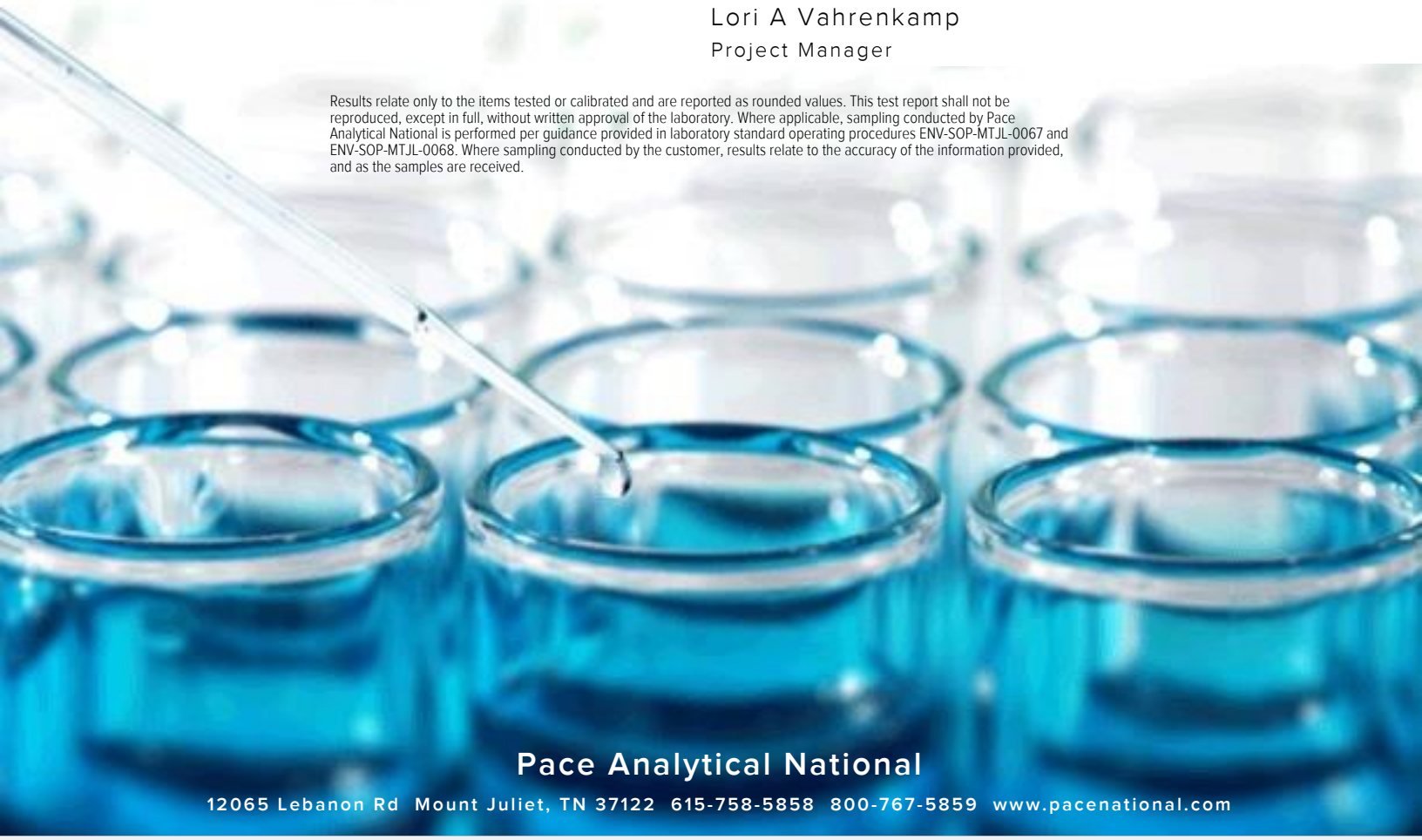
Project Number:

Description:

Report To: Kaijun Lu
750 Channel View Drive
Port Aransas, TX 78373

Entire Report Reviewed By:

Lori A Vahrenkamp
Project Manager



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

SAMPLE SUMMARY

1A L1566481-01 Solid

			Collected by	Collected date/time	Received date/time	
				12/08/22 13:00	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 18:42	AKB	Mt. Juliet, TN

1B L1566481-02 Solid

			Collected by	Collected date/time	Received date/time	
				12/08/22 13:00	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 18:45	AKB	Mt. Juliet, TN

1C L1566481-03 Solid

			Collected by	Collected date/time	Received date/time	
				12/08/22 13:00	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 18:48	AKB	Mt. Juliet, TN

2A L1566481-04 Solid

			Collected by	Collected date/time	Received date/time	
				12/08/22 11:00	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 19:17	AKB	Mt. Juliet, TN

2B L1566481-05 Solid

			Collected by	Collected date/time	Received date/time	
				12/08/22 11:00	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 19:20	AKB	Mt. Juliet, TN

2C L1566481-06 Solid

			Collected by	Collected date/time	Received date/time	
				12/08/22 11:00	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 19:22	AKB	Mt. Juliet, TN

3A L1566481-07 Solid

			Collected by	Collected date/time	Received date/time	
				12/08/22 10:00	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 19:24	AKB	Mt. Juliet, TN

3B L1566481-08 Solid

			Collected by	Collected date/time	Received date/time	
				12/08/22 10:00	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 19:27	AKB	Mt. Juliet, TN

3C L1566481-09 Solid

Collected by | Collected date/time 12/08/22 10:00 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 19:30	AKB	Mt. Juliet, TN

4A L1566481-10 Solid

Collected by | Collected date/time 12/06/22 15:00 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 19:32	AKB	Mt. Juliet, TN

4B L1566481-11 Solid

Collected by | Collected date/time 12/06/22 15:00 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 19:35	AKB	Mt. Juliet, TN

4C L1566481-12 Solid

Collected by | Collected date/time 12/06/22 15:00 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 19:37	AKB	Mt. Juliet, TN

5A L1566481-13 Solid

Collected by | Collected date/time 12/06/22 16:40 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 19:40	AKB	Mt. Juliet, TN

5B L1566481-14 Solid

Collected by | Collected date/time 12/06/22 16:40 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 19:47	AKB	Mt. Juliet, TN

5C L1566481-15 Solid

Collected by | Collected date/time 12/06/22 16:40 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 19:50	AKB	Mt. Juliet, TN

6A L1566481-16 Solid

Collected by | Collected date/time 12/06/22 14:10 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 19:52	AKB	Mt. Juliet, TN

6B L1566481-17 Solid

			Collected by	Collected date/time	Received date/time
				12/06/22 14:10	12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 19:55	AKB	Mt. Juliet, TN

6C L1566481-18 Solid

			Collected by	Collected date/time	Received date/time
				12/06/22 14:10	12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 19:57	AKB	Mt. Juliet, TN

7A L1566481-19 Solid

			Collected by	Collected date/time	Received date/time
				12/06/22 13:50	12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 20:00	AKB	Mt. Juliet, TN

7B L1566481-20 Solid

			Collected by	Collected date/time	Received date/time
				12/06/22 13:50	12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973974	1	12/14/22 07:03	12/14/22 18:35	AKB	Mt. Juliet, TN

7C L1566481-21 Solid

			Collected by	Collected date/time	Received date/time
				12/06/22 13:50	12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973984	1	12/14/22 07:15	12/14/22 11:51	SRT	Mt. Juliet, TN

8A L1566481-22 Solid

			Collected by	Collected date/time	Received date/time
				12/06/22 13:30	12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973984	1	12/14/22 07:15	12/14/22 11:58	SRT	Mt. Juliet, TN

8B L1566481-23 Solid

			Collected by	Collected date/time	Received date/time
				12/06/22 13:30	12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973984	1	12/14/22 07:15	12/14/22 12:00	SRT	Mt. Juliet, TN

8C L1566481-24 Solid

			Collected by	Collected date/time	Received date/time
				12/06/22 13:30	12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7471A	WG1973984	1	12/14/22 07:15	12/14/22 12:03	SRT	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Lori A Vahrenkamp
Project Manager

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 18:42	WG1973974

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 18:45	WG1973974

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 18:48	WG1973974

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 19:17	WG1973974

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 19:20	WG1973974

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 19:22	WG1973974

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 19:24	WG1973974

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 19:27	WG1973974

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 19:30	WG1973974

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 19:32	WG1973974

Mercury by Method 7471A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 19:35	WG1973974

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 19:37	WG1973974

Mercury by Method 7471A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 19:40	WG1973974

Mercury by Method 7471A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 19:47	WG1973974

Mercury by Method 7471A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 19:50	WG1973974

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 19:52	WG1973974

Mercury by Method 7471A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 19:55	WG1973974

Mercury by Method 7471A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 19:57	WG1973974

Mercury by Method 7471A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 20:00	WG1973974

Mercury by Method 7471A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 18:35	WG1973974

Mercury by Method 7471A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 11:51	WG1973984

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	MDL mg/kg	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 11:58	WG1973984

Mercury by Method 7471A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 12:00	WG1973984

Mercury by Method 7471A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg	mg/kg		date / time	
Mercury	<0.0180		0.0180	0.0400	1	12/14/2022 12:03	WG1973984

Method Blank (MB)

(MB) R3871925-1 12/14/22 18:30

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Mercury	<0.0180		0.0180	0.0400

Laboratory Control Sample (LCS)

(LCS) R3871925-2 12/14/22 18:32

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.500	0.566	113	80.0-120	

L1566481-20 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1566481-20 12/14/22 18:35 • (MS) R3871925-3 12/14/22 18:37 • (MSD) R3871925-4 12/14/22 18:40

