

# SUPPLEMENTAL NORM SURVEY AND LEAD SAMPLING REPORT

FORMER CACTUS PIPE AND SUPPLY FACILITY  
815 DORSETT STREET  
HOUSTON, HARRIS COUNTY, TEXAS

August 28, 2012  
Project No. 92127234

**Prepared for:**  
Railroad Commission of Texas  
1701 N. Congress  
Austin, Texas, 78711-2667

**Prepared by:**  
Terracon Consultants, Inc.  
11555 Clay Road, Suite 100  
Houston, Texas 77043

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**Terracon**

August 28, 2012

Railroad Commission of Texas  
1701 N. Congress  
Austin, Texas 78711-2967  
Attn: Daniel X. O'Donnell

Telephone: (512) 463-6832  
E-mail: daniel.o'donnell@rrc.state.tx.us

Re: Supplemental NORM Survey and Lead Sampling Report  
Former Cactus Pipe and Supply Facility  
815 Dorsett Street  
Houston, Harris County, Texas  
Terracon Project No. 92127234

Dear Mr. O'Donnell:

Terracon is pleased to submit this report for the recently completed supplemental NORM Survey and Lead Sampling for the above referenced site. Terracon's services were performed in accordance with the approved Work Order for this project dated April 3, 2012.

We appreciate the opportunity to perform these services for the Railroad Commission of Texas. Please contact either of the undersigned at (713) 690-8989 if there are any questions regarding the information provided in the report.

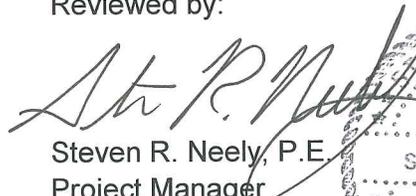
Sincerely,  
**Terracon Consultants, Inc.**

Prepared by:

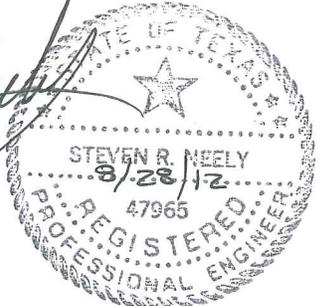


Arun Neupane  
Project Environmental Scientist

Reviewed by:



Steven R. Neely, P.E.  
Project Manager



CC: District-3 – Oil and Gas Division (1 hardcopy)



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**SUPPLEMENTAL NORM SURVEY AND LEAD SAMPLING REPORT  
FORMER CACTUS PIPE AND SUPPLY FACILITY  
815 DORSETT STREET**

**HOUSTON, HARRIS COUNTY, TEXAS**

**Terracon Project No. 92127214  
August 28, 2012**

## **1.0 INTRODUCTION**

### **1.1 Background and Scope**

The former Cactus Pipe and Supply Facility (hereinafter referred to as 'site') is located at 815 Dorsett Street in Houston, Texas. The 16.5-acre site is located on the northeast corner of Dorsett and Market Streets in Houston, Texas, one block south of I-10. The site was formerly utilized as an oil field pipe salvage yard from at least the 1950s through 1992. The City of Houston (COH) purchased the site in 1986. The City is planning to redevelop the site and therefore, is seeking site closure to residential standards.

Previous environmental assessments performed at the site by the RRC found contamination in the soil limited to near surface soils, and identified lead and naturally occurring radioactive material (NORM) as the two primary constituents of concern (COC). In September 2009, the RRC undertook a partial cleanup at the site for oil and gas waste based on the findings of the previous site assessment activities. The partial cleanup included soil impacted by NORM, TPH, lead, arsenic, barium, and cadmium. The RRC was not able to complete the full removal of the lead-impacted soil due to site constraints. Approximately 25% of the site was covered by end-dumped soil piles not considered to be Oil and Gas Waste by the RRC and there were a few areas of NORM-impacted soils adjacent to the existing buildings that could not be accessed until the buildings were demolished. While the RRC was in the field for the remediation work that took place in 2009, they delineated the approximate extent of the impacted soil left in place for later removal. The City of Houston completed demolition of the buildings in 2011 and removed or relocated the end-dumped soil piles in early 2012 to provide RRC access to these areas.