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.500	<0.0180	0.432	0.440	86.5	87.9	1	75.0-125			1.69	20

Method Blank (MB)

(MB) R3871665-1 12/14/22 11:15

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Mercury	<0.0180		0.0180	0.0400

Laboratory Control Sample (LCS)

(LCS) R3871665-2 12/14/22 11:18

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.500	0.457	91.4	80.0-120	

L1566600-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1566600-01 12/14/22 11:20 • (MS) R3871665-3 12/14/22 11:28 • (MSD) R3871665-4 12/14/22 11:30

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.500	0.0461	0.491	0.456	88.9	81.9	1	75.0-125			7.38	20

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Company Name/Address:
UTMSI - University of TX Marine Science

750 Channel View Drive

Billing Information:
Kaijun Lu
750 Channel View Drive
Port Aransas, TX 78373

Pres Chk

Report to: **Kaijun Lu**

Email To: **kaijun.lu@utexas.edu**

Project Description:

City/State Collected:

Please Circle: PT MT CT ET

Phone: **512-660-0718**

Client Project #

Lab Project #

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ___

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote # 00108094

Date Results Needed

No. of Cntrs

Analysis / Container / Preservative

HG 2ozClr-NoPres

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	HG 2ozClr-NoPres	Remarks	Sample # (lab only)
22021756 13	1A	SS		12-08-22	13:00	1	X		-01
22021756 12	1B	SS		12-08-22	13:00	1	X		-02
22021756 16	1C	SS		12-08-22	13:00	1	X		-03
22021756 17	2A	SS		12-08-22	11200	1	X		-04
22021756 15	2B	SS		12-08-22	11200	1	X		-05
22021756 14	2C	SS		12-08-22	11200	1	X		-06
22021756 32	3A	SS		12-08-22	10:00	1	X		-07
22021756 26	3B	SS		12-08-22	10:00	1	X		-08
22021756 52	3C	SS		12-08-22	10:00	1	X		-09
22021756 41	4A	SS		12-06-22	15:00	1	X		-10

Chain of Custody Page ___ of ___

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # 156481
J215

Acctnum: **UTMSIPATX.**
Template: **T218553**
Prelogin: **P958345**
PM: **3587 - Lori A Vahrenkamp**
PB: BW 10/21

Shipped Via: **FedEx Ground**

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier _____

Tracking # 6094 5460 7846

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 0.2+0=0.2 °C Bottles Received: 24
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 12/10/22 Time: 1000

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Company Name/Address:
UTMSI - University of TX Marine Science

750 Channel View Drive

Billing Information:
Kaijun Lu
750 Channel View Drive
Port Aransas, TX 78373

Pres Chk

Report to: **Kaijun Lu**

Email To: **kaijun.lu@utexas.edu**

Project Description:

City/State Collected:

Please Circle: PT MT CT ET

Phone: **512-660-0718**

Client Project #

Lab Project #

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N___ Y___

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote # 00108094

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

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MT JULIET, TN

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SDG # 156481

Table #

Acctnum: **UTMSIPATX.**

Template: **T218553**

Prelogin: **P958345**

PM: **3587 - Lori A Vahrenkamp**

PB: BW 10/21

Shipped Via: **FedEx Ground**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	HG 2ozClr-NoPres	Remarks	Sample # (lab only)
22021756?4	4B	SS		12-06-22	15200	1	X		-11
22021756 43	4C	SS		12-06-22	15200	1	X		-12
22021756 28	5A	SS		12-06-22	14:40	1	X		-13
22021756 35	5B	SS		12-06-22	14:40	1	X		-14
22021755 47	5C	SS		12-06-22	14:40	1	X		-15
22021756 25	6A	SS		12-06-22	14:10	1	X		-16
22021756 48	6B	SS		12-06-22	14:10	1	X		-17
22021756 11	6C	SS		12-06-22	14:10	1	X		-18
22021756 29	7A	SS		12-06-22	13:50	1	X		-19
22021756 42	7B	SS		12-06-22	13:50	1	X		-20

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS √ FedEx __ Courier _____

Tracking # 6094 5460 7646

Sample Receipt Checklist

COC Seal Present/Intact:	NP	Y N
COC Signed/Accurate:		√ N
Bottles arrive intact:		√ N
Correct bottles used:		√ N
Sufficient volume sent:		√ N
If Applicable		
VOA Zero Headspace:		Y N
Preservation Correct/Checked:		√ N
RAD Screen <0.5 mR/hr:		√ N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 0.2 °C Bottles Received: 24	If preservation required by Login: Date/Time
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 12/10/22 Time: 1000	Hold: / Condition: NCF / (OK)

Company Name/Address:
UTMSI - University of TX Marine Science
750 Channel View Drive

Billing Information:
Kaijun Lu
750 Channel View Drive
Port Aransas, TX 78373

Pres Chk

Report to: **Kaijun Lu**

Email To: **kaijun.lu@utexas.edu**

Project Description:

City/State Collected:

Please Circle: PT MT CT ET

Phone: **512-660-0718**

Client Project #

Lab Project #

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ___

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote # 00108094

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN

12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # 156648

Table #

Acctnum: **UTMSIPATX.**
Template: **T218553**
Prelogin: **P958345**
PM: **3587 - Lori A Vahrenkamp**
PB: BW 10/21

Shipped Via: **FedEX Ground**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	HG 2ozClr-NoPres									Remarks	Sample # (lab only)
22021756 33	TC	SS		12-06-22	13:50	1	X										-21
22021756 27	8A	SS		12-06-22	13:30	1	X										-22
22021756 50	8B	SS		12-06-22	13:30	1	X										-23
22021756 28	8C	SS		12-06-22	13:30	1	X										-24
22021756 34	Empty	SS				1	X										

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier _____

Tracking # 6094 5460 7646

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD Screen <0.5 mR/hr: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes (No) HCL / MeoH TBR
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 0.2 °C Bottles Received: 24
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 12/10/22 Time: 1000

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

ANALYTICAL REPORT

December 12, 2022

UTMSI - University of TX Marine Science

Sample Delivery Group:	L1559144
Samples Received:	11/17/2022
Project Number:	
Description:	Monitoring Water Quality South Texas Bays

Report To:

Kaijun Lu
750 Channel View Drive
Port Aransas, TX 78373

Entire Report Reviewed By:

Lori A Vahrenkamp
Project Manager

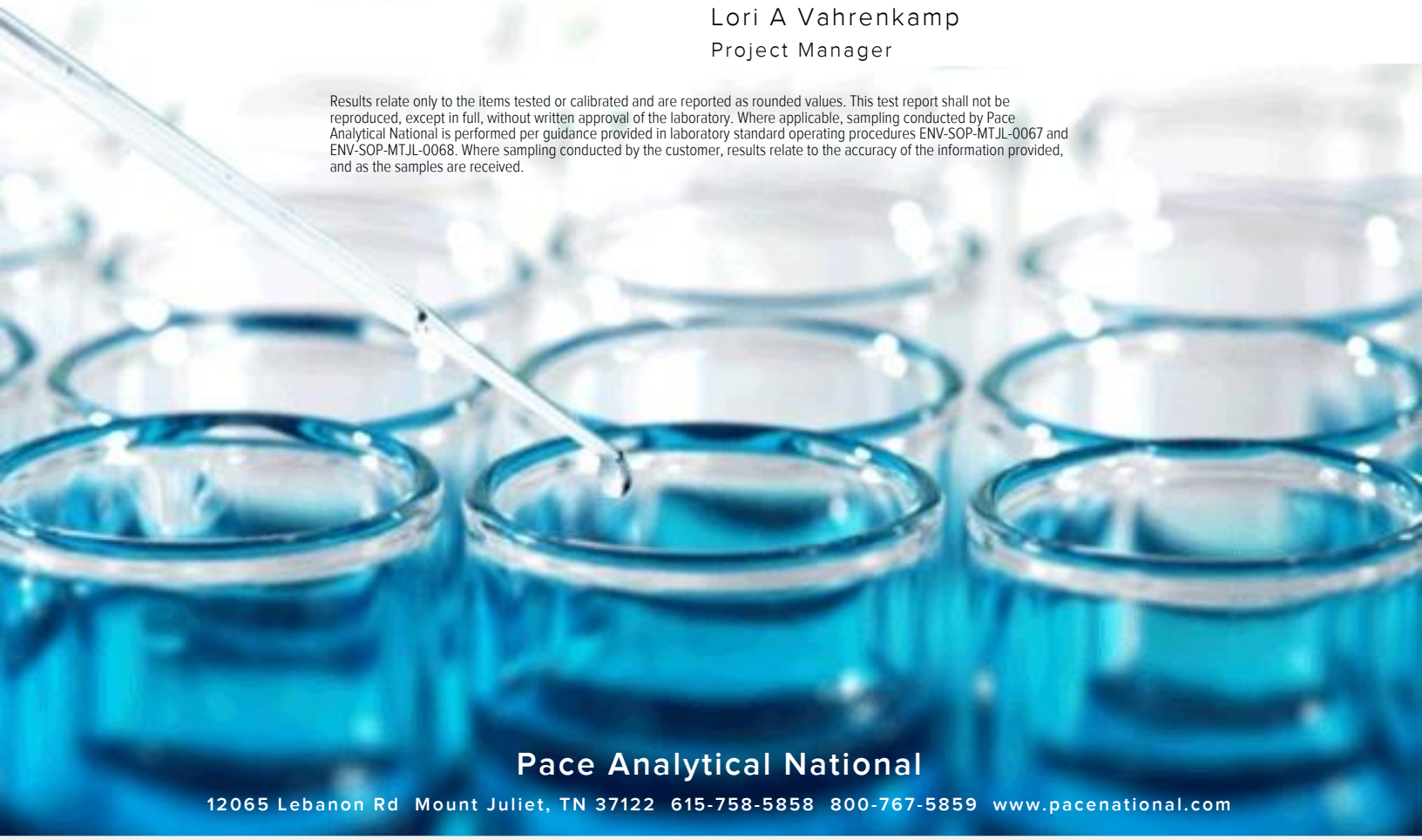


TABLE OF CONTENTS

SAMPLE SUMMARY

SITE 1 A L1559144-01 GW

Collected by: K J | Collected date/time: 11/10/22 00:00 | Received date/time: 11/17/22 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1961774	1	11/23/22 08:11	11/25/22 15:25	AKB	Mt. Juliet, TN

SITE 1 B L1559144-02 GW

Collected by: K J | Collected date/time: 11/10/22 00:00 | Received date/time: 11/17/22 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1961774	1	11/23/22 08:11	11/25/22 15:27	AKB	Mt. Juliet, TN

SITE 1 C L1559144-03 GW

Collected by: K J | Collected date/time: 11/10/22 00:00 | Received date/time: 11/17/22 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1961774	1	11/23/22 08:11	11/25/22 15:30	AKB	Mt. Juliet, TN

SITE 2 A L1559144-04 GW

Collected by: K J | Collected date/time: 11/10/22 00:00 | Received date/time: 11/17/22 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1961774	1	11/23/22 08:11	11/25/22 15:32	AKB	Mt. Juliet, TN

SITE 2 B L1559144-05 GW

Collected by: K J | Collected date/time: 11/10/22 00:00 | Received date/time: 11/17/22 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1961774	1	11/23/22 08:11	11/25/22 15:34	AKB	Mt. Juliet, TN

SITE 2 C L1559144-06 GW

Collected by: K J | Collected date/time: 11/10/22 00:00 | Received date/time: 11/17/22 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1961774	1	11/23/22 08:11	11/25/22 15:41	AKB	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Lori A Vahrenkamp
Project Manager

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	11/25/2022 15:25	WG1961774

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	11/25/2022 15:27	WG1961774

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	11/25/2022 15:30	WG1961774

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	11/25/2022 15:32	WG1961774

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	11/25/2022 15:34	WG1961774

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	11/25/2022 15:41	WG1961774

Method Blank (MB)

(MB) R3865118-1 11/25/22 15:14

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	<0.000100		0.000100	0.000200

Laboratory Control Sample (LCS)

(LCS) R3865118-2 11/25/22 15:16

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.00300	0.00278	92.7	80.0-120	

L1559146-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1559146-02 11/25/22 15:19 • (MS) R3865118-3 11/25/22 15:21 • (MSD) R3865118-4 11/25/22 15:23

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	<0.000100	0.00304	0.00310	101	103	1	75.0-125			1.95	20

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
UTMSI - University of TX Marine Science
750 Channel View Drive

Billing Information:
Kaijun Lu
750 Channel View Drive
Port Aransas, TX 78373

Pres Chk

Report to: Kaijun Lu

Email To: kaijun.lu@utexas.edu

Project Description: Monitoring Water Quality South Texas Bays

City/State Collected: Aransas Pass, Texas

Please Circle: PT MT CT ET

Phone: 512-660-0718

Client Project #

Lab Project #

Collected by (print): Kaijun Lu

Site/Facility ID #

P.O. #

Collected by (signature): Kaijun Lu

Immediately Packed on Ice N ✓ Y ___

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote # 00108094

Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	HG 250mlHDPE-HNO3	RA-226 1L-HDPE-Add HNO3	RA-228, KPA-U 1L-HDPE-Add HNO3	Remarks	Sample # (lab only)
Site 1 A		GW	1m	11-10-22		3	X	X	X		-01
Site 1 B		GW	1m	11-10-22		3	X	X	X		-02
Site 1 C		GW	1m	11-10-22		3	X	X	X		-03
Site 2 A		GW	1m	11-10-22		3	X	X	X		-04
Site 2 B		GW	1m	11-10-22		3	X	X	X		-05
Site 2 C		GW	1m	11-10-22		3	X	X	X		-06

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1559144
F177

Acctnum: UTMSIPATX.
Template: T218544
Prelogin: P958341
PM: 3587 - Lori A Vahrenkamp
PB: BW 10/21
Shipped Via: FedEX Ground

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier _____

Tracking # 6094 5460 7635

Sample Receipt Checklist
COC Seal Present/Intact: ~~NP~~ Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD Screen <0.5 mR/hr: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) Matt Lfw

Trip Blank Received: Yes / (No) HCL / MeoH TBR

Temp: MS 4.7 °C Bottles Received: 0.8 + 0.8 13

If preservation required by Login: Date/Time

Date: 11-17-22 Time: 1100

Hold:

Condition: NCF / (OK)

ANALYTICAL REPORT

December 14, 2022

UTMSI - University of TX Marine Science

Sample Delivery Group: L1566480

Samples Received: 12/10/2022

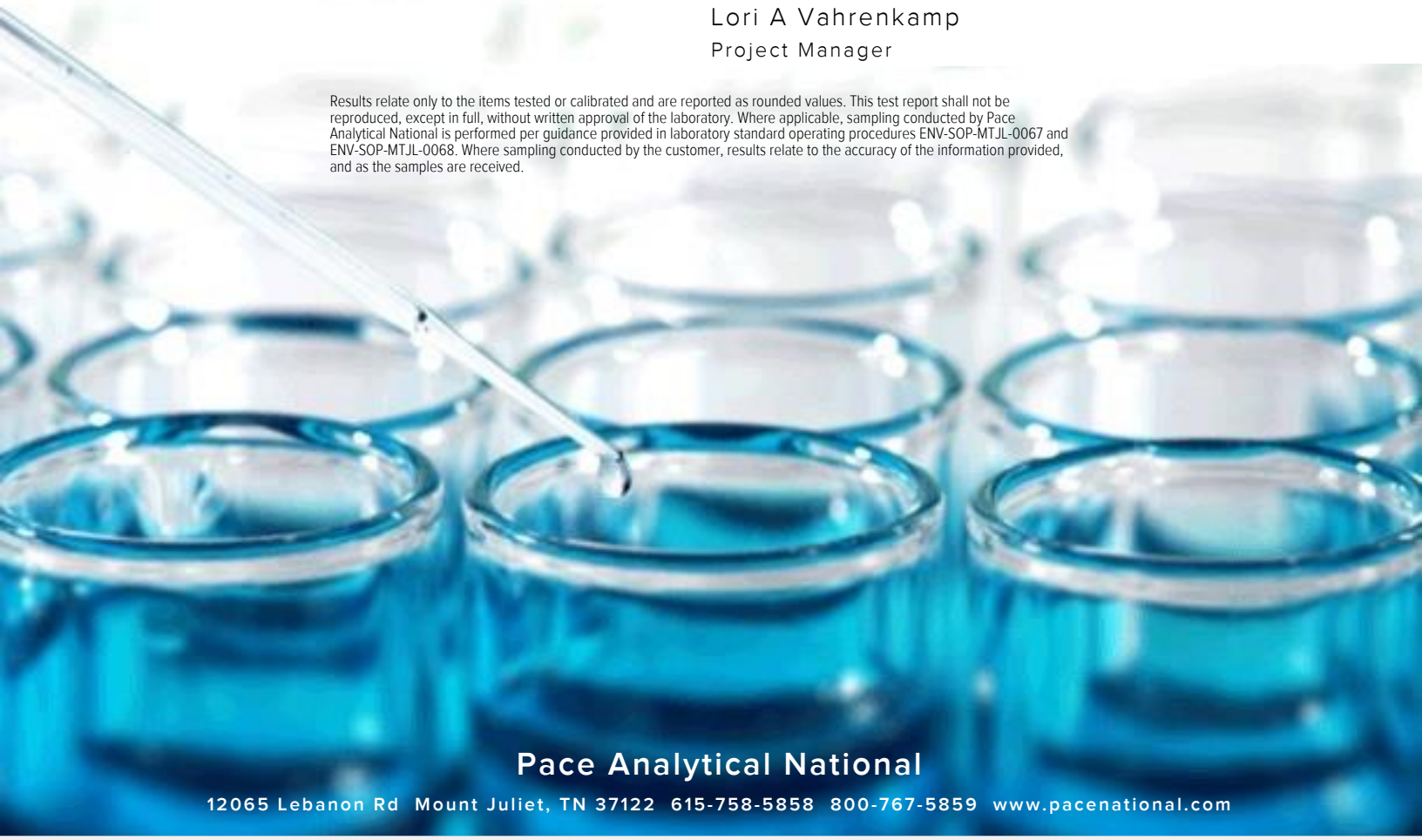
Project Number:

Description:

Report To: Kaijun Lu
750 Channel View Drive
Port Aransas, TX 78373

Entire Report Reviewed By:

Lori A Vahrenkamp
Project Manager



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

SITE 1A L1566480-01 GW

Collected by | Collected date/time 12/06/22 15:00 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972682	1	12/13/22 09:19	12/13/22 21:06	SRT	Mt. Juliet, TN

SITE 1B L1566480-02 GW

Collected by | Collected date/time 12/06/22 15:00 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972682	1	12/13/22 09:19	12/13/22 21:08	SRT	Mt. Juliet, TN