The objectives of the site assessment activities reported herein were to determine if there is NORM and/or lead impacted shallow soil present within the limits of the area occupied by the former end-dumped soil piles, and where necessary, supplement the previously performed preliminary delineation of the lead-impacted soil in those areas remaining to be remediated.

## 2.0 FIELD ACTIVITIES

### 2.1 NORM Survey

Prior to mobilization to the site, the Visual Sample Plan (VSP) software for identifying hotspots was used to generate NORM screening locations within the area to be screened—the sum of all mapped soil pile areas. This resulted in NORM screening locations on an approximately 20-foot grid pattern. A sub-meter GPS instrument pre-loaded with the predetermined NORM screening locations was used in the field to navigate to each location to be scanned for NORM. Some of the screening locations had to be field adjusted due to site constraints like debris piles still present at the site.

RRC in 2009 had determined the average background NORM level for the site to be 15 microrentgens per hour ( $\mu\text{R/hr}$ ). The background level was calculated by averaging several NORM readings collected across the site in unaffected areas by RRC's remediation contractor, USA Environment, LP.

A Ludlum Model 3 gamma ray scintillometer (GRS) was used to scan and record NORM levels at each screening location for this supplemental site assessment. The GRS was calibrated prior to use in the field. NORM readings in ( $\mu\text{R/hr}$ ) were recorded at the representative (pre-determined) locations; and the areas between these screening locations were also scanned to note and record any significant deviation if it existed. If an elevated NORM reading was detected at a scanned location, additional readings were collected around the location exhibiting the elevated reading to fully delineate the NORM-impacted soil in the area.

Additionally, NORM screening performed by COH during its demolition activities completed at the site in 2011 identified two additional locations having elevated NORM readings and these two areas were added to the study area. One location is an area between the pipe racks that remain in the northeastern portion of the site. The other location is at the southern portion of the site, west of the former buildings. These two additional screening locations (RN-1 and RN-3) are shown on Figure 2 and have been documented using GPS.

The RRC had adopted a site-specific screening level for NORM of 30  $\mu\text{R/hr}$  (twice the average background radiation for the site) and Terracon used the same action level for field delineation of NORM. Three areas exhibited field NORM readings greater than 30  $\mu\text{R/hr}$ . These three areas (RN-1, RN-2 and RN-3) are depicted on Figure 2 and included two of the areas (RN-1 and RN-3) identified by the COH as having elevated NORM readings during their demolition

activities on site. NORM levels detected in these three areas ranged from 50 to 160  $\mu\text{R/hr}$ . At locations where NORM readings exceeding 30  $\mu\text{R/hr}$  were detected, a soil sample was collected and packaged for further analysis at a radiochemistry laboratory. Soil samples RN-1, RN-2, and RN-3 were collected from the near surface (0 to 1 feet bgs) from these areas for laboratory analysis. The laboratory results are discussed in Section 3.1.

Soil samples RN-1 through RN-3 were collected in laboratory-supplied containers and relinquished to Anacon Laboratories (Anacon) in Houston, Texas. Anacon subsequently shipped the samples to the Pace Analytical Services for radiochemistry analyses.

## **2.2 Soil Borings and XRF Screening for Lead**

As with the NORM screening locations, predetermined sampling locations were generated using VSP software (programed to identify hotspots) prior to mobilization to the site and a sub-meter GPS unit was used in the field to navigate to these locations. Lead sample locations were plotted in an approximate 30-foot grid pattern, within a sampling area that constituted the sum of all mapped soil pile areas. Similarly as with the NORM screening, some of the sampling locations for lead had to be field adjusted due to site constraints like debris piles still present at the site.

Sixty-four soil samples (RB-1 through RB-64) were collected from the footprint of the end-dumped soil piles and from other potentially lead-impacted areas that were previously delineated by the RRC but not yet excavated. The soil borings for lead samples were advanced by a Monitor Well Driller licensed in the State of Texas to a depth of 4 feet below ground surface (bgs) using a tractor-mounted direct-push technology (DPT) rig. For all of the soil borings completed, where fill material was encountered it was fully penetrated within 4 feet bgs and the lithology encountered below the fill material was generally silty clay. Sampling equipment was decontaminated by an Alconox wash, potable water rinse and final distilled water rinse prior to commencement of the field activities and between the advancement of each soil boring.