SITE 1C L1566480-03 GW

Collected by | Collected date/time 12/06/22 16:40 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972682	1	12/13/22 09:19	12/13/22 21:10	SRT	Mt. Juliet, TN

SITE 2A L1566480-04 GW

Collected by | Collected date/time 12/06/22 14:40 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972682	1	12/13/22 09:19	12/13/22 21:12	SRT	Mt. Juliet, TN

SITE 2B L1566480-05 GW

Collected by | Collected date/time 12/06/22 14:40 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 12:11	SRT	Mt. Juliet, TN

SITE 2C L1566480-06 GW

Collected by | Collected date/time 12/06/22 14:10 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 12:13	SRT	Mt. Juliet, TN

SITE 3A L1566480-07 GW

Collected by | Collected date/time 12/06/22 14:10 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 12:15	SRT	Mt. Juliet, TN

SITE 3B L1566480-08 GW

Collected by | Collected date/time 12/06/22 14:10 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 12:21	SRT	Mt. Juliet, TN

SITE 3C L1566480-09 GW

			Collected by	Collected date/time	Received date/time	
				12/06/22 13:50	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 12:24	SRT	Mt. Juliet, TN

SITE 4-1 L1566480-10 GW

			Collected by	Collected date/time	Received date/time	
				12/06/22 13:50	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 12:05	SRT	Mt. Juliet, TN

SITE 4-2 L1566480-11 GW

			Collected by	Collected date/time	Received date/time	
				12/06/22 13:00	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 12:26	SRT	Mt. Juliet, TN

SITE 4-3 L1566480-12 GW

			Collected by	Collected date/time	Received date/time	
				12/06/22 13:00	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 12:28	SRT	Mt. Juliet, TN

SITE 5-1 L1566480-13 GW

			Collected by	Collected date/time	Received date/time	
				12/06/22 13:00	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 12:30	SRT	Mt. Juliet, TN

SITE 5-2 L1566480-14 GW

			Collected by	Collected date/time	Received date/time	
				12/06/22 11:00	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 12:32	SRT	Mt. Juliet, TN

SITE 5-3 L1566480-15 GW

			Collected by	Collected date/time	Received date/time	
				12/06/22 11:00	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 12:34	SRT	Mt. Juliet, TN

SITE 6-1 L1566480-16 GW

			Collected by	Collected date/time	Received date/time	
				12/06/22 11:00	12/10/22 10:00	
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 12:36	SRT	Mt. Juliet, TN

SITE 6-2 L1566480-17 GW

Collected by | Collected date/time 12/06/22 10:00 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 12:54	SRT	Mt. Juliet, TN

SITE 6-3 L1566480-18 GW

Collected by | Collected date/time 12/06/22 10:00 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 12:56	SRT	Mt. Juliet, TN

SITE 7-1 L1566480-19 GW

Collected by | Collected date/time 12/06/22 10:00 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 12:58	SRT	Mt. Juliet, TN

SITE 7-2 L1566480-20 GW

Collected by | Collected date/time 12/06/22 15:00 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 13:00	SRT	Mt. Juliet, TN

SITE 7-3 L1566480-21 GW

Collected by | Collected date/time 12/06/22 13:50 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 13:03	SRT	Mt. Juliet, TN

SITE 8-1 L1566480-22 GW

Collected by | Collected date/time 12/06/22 13:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 13:05	SRT	Mt. Juliet, TN

SITE 8-2 L1566480-23 GW

Collected by | Collected date/time 12/06/22 13:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 13:07	SRT	Mt. Juliet, TN

SITE 8-3 L1566480-24 GW

Collected by | Collected date/time 12/06/22 13:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1972683	1	12/13/22 20:08	12/14/22 13:09	SRT	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Lori A Vahrenkamp
Project Manager

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/13/2022 21:06	WG1972682

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/13/2022 21:08	WG1972682

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/13/2022 21:10	WG1972682

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/13/2022 21:12	WG1972682

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 12:11	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 12:13	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 12:15	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 12:21	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 12:24	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 12:05	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 12:26	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 12:28	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 12:30	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 12:32	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 12:34	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 12:36	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 12:54	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 12:56	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 12:58	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 13:00	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 13:03	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 13:05	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 13:07	WG1972683

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.000100		0.000100	0.000200	1	12/14/2022 13:09	WG1972683

Method Blank (MB)

(MB) R3871404-1 12/13/22 20:12

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	<0.000100		0.000100	0.000200

Laboratory Control Sample (LCS)

(LCS) R3871404-2 12/13/22 20:14

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.00300	0.00301	100	80.0-120	

L1565868-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1565868-02 12/13/22 20:16 • (MS) R3871404-3 12/13/22 20:18 • (MSD) R3871404-4 12/13/22 20:20

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	<0.000100	0.00301	0.00298	100	99.5	1	75.0-125			0.964	20

Method Blank (MB)

(MB) R3871700-1 12/14/22 12:01

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	<0.000100		0.000100	0.000200

Laboratory Control Sample (LCS)

(LCS) R3871700-2 12/14/22 12:03

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.00300	0.00332	111	80.0-120	

L1566480-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1566480-10 12/14/22 12:05 • (MS) R3871700-3 12/14/22 12:07 • (MSD) R3871700-4 12/14/22 12:09

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	<0.000100	0.00350	0.00352	117	117	1	75.0-125			0.532	20

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
UTMSI - University of TX Marine Science

750 Channel View Drive

Billing Information:
Kaijun Lu
750 Channel View Drive
Port Aransas, TX 78373

Report to: **Kaijun Lu**

Email To: **kaijun.lu@utexas.edu**

Project Description:

City/State Collected:

Please Circle: PT MT CT ET

Phone: **512-660-0718**

Client Project #

Lab Project #

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N____ Y____

Rush? (Lab MUST Be Notified)
____ Same Day ____ Five Day
____ Next Day ____ 5 Day (Rad Only)
____ Two Day ____ 10 Day (Rad Only)
____ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page 1 of 3

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1566480
H223

Acctnum: UTMSIPAH
Template: T218554
Prelogin: P958348
PM: 3587 - Lori A Vahrenkamp
PB: 10/20/22 MW
Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	HG 250mlHDPE-HNO3	Pres Chk	Remarks	Sample # (lab only)
P958348 -08	4B	GW		12-06-22	15:00	1	X			-01
P958348 -23	4C	GW		12-06-22	15:00	1	X			-02
P958348 -02	5A	GW		12-06-22	14:40	1	X			-03
P958348 -07	5B	GW		12-06-22	14:40	1	X			-04
P958348 -21	5C	GW		12-06-22	14:40	1	X			-05
P958348 -24	6A	GW		12-06-22	14:10	1	X			-06
P958348 -04	6B	GW		12-06-22	14:10	1	X			-07
P958348 -06	6C	GW		12-06-22	14:10	1	X			-08
P958348 -09	7A	GW		12-06-22	13:50	1	X			-09
-11	7B	GW		12-06-22	13:50	1	X			-10

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier _____

Tracking # 6094 5460 7598

Sample Receipt Checklist
COC Seal Present/Intact: NP __Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: ✓Y __N
RAD Screen <0.5 mR/hr: ✓Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 6 °C Bottles Received: 24	If preservation required by Login: Date/Time
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) Caleb Tapp	Date: 12/10/22 Time: 10:00	Hold: Condition: NCF / OK

Company Name/Address:
UTMSI - University of TX Marine Science

750 Channel View Drive

Billing Information:
Kaijun Lu
750 Channel View Drive
Port Aransas, TX 78373

Report to: **Kaijun Lu**

Email To: **kaijun.lu@utexas.edu**

Project Description:

City/State Collected:

Please Circle: PT MT CT ET

Phone: **512-660-0718**

Client Project #

Lab Project #

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ___

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page 2 of 3

Pace
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MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1566480

Table #

Acctnum: **UTMSIPATX.**

Template: **T218554**

Prelogin: **P958348**

PM: **3587 - Lori A Vahrenkamp**

PB: 10/20/22 MM

Shipped Via: **FedEX Ground**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	HG 250mlHDPE-HNO3	Pres Chk									Remarks	Sample # (lab only)
P958348 -13	1A	GW		12-08-22	13:00	1	X											-11
P958348 -19	1B	GW		12-08-22	13:00	1	X											-12
P958348 -20	1C	GW		12-08-22	13:00	1	X											-13
P958348 -03	2A	GW		12-08-22	11:00	1	X											-14
P958348 -14	2B	GW		12-08-22	11:00	1	X											-15
P958348 -10	2C	GW		12-08-22	11:00	1	X											-16
P958348 -18	3A	GW		12-08-22	10:00	1	X											-17
P958348 -25	3B	GW		12-08-22	10:00	1	X											-18
P958348 -17	3C	GW		12-08-22	10:00	1	X											-19
P958348 -22	4A	GW		12-08-22	15:00	1	X											-20

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier _____

Tracking # 6094 5460 7598

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD Screen <0.5 mR/hr: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / NO HCL / MeoH TBR	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: GB A 2 °C 1-8	Bottles Received: 24
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) Caleb Tapp	Date: 12/10/22	Time: 10:00

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Company Name/Address:
UTMSI - University of TX Marine Science

750 Channel View Drive

Billing Information:
Kaijun Lu
750 Channel View Drive
Port Aransas, TX 78373

Report to: **Kaijun Lu**

Email To: **kaijun.lu@utexas.edu**

Project Description:

City/State Collected:

Please Circle: PT MT CT ET

Phone: **512-660-0718**

Client Project #

Lab Project #

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N____ Y____

Rush? (Lab MUST Be Notified)
____ Same Day ____ Five Day
____ Next Day ____ 5 Day (Rad Only)
____ Two Day ____ 10 Day (Rad Only)
____ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page 3 of 3

Pace
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12065 Lebanon Rd Mount Juliet, TN 37122
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SDG # L1566480

Table #

Acctnum: **UTMSIPATX.**

Template: **T218554**

Prelogin: **P958348**

PM: 3587 - Lori A Vahrenkamp

PB: 10/20/22 MW

Shipped Via: **FedEX Ground**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	HG 250mlHDPE-HNO3	Remarks	Sample # (lab only)
P958348-01	7C	GW		12-06-22	13:50	1	X		-21
P958348-12	8A	GW		12-06-22	13:30	1	X		-22
P958348-05	8B	GW		12-06-22	13:30	1	X		-23
P958348-15	8C	GW		12-06-22	13:30	1	X		-24
P958348-16	Empty	GW		12-06-22	13:30	1	X		-25 NA

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier _____

Tracking # 6094 5460 7598

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD Screen <0.5 mR/hr: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / (No) HCL / MeoH TBR	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: GBA2 1.9 °C	Bottles Received: 24
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) Caleb Tapp	Date: 12/10/22	Time: 10:00

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

ANALYTICAL REPORT

December 28, 2022

UTMSI - University of TX Marine Science

Sample Delivery Group:	L1559148
Samples Received:	11/17/2022
Project Number:	
Description:	Monitoring Water Quality South Texas Bays

Report To:

Kaijun Lu
750 Channel View Drive
Port Aransas, TX 78373

Entire Report Reviewed By:

Lori A Vahrenkamp
Project Manager

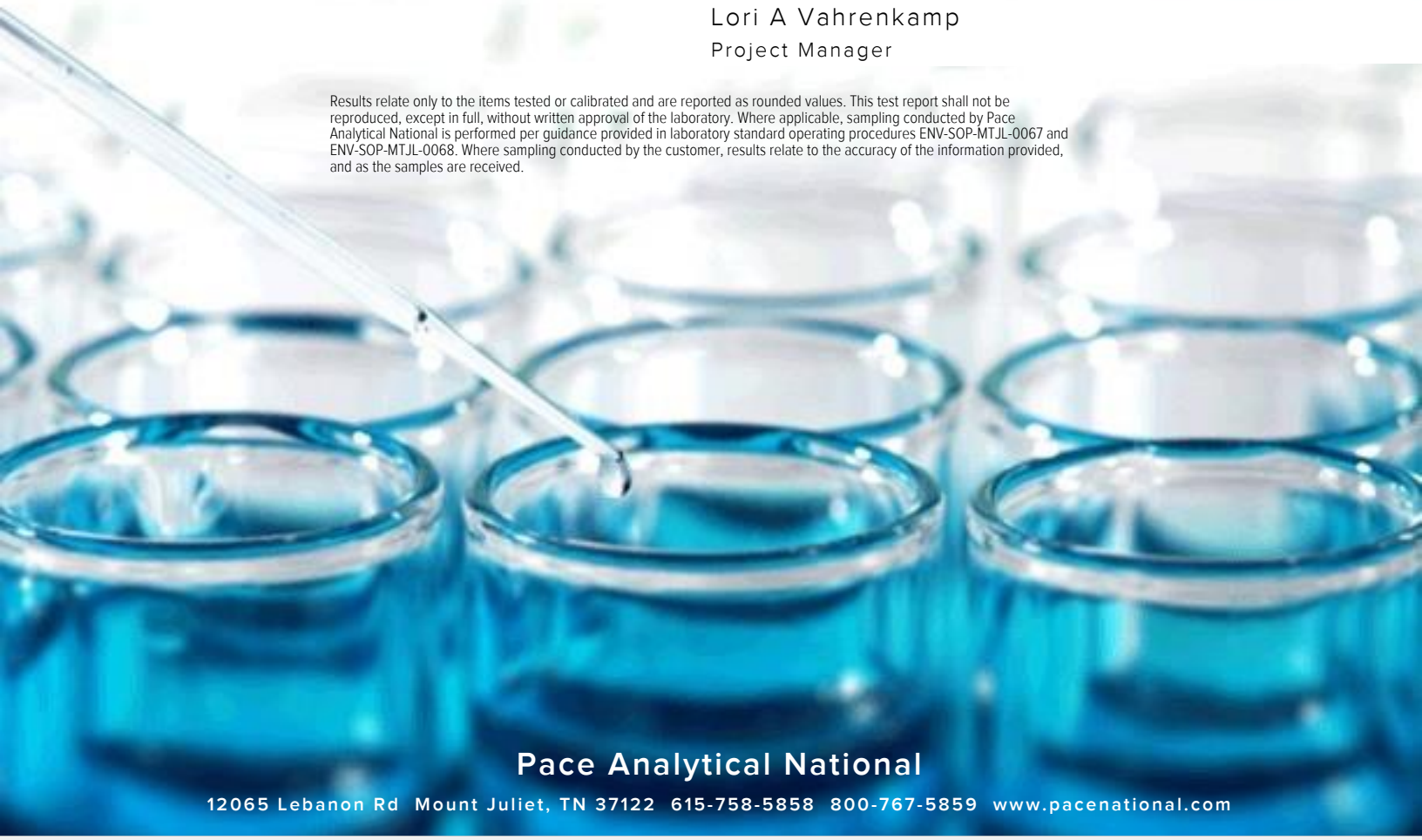


TABLE OF CONTENTS

SITE 1 A L1559148-01 Non-Potable Water

Collected by: KJ | Collected date/time: 11/10/22 00:00 | Received date/time: 11/17/22 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1963825	1	11/22/22 14:12	12/01/22 15:34	SNR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1971832	1	12/19/22 15:10	12/22/22 14:49	RGT	Mt. Juliet, TN

SITE 1 B L1559148-02 Non-Potable Water

Collected by: KJ | Collected date/time: 11/10/22 00:00 | Received date/time: 11/17/22 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1963825	1	11/22/22 14:12	12/01/22 15:37	SNR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1971832	1	12/19/22 15:10	12/22/22 14:49	RGT	Mt. Juliet, TN

SITE 1 C L1559148-03 Non-Potable Water

Collected by: KJ | Collected date/time: 11/10/22 00:00 | Received date/time: 11/17/22 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1963825	1	11/22/22 14:12	12/01/22 15:39	SNR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1971832	1	12/19/22 15:10	12/22/22 14:49	RGT	Mt. Juliet, TN

SITE 2 A L1559148-04 Non-Potable Water

Collected by: KJ | Collected date/time: 11/10/22 00:00 | Received date/time: 11/17/22 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1963825	1	11/22/22 14:12	12/01/22 15:42	SNR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1971832	1	12/19/22 15:10	12/22/22 14:49	RGT	Mt. Juliet, TN

SITE 2 B L1559148-05 Non-Potable Water

Collected by: KJ | Collected date/time: 11/10/22 00:00 | Received date/time: 11/17/22 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1963825	1	11/22/22 14:12	12/01/22 15:44	SNR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1971832	1	12/19/22 15:10	12/22/22 14:49	RGT	Mt. Juliet, TN

SITE 2 C L1559148-06 Non-Potable Water

Collected by: KJ | Collected date/time: 11/10/22 00:00 | Received date/time: 11/17/22 11:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1963825	1	11/22/22 14:12	12/01/22 15:47	SNR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1971832	1	12/19/22 15:10	12/20/22 12:30	RGT	Mt. Juliet, TN

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Lori A Vahrenkamp
Project Manager

Project Narrative

Due to the limited sample volume received, the laboratory proceeded with the KPA-U and Ra-226 analyses. The Ra-228 analysis was unable to be completed due the limited sample volume received.

Radiochemistry by Method D5174

Analyte	Result	Qualifier	Uncertainty	RDL	Analysis Date	Batch
	mg/l		+ / -	mg/l	date / time	
Uranium	<0.00100			0.00100	12/01/2022 15:34	WG1963825

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	1.21		0.415	0.241	12/22/2022 14:49	WG1971832
(T) Barium-133	*85.8*			*30.0-143*	*12/22/2022 14:49*	WG1971832

Radiochemistry by Method D5174

Analyte	Result	Qualifier	Uncertainty	RDL	Analysis Date	Batch
	mg/l		+ / -	mg/l	date / time	
Uranium	0.0412		0.00133	0.00100	12/01/2022 15:37	WG1963825

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.813		0.390	0.339	12/22/2022 14:49	WG1971832
(T) Barium-133	*83.9*			*30.0-143*	*12/22/2022 14:49*	WG1971832

Radiochemistry by Method D5174

Analyte	Result	Qualifier	Uncertainty	RDL	Analysis Date	Batch
	mg/l		+ / -	mg/l	date / time	
Uranium	0.0389		0.00125	0.00100	12/01/2022 15:39	WG1963825

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	1.74		0.512	0.278	12/22/2022 14:49	WG1971832
(T) Barium-133	*83.6*			*30.0-143*	*12/22/2022 14:49*	WG1971832

Radiochemistry by Method D5174

Analyte	Result	Qualifier	Uncertainty	RDL	Analysis Date	Batch
	mg/l		+ / -	mg/l	date / time	
Uranium	0.0558		0.00179	0.00100	12/01/2022 15:42	WG1963825

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	4.50		0.772	0.279	12/22/2022 14:49	WG1971832
(T) Barium-133	*91.7*			*30.0-143*	*12/22/2022 14:49*	WG1971832