Soil cores were collected using four-foot-long sample barrels with acetate liners. The soil cores were scanned in the field for lead using an Innovex® XRF Analyzer at depth intervals of 0 to 1 foot, 1 to 2 feet, and 3 to 4 feet and results were recorded. Table 1 presents the XRF results for lead for the sixty-four soil borings completed at the site. Where the XRF reading indicated a lead concentration exceeding 400 parts per million (ppm), a soil sample representative of that interval was collected and packaged for laboratory analysis for total lead.

Additionally, each soil core was scanned for NORM. NORM levels detected in soil cores were all below 30  $\mu\text{R/hr}$ .

There were a total of twelve borings where one of the intervals scanned exceeded 400 ppm for lead and soil samples were collected from these cores for laboratory analyses. The soil samples were placed in laboratory-supplied glassware, placed on ice in a cooler, and transported with a completed chain-of-custody form to Anacon Laboratories, in Houston, Texas. As per the scope of work, each soil sample was analyzed for total lead using EPA test method 6020.

The excess soil cores having an XRF reading for lead of greater than 400 ppm were placed in a 55-gallon drum appropriately labeled with project-specific information and date. The drum is stored onsite pending profiling and disposal of the waste. The boreholes were backfilled to surface grade using bentonite pellets in accordance with applicable state regulations.

20.

### **3.0 INVESTIGATION RESULTS AND EVALUATION**

The soil sample analytical results have been summarized in Tables 2 and 3. A copy of the analytical report and chain-of-custody form is included in Appendix A. The results of the laboratory analyses are discussed below.

#### **3.1 NORM**

The soil sample analytical results for NORM are summarized in Table 3. Soil samples RN-1 through RN-3 were analyzed by gamma spectroscopy to determine their radioactivity concentrations of Radium-226 and Radium-228. Radium-226 concentrations detected in RN-2 and RN-3 exceeded the Department of State Health Services (DSHS) exemption level above which oil and gas waste is considered NORM oil and gas waste of 30 picocuries per gram (pCi/g) at 36.5 pCi/g and 254 pCi/g respectively.

Based on the field screening for NORM completed at the site and the results of laboratory analysis of select soil samples for NORM, the area represented by the soil samples RN-2 and RN-3 appear to be impacted by NORM requiring removal.

### 3.2 Lead

The laboratory results of the twelve soil samples selected based on XRF readings exceeding 400 ppm are summarized in Table 2. Soil samples RB-13 (758 milligrams per kilogram, mg/Kg), RB-20 (1,560 mg/Kg), RB-36 (646 mg/Kg), RB-57 (1,310 mg/Kg), RB-59 (754 mg/Kg) and RB-60 (907 mg/Kg) exceeded TCEQ health-based protective concentration level (PCL) for lead of 500 mg/Kg. The remainder of the twelve samples (RB-21, RB-35, RB-42, RB-43, RB-51, and RB-63) did not exhibit concentrations above 500 mg/Kg. This indicates that for each sample location, the result obtained by XRF may not always correlate closely with the result obtained from laboratory analysis. We believe the reason for this lack of correlation is due to variability of the lead concentration within the sampled volume; in other words the source of lead that resulted in the elevated XRF reading is not uniformly distributed throughout the sample and since the lab takes such a small relative volume of the sample to run its analysis, the source of the lead causing the higher XRF reading can be missed.

Therefore, for the purposes of determining areas that need further remediation for lead, Terracon recommends that both the laboratory results together with the XRF results obtained in the field be considered. There appears to be twelve hot spots for lead, represented by the samples that exhibited a reading of greater than 400 ppm during XRF field screening. Based on the results of XRF field screening, the hot spots are limited to 3 feet bgs in depth.

### 4.0 FINDINGS AND RECOMMENDATIONS

Based on the results of the investigation, Terracon provides the following findings and recommendations:

- The field screening for NORM and the results of laboratory analysis on corresponding soil samples for NORM indicate the areas represented by soil samples RN-2 and RN-3 appear to be the only remaining NORM-impacted soil as the site. Terracon recommends that at RN-2 and RN-3, a 10-ft by 10-ft area, 2 feet deep, be excavated and the excavated material be properly disposed of offsite. The estimated volume of the NORM-impacted material to be removed is approximately 10 cubic yards for each area, totaling 20 cubic yards.
- The locations under the former end-dumped soil piles that appear to have a lead concentration exceeding the TCEQ health-based PCL of 500 mg/Kg include the following sample locations: RB-13, RB-20, RB-21, RB-35, RB-36, RB-42, RB-43, RB-51,

RB-57, RB-59, RB-60, and RB-63. Terracon recommends that these hotspots be remediated by excavating a 10-ft by 10-ft area, 3 feet deep, centered on each sample location. The location of these hotspots is shown on Figure 2.