Radiochemistry by Method D5174

Analyte	Result	Qualifier	Uncertainty	RDL	Analysis Date	Batch
	mg/l		+ / -	mg/l	date / time	
Uranium	0.0326		0.00105	0.00100	12/01/2022 15:44	WG1963825

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	1.36		0.544	0.422	12/22/2022 14:49	WG1971832
(T) Barium-133	*66.3*			*30.0-143*	*12/22/2022 14:49*	WG1971832

Radiochemistry by Method D5174

Analyte	Result	Qualifier	Uncertainty	RDL	Analysis Date	Batch
	mg/l		+ / -	mg/l	date / time	
Uranium	0.0284		0.000913	0.00100	12/01/2022 15:47	WG1963825

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.327		0.240	0.265	12/20/2022 12:30	WG1971832
(T) Barium-133	*102*			*30.0-143*	*12/20/2022 12:30*	WG1971832

Method Blank (MB)

(MB) R3868327-1 12/01/22 14:57

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Uranium	<0.00100		0.00100	0.00100

L1559148-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1559148-04 12/01/22 15:42 • (DUP) R3868327-5 12/01/22 15:06

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Uranium	0.0558	0.0481	1	14.7		20

Laboratory Control Sample (LCS)

(LCS) R3868327-2 12/01/22 14:59

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Uranium	0.0300	0.0315	105	80.0-120	

L1552490-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1552490-01 12/01/22 15:09 • (MS) R3868327-3 12/01/22 15:01 • (MSD) R3868327-4 12/01/22 15:04

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Uranium	0.0200	<0.00100	0.0129	0.0126	64.6	62.8	1	75.0-125	J6	J6	2.70	20

Method Blank (MB)

(MB) R3875288-1 12/20/22 12:30

Analyte	MB Result pCi/l	MB Qualifier	MB Uncertainty + / - pCi/l	MB MDA pCi/l
Radium-226	0.0554	J	0.0556	0.0721
(T) Barium-133	*95.9*		*95.9*	

L1557819-10 Original Sample (OS) • Duplicate (DUP)

(OS) L1557819-10 12/20/22 12:30 • (DUP) R3875288-5 12/20/22 12:30

Analyte	Original Result pCi/l	Original Uncertainty + / -	Original MDA pCi/l	DUP Result pCi/l	DUP Uncertainty + / -	DUP MDA pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-226	0.429	0.294	0.318	0.558	0.272	0.318	1	26.0	0.321		20	3
(T) Barium-133	*96.5*			*97.9*	*97.9*							

Laboratory Control Sample (LCS)

(LCS) R3875288-2 12/20/22 12:30

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.02	5.33	106	80.0-120	
(T) Barium-133			*92.3*		

L1557819-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1557819-02 12/20/22 12:30 • (MS) R3875288-3 12/20/22 12:30 • (MSD) R3875288-4 12/20/22 12:30

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-226	20.0	0.407	16.2	18.8	79.0	92.1	1	75.0-125			15.0		20
(T) Barium-133		*101*			*98.2*	*95.5*							

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDA	Minimum Detectable Activity.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RER	Replicate Error Ratio.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(T)	Tracer - A radioisotope of known concentration added to a solution of chemically equivalent radioisotopes at a known concentration to assist in monitoring the yield of the chemical separation.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
UTMSI - University of TX Marine Science
750 Channel View Drive

Billing Information:
Kaijun Lu
750 Channel View Drive
Port Aransas, TX 78373

Report to: Kaijun Lu
Email To: kaijun.lu@utexas.edu

Project Description: Monitoring Water Quality South Texas Bays
City/State Collected: Aransas Pass, Texas
Please Circle: PT MT CT ET

Phone: 512-660-0718
Client Project #
Lab Project #

Collected by (print): Kaijun Lu
Site/Facility ID #
P.O. #

Collected by (signature): Kaijun Lu
Immediately Packed on Ice N ✓ Y ___

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day
Quote # 00108094
Date Results Needed

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1559148
F177

Acctnum: UTMSIPATX.
Template: T218544
Prelogin: P958341
PM: 3587 - Lori A Vahrenkamp
PB: BW 10/21
Shipped Via: FedEX Ground

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	HG 250mlHDPE-HNO3	RA-226 1L-HDPE-Add HNO3	RA-228, KPA-U 1L-HDPE-Add HNO3	Remarks	Sample # (lab only)
Site 1 A		GW	1m	11-10-22		3	X	X	X		-01
Site 1 B		GW	1m	11-10-22		3	X	X	X		-02
Site 1 C		GW	1m	11-10-22		3	X	X	X		-03
Site 2 A		GW	1m	11-10-22		3	X	X	X		-04
Site 2 B		GW	1m	11-10-22		3	X	X	X		-05
Site 2 C		GW	1m	11-10-22		3	X	X	X		-06

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:
pH _____ Temp _____
Flow _____ Other _____

Samples returned via: __ UPS ✓ FedEx __ Courier _____
Tracking # 6094 5460 7635

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD Screen <0.5 mR/hr: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: MSA°C 0.8+0.8 Bottles Received: 13	If preservation required by Login: Date/Time
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature) Matthew	Date: 11-17-22 Time: 1100	Hold: Condition: NCF / OK

ANALYTICAL REPORT

April 10, 2023

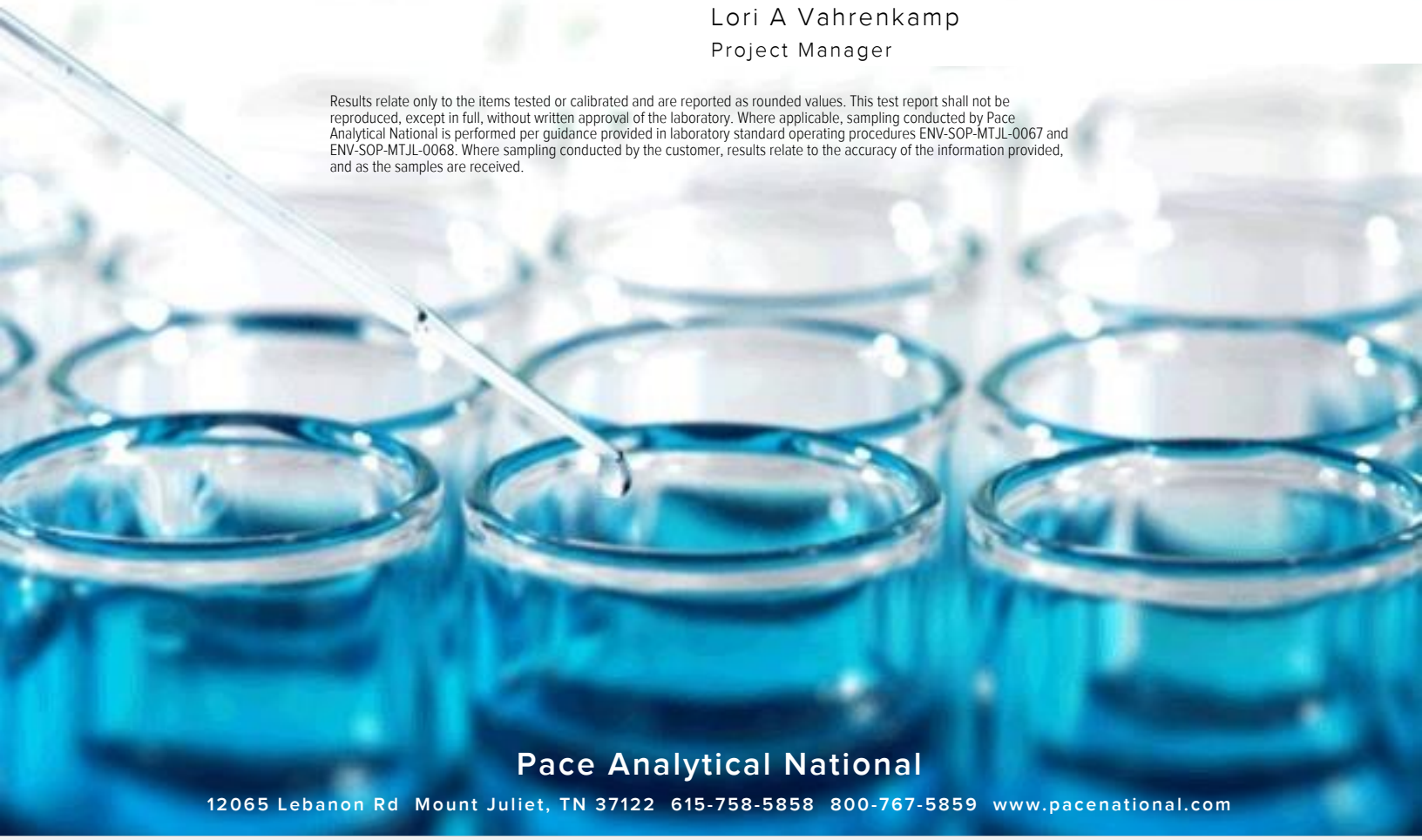
Revised Report

UTMSI - University of TX Marine Science

Sample Delivery Group:	L1569444
Samples Received:	12/10/2022
Project Number:	
Description:	Monitoring Water Quality South Texas Bays
Report To:	Kaijun Lu 750 Channel View Drive Port Aransas, TX 78373

Entire Report Reviewed By:

Lori A Vahrenkamp
Project Manager



Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

SOIL SITE C1 L1569444-01 GW

Collected by | Collected date/time 12/06/22 09:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1977462	10	12/21/22 08:21	12/21/22 14:20	SRT	Mt. Juliet, TN