- The soil cores with an XRF reading for lead of greater than 400 ppm that were not submitted for laboratory analysis were placed in a 55-gallon drum appropriately labeled with project-specific information and date. The drum is stored onsite pending its future disposal. It is anticipated that the contents of the drum will be disposed of together with excavated lead-affected soil at the site, once such excavation/remediation takes place.

## **FIGURES**

**FIGURE 1 – SITE VICINITY MAP**  
**FIGURE 2 – SITE PLAN**

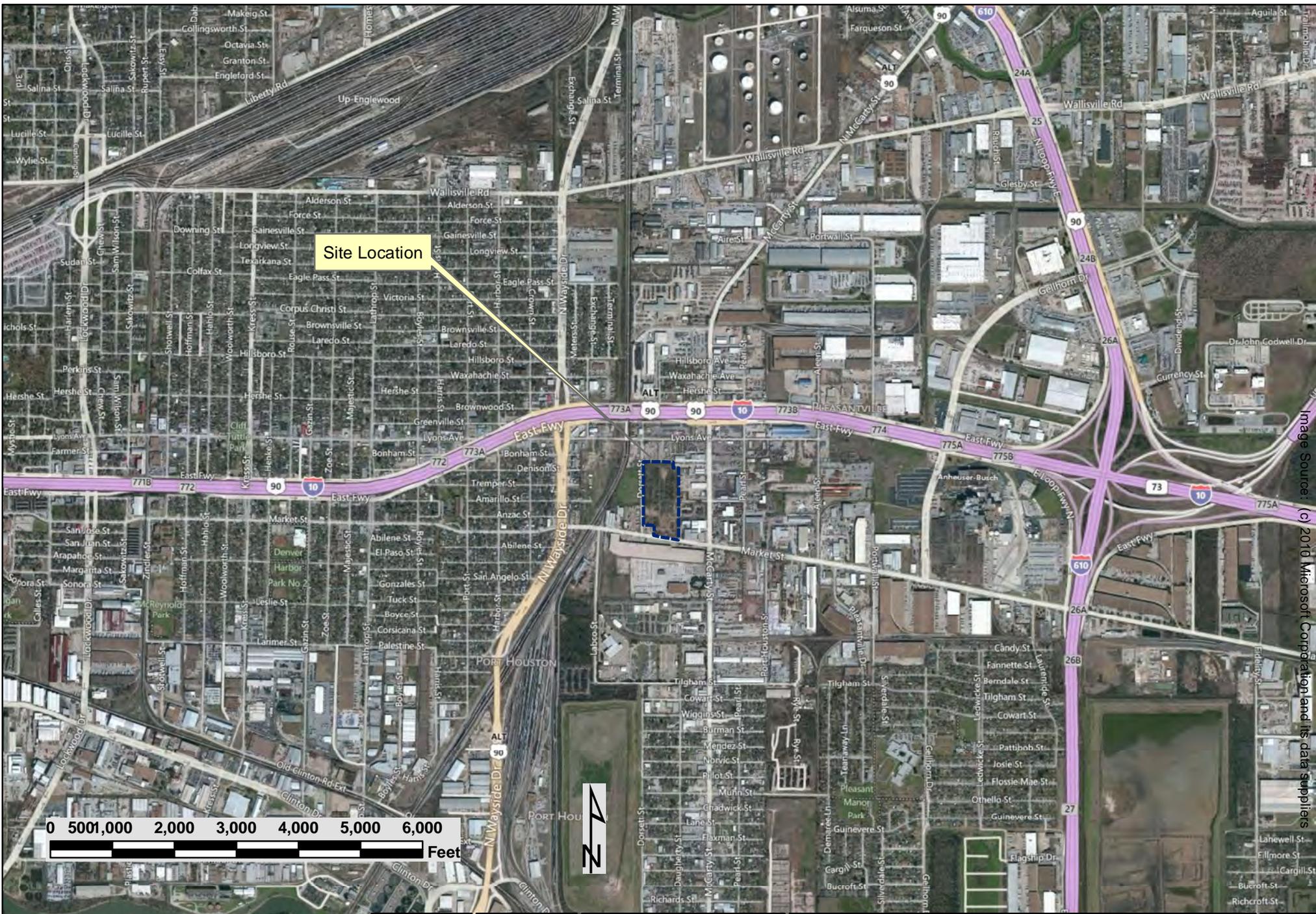


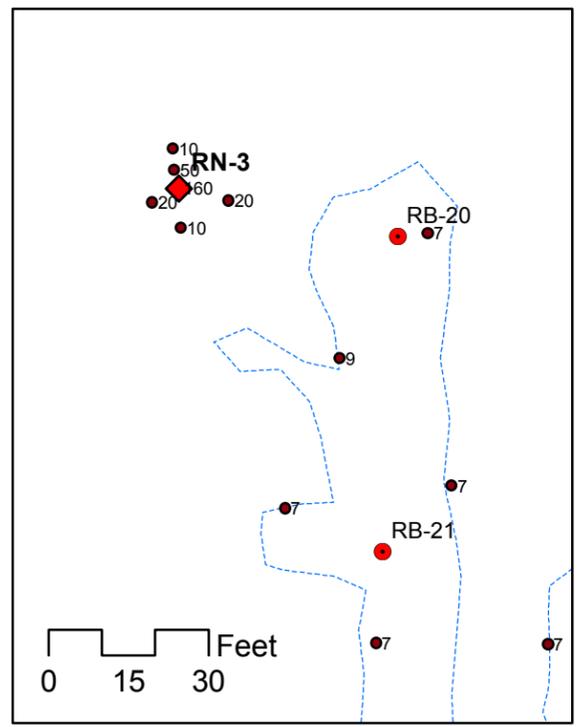
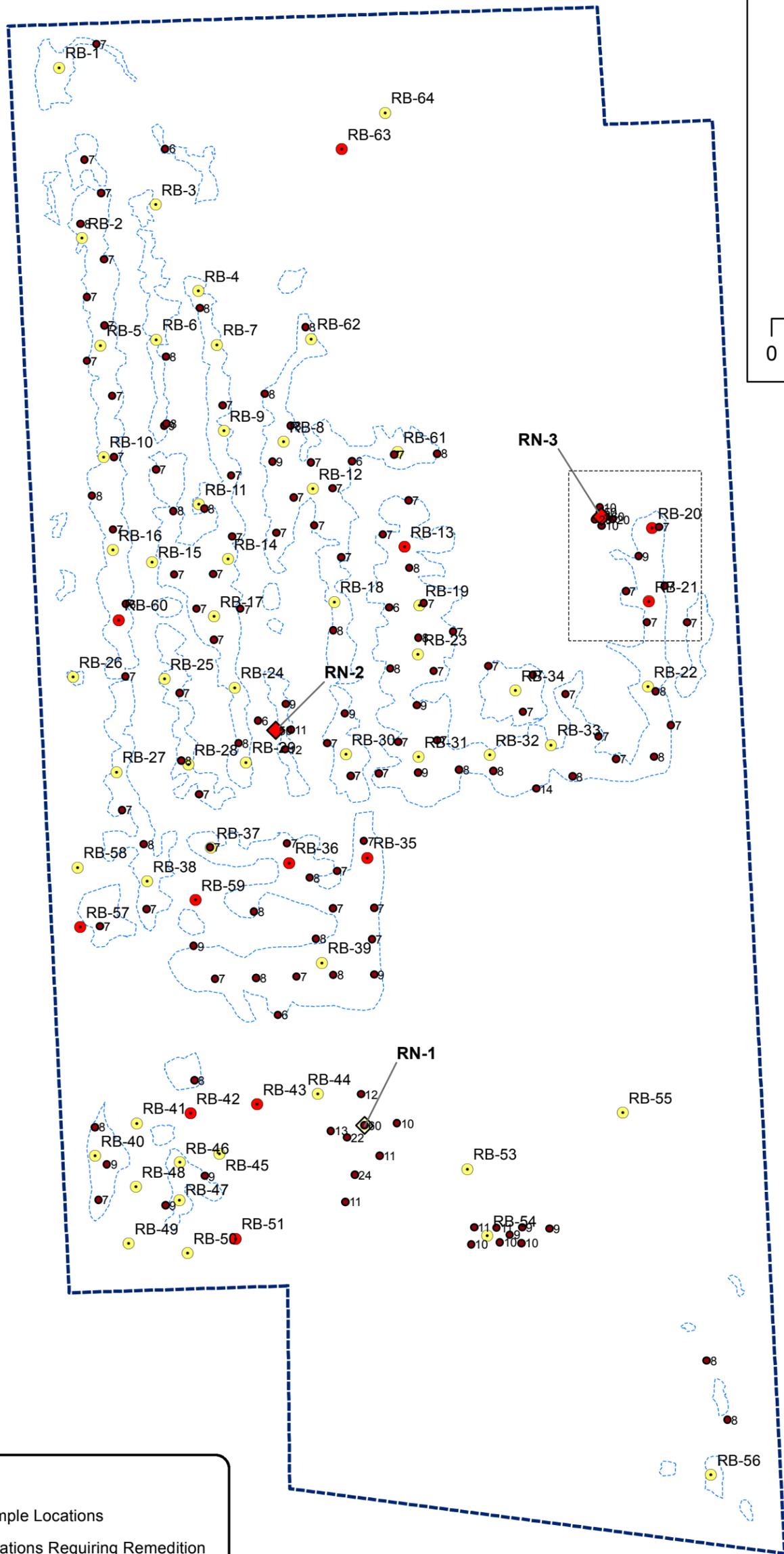
Image Source: (c) 2010 Microsoft Corporation and its data suppliers