SOIL SITE C1 L1569444-02 Non-Potable Water

Collected by | Collected date/time 12/06/22 09:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1979170	1	12/23/22 13:49	12/28/22 13:32	SNR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1977878	1	01/04/23 16:26	01/10/23 19:03	DME	Mt. Juliet, TN

SOIL SITE C2 L1569444-03 GW

Collected by | Collected date/time 12/06/22 09:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1977462	10	12/21/22 08:21	12/21/22 14:28	SRT	Mt. Juliet, TN

SOIL SITE C2 L1569444-04 Non-Potable Water

Collected by | Collected date/time 12/06/22 09:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1979170	1	12/23/22 13:49	12/28/22 13:35	SNR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1977878	1	01/04/23 16:26	01/10/23 19:03	DME	Mt. Juliet, TN

SOIL SITE C3 L1569444-05 GW

Collected by | Collected date/time 12/06/22 09:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1977462	10	12/21/22 08:21	12/21/22 14:30	SRT	Mt. Juliet, TN

SOIL SITE C3 L1569444-06 Non-Potable Water

Collected by | Collected date/time 12/06/22 09:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1979170	1	12/23/22 13:49	12/28/22 13:37	SNR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1977878	1	01/09/23 08:00	01/10/23 19:03	DME	Mt. Juliet, TN

SOIL SITE D1 L1569444-07 GW

Collected by | Collected date/time 12/08/22 14:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1977462	10	12/21/22 08:21	12/21/22 14:32	SRT	Mt. Juliet, TN

SOIL SITE D1 L1569444-08 Non-Potable Water

Collected by | Collected date/time 12/08/22 14:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1979170	1	12/23/22 13:49	12/28/22 13:40	SNR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1977878	1	01/04/23 16:26	01/10/23 19:03	DME	Mt. Juliet, TN

SOIL SITE D2 L1569444-09 GW

Collected by | Collected date/time 12/08/22 14:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1977462	10	12/21/22 08:21	12/21/22 14:34	SRT	Mt. Juliet, TN

SOIL SITE D2 L1569444-10 Non-Potable Water

Collected by | Collected date/time 12/08/22 14:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1979170	1	12/23/22 13:49	12/28/22 13:42	SNR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1977878	1	01/04/23 16:26	01/10/23 19:03	DME	Mt. Juliet, TN

SOIL SITE D3 L1569444-11 GW

Collected by | Collected date/time 12/08/22 14:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1977462	10	12/21/22 08:21	12/21/22 14:36	SRT	Mt. Juliet, TN

SOIL SITE D3 L1569444-12 Non-Potable Water

Collected by | Collected date/time 12/08/22 14:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1979170	1	12/23/22 13:49	12/28/22 13:45	SNR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1977878	1	01/04/23 16:26	01/10/23 19:03	DME	Mt. Juliet, TN

SOIL SITE C1 L1569444-13 GW

Collected by | Collected date/time 12/06/22 09:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1977462	10	12/21/22 08:21	12/21/22 14:39	SRT	Mt. Juliet, TN

SOIL SITE C1 L1569444-14 Non-Potable Water

Collected by | Collected date/time 12/06/22 09:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1979170	1	12/23/22 13:49	12/28/22 13:53	SNR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1979908	1	12/29/22 11:49	01/06/23 15:41	RGT	Mt. Juliet, TN

SOIL SITE C2 L1569444-15 GW

Collected by | Collected date/time 12/06/22 10:00 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1977462	10	12/21/22 08:21	12/21/22 14:43	SRT	Mt. Juliet, TN

SOIL SITE C2 L1569444-16 Non-Potable Water

Collected by | Collected date/time 12/06/22 10:00 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1979170	1	12/23/22 13:49	12/28/22 13:55	SNR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1979908	1	12/29/22 11:49	01/06/23 15:41	RGT	Mt. Juliet, TN

SAMPLE SUMMARY

SOIL SITE C3 L1569444-17 GW

Collected by | Collected date/time 12/06/22 10:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Mercury by Method 7470A	WG1977462	10	12/21/22 08:21	12/21/22 14:45	SRT	Mt. Juliet, TN

SOIL SITE C3 L1569444-18 Non-Potable Water

Collected by | Collected date/time 12/06/22 10:30 | Received date/time 12/10/22 10:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Radiochemistry by Method D5174	WG1979170	1	12/23/22 13:49	12/28/22 13:58	SNR	Mt. Juliet, TN
Radiochemistry by Method SM7500Ra B M	WG1979908	1	12/29/22 11:49	01/06/23 15:41	RGT	Mt. Juliet, TN

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All radiochemical sample results for solids are reported on a dry weight basis with the exception of tritium, carbon-14 and radon, unless wet weight was requested by the client. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Lori A Vahrenkamp
Project Manager

Report Revision History

Level II Report - Version 1: 01/17/23 16:56

Project Narrative

Revised Report Issued 04-10-23.

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.00100		0.00100	0.00200	10	12/21/2022 14:20	WG1977462

Radiochemistry by Method D5174

Analyte	Result	Qualifier	Uncertainty	RDL	Analysis Date	Batch
	mg/l		+ / -	mg/l	date / time	
Uranium	0.00634		0.000314	0.00100	12/28/2022 13:32	WG1979170

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	1.09		0.540	0.396	01/10/2023 19:03	WG1977878
(T) Barium-133	*44.2*			*30.0-143*	*01/10/2023 19:03*	WG1977878

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.00100		0.00100	0.00200	10	12/21/2022 14:28	WG1977462

Radiochemistry by Method D5174

Analyte	Result	Qualifier	Uncertainty	RDL	Analysis Date	Batch
	mg/l		+ / -	mg/l	date / time	
Uranium	<0.00100			0.00100	12/28/2022 13:35	WG1979170

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	1.15		0.574	0.335	01/10/2023 19:03	WG1977878
(T) Barium-133	*41.6*			*30.0-143*	*01/10/2023 19:03*	WG1977878

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.00100		0.00100	0.00200	10	12/21/2022 14:30	WG1977462

Radiochemistry by Method D5174

Analyte	Result	Qualifier	Uncertainty	RDL	Analysis Date	Batch
	mg/l		+ / -	mg/l	date / time	
Uranium	0.00643		0.000323	0.00100	12/28/2022 13:37	WG1979170

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	1.33		0.594	0.485	01/10/2023 19:03	WG1977878
(T) Barium-133	*60.6*			*30.0-143*	*01/10/2023 19:03*	WG1977878

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.00100		0.00100	0.00200	10	12/21/2022 14:32	WG1977462

Radiochemistry by Method D5174

Analyte	Result	Qualifier	Uncertainty	RDL	Analysis Date	Batch
	mg/l		+ / -	mg/l	date / time	
Uranium	<0.00100			0.00100	12/28/2022 13:40	WG1979170

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	1.07		0.384	0.185	01/10/2023 19:03	WG1977878
(T) Barium-133	*85.3*			*30.0-143*	*01/10/2023 19:03*	WG1977878

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.00100		0.00100	0.00200	10	12/21/2022 14:34	WG1977462

Radiochemistry by Method D5174

Analyte	Result	Qualifier	Uncertainty	RDL	Analysis Date	Batch
	mg/l		+ / -	mg/l	date / time	
Uranium	<0.00100			0.00100	12/28/2022 13:42	WG1979170

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	3.25		0.795	0.424	01/10/2023 19:03	WG1977878
(T) Barium-133	*68.5*			*30.0-143*	*01/10/2023 19:03*	WG1977878

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.00100		0.00100	0.00200	10	12/21/2022 14:36	WG1977462

Radiochemistry by Method D5174

Analyte	Result	Qualifier	Uncertainty	RDL	Analysis Date	Batch
	mg/l		+ / -	mg/l	date / time	
Uranium	<0.00100			0.00100	12/28/2022 13:45	WG1979170

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	1.50		0.562	0.392	01/10/2023 19:03	WG1977878
(T) Barium-133	*67.8*			*30.0-143*	*01/10/2023 19:03*	WG1977878

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.00100		0.00100	0.00200	10	12/21/2022 14:39	WG1977462

Radiochemistry by Method D5174

Analyte	Result	Qualifier	Uncertainty	RDL	Analysis Date	Batch
	mg/l		+ / -	mg/l	date / time	
Uranium	0.00872		0.000434	0.00100	12/28/2022 13:53	WG1979170

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	1.73		0.521	0.304	01/06/2023 15:41	WG1979908
(T) Barium-133	*87.0*			*30.0-143*	*01/06/2023 15:41*	WG1979908

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.00100		0.00100	0.00200	10	12/21/2022 14:43	WG1977462

Radiochemistry by Method D5174

Analyte	Result	Qualifier	Uncertainty	RDL	Analysis Date	Batch
	mg/l		+ / -	mg/l	date / time	
Uranium	0.0123		0.000610	0.00100	12/28/2022 13:55	WG1979170

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	1.58		0.536	0.418	01/06/2023 15:41	WG1979908
(T) Barium-133	*83.1*			*30.0-143*	*01/06/2023 15:41*	WG1979908

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	<0.00100		0.00100	0.00200	10	12/21/2022 14:45	WG1977462

Radiochemistry by Method D5174

Analyte	Result	Qualifier	Uncertainty	RDL	Analysis Date	Batch
	mg/l		+ / -	mg/l	date / time	
Uranium	0.0130		0.000644	0.00100	12/28/2022 13:58	WG1979170