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SCALE	1 in = 2,000 feet
DATE	8/23/2012

  
**Terracon**  
 Consulting Engineers & Scientists  
 Terracon Project No. 92127214

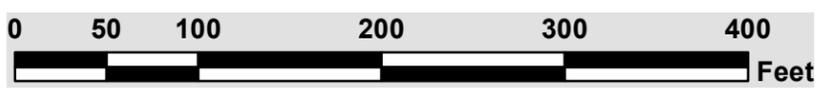
<b>SITE VICINITY MAP</b>
Former Cactus Pipe & Supply Site 815 Dorsett Street Houston, Harris County, Texas

<b>Figure</b>
<b>1</b>



**Legend**

- Lead Sample Locations
- Lead Locations Requiring Remediation
- NORM Screening Locations
- ◆ NORM Sample Locations
- ◆ NORM Location Requiring Remediation
- Site Boundary
- Former End-Dumped Soil Piles



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SCALE	1 in = 100 ft
DATE	9/4/2012

**Terracon**  
Consulting Engineers and Scientists

Terracon Project No. 9227234

**SITE PLAN**

Former Cactus Pipe & Supply Site  
815 Dorsett Street  
Houston, Harris County, Texas

Figure	2
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## **TABLES**

- TABLE 1 - SUMMARY OF XRF SCREENING RESULTS - LEAD**
- TABLE 2 - SUMMARY OF SOIL ANALYTICAL RESULTS - LEAD**
- TABLE 3 - SUMMARY OF SOIL ANALYTICAL RESULTS - NORM**

**TABLE 1**  
 Summary of XRF Screening Results-Lead  
 Former Cactus Pipe and Supply Facility  
 815 Dorsett  
 Houston, Harris County, Texas

all measurements are in parts per million (ppm)

Sample ID	Sample Date	Depth (in feet)	Reading
RB-1	4/26/2012	1	15
		2	16
		4	15
RB-2	4/26/2012	1	115
		2	18
		4	20
RB-3	4/26/2012	1	131
		2	16
		4	20
RB-4	4/26/2012	1	45
		2	21
		4	14
RB-5	4/26/2012	1	30
		2	15
		4	18
RB-6	4/26/2012	1	10
		2	14
		4	15
RB-7	4/26/2012	1	269
		2	22
		4	18
RB-8	4/26/2012	1	117
		2	15
		4	12
RB-9	4/26/2012	1	23
		2	16
		4	22
RB-10	4/26/2012	1	22
		2	112
		4	46
RB-11	4/26/2012	1	44
		2	15
		4	20
RB-12	4/26/2012	1	29
		2	20
		4	16
RB-13	4/26/2012	1	<b>641</b>
		2	13
		4	13
RB-14	4/26/2012	1	44
		2	23
		4	17
RB-15	4/26/2012	1	55
		2	17
		4	19
RB-16	4/26/2012	1	167
		2	13
		4	15
RB-17	4/26/2012	1	18
		2	300
		4	21