Radiochemistry by Method SM7500Ra B M

Analyte	Result	Qualifier	Uncertainty	MDA	Analysis Date	Batch
	pCi/l		+ / -	pCi/l	date / time	
RADIUM-226	0.270	J3	0.227	0.255	01/06/2023 15:41	WG1979908
(T) Barium-133	*81.3*			*30.0-143*	*01/06/2023 15:41*	WG1979908

Method Blank (MB)

(MB) R3876550-1 12/28/22 12:45

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Uranium	<0.00100		0.00100	0.00100

L1569444-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1569444-04 12/28/22 13:35 • (DUP) R3876550-5 12/28/22 12:56

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Uranium	<0.00100	<0.00100	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3876550-2 12/28/22 12:48

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Uranium	0.0300	0.0284	94.8	80.0-120	

L1566524-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1566524-01 12/28/22 12:58 • (MS) R3876550-3 12/28/22 12:51 • (MSD) R3876550-4 12/28/22 12:53

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Uranium	0.0200	<0.00100	0.0170	0.0176	84.9	88.2	1	75.0-125			3.83	20

Method Blank (MB)

(MB) R3880744-1 01/10/23 19:03

Analyte	MB Result	MB Qualifier	MB Uncertainty	MB MDA
	pCi/l		+ / -	pCi/l
Radium-226	0.0132	U	0.0471	0.0859
(T) Barium-133	*84.9*		*84.9*	

L1564686-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1564686-02 01/10/23 19:03 • (DUP) R3880744-5 01/10/23 19:03

Analyte	Original Result	Original Uncertainty	Original MDA	DUP Result	DUP Uncertainty	DUP MDA	Dilution	DUP RPD	DUP RER	DUP Qualifier	DUP RPD Limits	DUP RER Limit
	pCi/l	+ / -	pCi/l	pCi/l	+ / -	pCi/l		%			%	
Radium-226	0.640	0.294	0.211	0.118	0.187	0.211	1	138	1.50	J	20	3
(T) Barium-133	*87.2*			*93.2*	*93.2*							

Laboratory Control Sample (LCS)

(LCS) R3880744-2 01/10/23 19:03

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	pCi/l	pCi/l	%	%	
Radium-226	5.02	5.37	107	80.0-120	
(T) Barium-133			*87.4*		

L1564686-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1564686-01 01/10/23 19:03 • (MS) R3880744-3 01/10/23 19:03 • (MSD) R3880744-4 01/10/23 19:03

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	MS RER	RPD Limits
	pCi/l	pCi/l	pCi/l	pCi/l	%	%		%			%		%
Radium-226	20.0	0.768	22.6	20.5	109	98.6	1	75.0-125			9.62		20
(T) Barium-133		*83.3*			*84.1*	*92.0*							

Method Blank (MB)

(MB) R3879328-1 01/06/23 15:41

Analyte	MB Result pCi/l	MB Qualifier	MB Uncertainty + / - pCi/l	MB MDA pCi/l
Radium-226	-0.00738	U	0.0145	0.0488
(T) Barium-133	*102*		*102*	

L1569444-18 Original Sample (OS) • Duplicate (DUP)

(OS) L1569444-18 01/06/23 15:41 • (DUP) R3879328-5 01/06/23 15:41

Analyte	Original Result pCi/l	Original Uncertainty + / -	Original MDA pCi/l	DUP Result pCi/l	DUP Uncertainty + / -	DUP MDA pCi/l	Dilution	DUP RPD %	DUP RER	DUP Qualifier	DUP RPD Limits %	DUP RER Limit
Radium-226	0.270	0.227	0.255	2.88	0.701	0.255	1	166	3.54	J3	20	3
(T) Barium-133	*81.3*			*87.1*	*87.1*							

Laboratory Control Sample (LCS)

(LCS) R3879328-2 01/06/23 15:41

Analyte	Spike Amount pCi/l	LCS Result pCi/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Radium-226	5.02	5.61	112	80.0-120	
(T) Barium-133			*109*		

L1569496-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1569496-01 01/06/23 15:41 • (MS) R3879328-3 01/06/23 15:41 • (MSD) R3879328-4 01/06/23 15:41

Analyte	Spike Amount pCi/l	Original Result pCi/l	MS Result pCi/l	MSD Result pCi/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	MS RER	RPD Limits %
Radium-226	20.0	1.92	21.6	22.5	98.5	103	1	75.0-125			3.81		20
(T) Barium-133					*105*	*102*							

QUALITY CONTROL SUMMARY

L1569444-01,03,05,07,09,11,13,15,17

Method Blank (MB)

(MB) R3874436-1 12/21/22 13:54

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	<0.000100		0.000100	0.000200

Laboratory Control Sample (LCS)

(LCS) R3874436-2 12/21/22 13:56

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.00300	0.00253	84.2	80.0-120	

L1569368-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1569368-03 12/21/22 14:02 • (MS) R3874436-3 12/21/22 14:04 • (MSD) R3874436-4 12/21/22 14:06

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	<0.000100	0.00283	0.00284	94.4	94.5	1	75.0-125			0.176	20

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDA	Minimum Detectable Activity.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RER	Replicate Error Ratio.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(T)	Tracer - A radioisotope of known concentration added to a solution of chemically equivalent radioisotopes at a known concentration to assist in monitoring the yield of the chemical separation.
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
U	Below Detectable Limits: Indicates that the analyte was not detected.

ACCREDITATIONS & LOCATIONS

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
UTMSI - University of TX Marine Science

750 Channel View Drive

Billing Information:
Kaijun Lu
750 Channel View Drive
Port Aransas, TX 78373

Report to: **Kaijun Lu**

Email To: **kaijun.lu@utexas.edu**

Project Description: **Monitoring Water Quality South Texas Bays**

City/State Collected:

Please Circle: PT MT CT ET

Phone: **512-660-0718**

Client Project #

Lab Project #

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ___

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Pres Chk: V V

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	HG 250mlHDPE-HNO3	RA-226 1L-HDPE-Add HNO3	RA-228, KPA-U 1L-HDPE-Add HNO3	Remarks	Sample # (lab only)
soil site c1		GW		12-06-22	09:30	~~3~~ 2	X	X	X		-01,02
soil site c2		GW		12-06-22	09:30	~~3~~ 2	X	X	X		-03,04
soil site c3		GW		12-06-22	09:30	~~3~~ 2	X	X	X		-05,06
soil site D1		GW		12-08-22	14:30	~~3~~ 2	X	X	X		-07,08
soil site D2		GW		12-08-22	14:30	~~3~~ 2	X	X	X		-09,10
soil site D3		GW		12-08-22	14:30	~~3~~ 2	X	X	X		-11,12
soil site E1		GW		12-06-22	13:00	~~3~~ 0	X	X	X		
soil site E2		GW		12-06-22	13:00	~~3~~ 0	X	X	X		
soil site E3		GW		12-06-22	13:00	~~3~~ 0	X	X	X		
		GW				~~3~~ 8	X	X	X		

Chain of Custody Page ___ of ___

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L1569444
C015

Acctnum: **UTMSIPATX.**
Template: **T218544**
Prelogin: **P958341**
PM: **3587 - Lori A Vahrenkamp**
PB: BW 10/21
Shipped Via: **FedEX Ground**

* Matrix:
SS - Soil **AIR** - Air **F** - Filter
GW - Groundwater **B** - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS ✓ FedEx __ Courier _____

Tracking # 6094 5460 7602
6094 5460 7613

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N
RAD Screen <0.5 mR/hr: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received: 18	If preservation required by Login: Date/Time
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 12.10.22 Time: 1000	Hold: Condition: NCF / OK

LR569444

C015

Tracking Numbers	Temperature
6094 5460 7602	GBA2 3.410= 3.4
6094 5460 7613	GBA2 2.010= 2.0

12/10-NCF-UTMSIPATX L1569444

R5

Time estimate: oh **Time spent:** oh

Members

HM Hailey Melson (responsible) Lori Vahrenkamp

Due on *14 December 2022 8:00 AM* for target *Done*

- [x] Login Clarification needed
- [ ] Chain of custody is incomplete
- [ ] Please specify Metals requested
- [ ] Please specify TCLP requested
- [ ] Received additional samples not listed on COC
- [ ] Sample IDs on containers do not match IDs on COC
- [ ] Client did not "X" analysis
- [ ] Chain of Custody is missing
- [ ] If no COC: Received by:_____
- [ ] If no COC: Date/Time:_____
- [ ] If no COC: Temp./Cont.Rec./pH:_____
- [ ] If no COC: Carrier:_____
- [ ] If no COC: Tracking #:_____
- [ ] Client informed by call
- [ ] Client informed by Email
- [ ] Client informed by Voicemail
- [ ] Date/Time:_____
- [ ] PM initials:_____
- [ ] Client Contact:_____

Comments

Hailey Melson — *10 December 2022 2:02 PM*

1) 1 Rad container received empty for all containers.
2) Did not received IDs: Soil Site E 1, 2 or 3. Received an extra set of samples labeled Soil Site C1, 2 and 3 but the times and dates do not match anything on the COC.

Hailey Melson — *20 December 2022 8:13 AM*

Any Word?

Lori Vahrenkamp — *20 December 2022 1:40 PM*

Please proceed with Uranium and Ra-226

Hailey Melson — *20 December 2022 2:42 PM*

How would you like to proceed with the Second part of the NCF?

Lori Vahrenkamp *20 December 2022 2:44 PM*

Proceed with logging sample containers labeled "Soil Site C1, 2, 3" with sample ids, sample collection dates, times as listed on the containers.

Hailey Melson *20 December 2022 2:47 PM*

Done