**TABLE 1**  
 Summary of XRF Screening Results-Lead  
 Former Cactus Pipe and Supply Facility  
 815 Dorsett  
 Houston, Harris County, Texas

all measurements are in parts per million (ppm)

Sample ID	Sample Date	Depth (in feet)	Reading
RB-18	4/26/2012	1	50
		2	19
		4	22
RB-19	4/26/2012	1	133
		2	17
		4	14
RB-20	4/26/2012	1	<b>2,292</b>
		2	47
		4	16
RB-21	4/26/2012	1	18
		2	<b>406</b>
		4	23
RB-22	4/26/2012	1	79
		2	35
		4	12
RB-23	4/26/2012	1	223
		2	13
		4	23
RB-24	4/26/2012	1	52
		2	243
		4	14
RB-25	4/27/2012	1	11
		2	13
		4	50
RB-26	4/27/2012	1	10
		2	14
		4	15
RB-27	4/27/2012	1	21
		2	14
		4	18
RB-28	4/27/2012	1	43
		2	22
		4	19
RB-29	4/27/2012	1	34
		2	12
		4	13
RB-30	4/27/2012	1	25
		2	17
		4	16
RB-31	4/27/2012	1	16
		2	11
		4	15
RB-32	4/27/2012	1	12
		2	16
		4	21
RB-33	4/27/2012	1	19
		2	16
		4	21
RB-34	4/27/2012	1	18
		2	17
		4	9

**TABLE 1**  
 Summary of XRF Screening Results-Lead  
 Former Cactus Pipe and Supply Facility  
 815 Dorsett  
 Houston, Harris County, Texas

all measurements are in parts per million (ppm)

Sample ID	Sample Date	Depth (in feet)	Reading
RB-35	4/30/2012	1	<b>904</b>
		2	10
		4	9
RB-36	4/30/2012	1	<b>3,900</b>
		2	9
		4	20
RB-37	4/30/2012	1	21
		2	52
		4	12
RB-38	4/30/2012	1	19
		2	335
		4	50
RB-39	4/30/2012	1	210
		2	15
		4	13
RB-40	4/30/2012	1	18
		2	58
		4	9
RB-41	4/30/2012	1	50
		2	16
		4	12
RB-42	4/30/2012	1	21
		2	<b>691</b>
		4	105
RB-43	4/30/2012	1	21
		2	<b>740</b>
		4	16
RB-44	4/30/2012	1	14
		2	392
		4	46
RB-45	4/30/2012	1	45
		2	398
		4	110
RB-46	4/30/2012	1	79
		2	246
		4	12
RB-47	4/30/2012	1	60
		2	267
		4	13
RB-48	4/30/2012	1	180
		2	14
		4	12
RB-49	4/30/2012	1	13
		2	14
		4	18
RB-50	4/30/2012	1	67
		2	16
		4	26
RB-51	4/30/2012	1	20
		2	<b>1,561</b>
		4	12

**TABLE 1**  
 Summary of XRF Screening Results-Lead  
 Former Cactus Pipe and Supply Facility  
 815 Dorsett  
 Houston, Harris County, Texas

all measurements are in parts per million (ppm)

Sample ID	Sample Date	Depth (in feet)	Reading
RB-52	4/30/2012	1	128
		2	16
		4	9
RB-53	4/30/2012	1	228
		2	142
		4	13
RB-54	4/30/2012	1	61
		2	272
		4	20
RB-55	4/30/2012	1	186
		2	11
		4	16
RB-56	4/30/2012	1	49
		2	13
		4	17
RB-57	4/30/2012	1	<b>1,890</b>
		2	19
		4	16
RB-58	4/30/2012	1	243
		2	10
		4	12
RB-59	4/30/2012	1	<b>921</b>
		2	16
		4	9
RB-60	4/30/2012	1	80
		2	<b>4,993</b>
		4	27
RB-61	4/30/2012	1	303
		2	18
		4	34
RB-62	4/30/2012	1	256
		2	16
		4	17
RB-63	4/30/2012	1	<b>562</b>
		2	74
		4	29
RB-64	4/30/2012	1	33
		2	32
		4	11

Note:

XRF readings in **BOLD** indicate exceedence of the field action level of 400 ppm for lead. Samples exhibiting XRF reading of greater than or equal to 400 ppm were selected for laboratory analysis.

**TABLE 2**

**Summary of Soil Analytical Results - Lead  
Former Cactus Pipe and Supply Facility  
815 Dorsett Street  
Houston, TX**

(all concentrations are in milligrams per kilogram)

<b>Sample Number</b>	<b>Sample Date</b>	<b>Sample Depth (feet)</b>	<b>Lead (EPA 6020)</b>
RB-13	04/26/12	0-1	<b>758</b>
RB-20	04/26/12	0-1	<b>1560</b>
RB-21	04/26/12	1-2	61.8
RB-35	04/30/12	0-1	11.6
RB-36	04/30/12	1-2	<b>646</b>
RB-42	04/30/12	2-3	174
RB-43	04/30/12	2-3	210
RB-51	04/30/12	2-3	318
RB-57	04/30/12	1-2	<b>1310</b>
RB-59	04/30/12	1-2	<b>754</b>
RB-60	04/30/12	1-2	<b>907</b>
RB-63	04/30/12	0-1	288
<b>TCEQ TRRP Tier1 Health-Based PCL for a 0.5 Acre source-area Residential Site</b>			<b>500</b>

Notes:

Values in **Bold Type** indicate exceedence of TCEQ TRRP Tier 1 Health-Based PCL.

- TCEQ - Texas Commission on Environmental Quality
- EPA - Environmental Protection Agency
- TRRP - Texas Risk Reduction Program
- PCL - Protective Concentration Level
- Health Based PCL - PCL for Total Soil Combined Exposure Pathway ( $^{Tot}Soil_{Comb}$ )

**TABLE 3**

**Summary of Soil Analytical Results - NORM  
Former Cactus Pipe and Supply Facility  
815 Dorsett Street  
Houston, TX**

Sample Number	Sample Date	Sample Depth (ft)	Radioactivity (in pCi/g) (EPA 901.1 M)	
			Ra-226	Ra-228
RN-1	04/30/12	0-1	4.51	0.425
RN-2	04/30/12	0-1	<b>36.5</b>	0.898
RN-3	05/01/12	0-1	<b>254</b>	4.51
<b>DSHS Exemption Level<sup>1</sup></b>			<b>30</b>	<b>30</b>

Notes:

- 1 Values in **Bold Type** indicate exceedence of Department of State Health Services (DSHS) exemption level above which oil and gas waste is considered NORM

**APPENDIX A**

**ANALYTICAL LABORATORY REPORTS**



June 04, 2012

Arun Neupane  
Terracon  
11555 Clay Road  
Houston, TX 77043  
TEL: (713) 408-1493  
FAX (713) 690-8787  
RE:

Order No.: 1205019

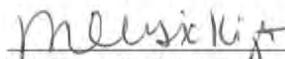
Dear Arun Neupane:

Anacon, Inc. received 3 samples on 5/2/2012 for the analyses presented in the following report.

Analyses are performed with method-required QA/QC samples. These data are provided along with the sample results. There were no problems with the analyses unless noted in a Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

  
\_\_\_\_\_  
Melissa Knight, Lab Manager

Total Number of Pages 11  
(Including Data Package Cover Sheet)

THIS DOCUMENT MEETS NELAC STANDARDS  
NELAC CERTIFICATE # T104704206-010-1

REC'D JUN 08 2012

730 FM 1959  
HOUSTON, TX 77034  
(281) 922-7000 Tel.  
(281) 481-0089 Fax



Chain of Custody Record

Toll Free: 1-800-870-3899  
www.anaconlab.com

Shaded Areas for Lab Use Only.

Client: Tovarion (cont'back),  
Address: 11555 Ciny Road

Contact Person: Ayun Neupane

Phone Number: 713 4081493

Fax Number:

E-mail Address: ANeupane@Tovarion.com

*OFFICIAL*

Anacon Log Number: 1205014

Turn Around Time: Sp'd'nd

Sample Location: RRC-Cactus Pipe

Delivered By: River Oaks #99

Custody Seal (ANI):

Temperature:

Sampled By: Ayun Neupane

Please Print

EPA  
(901.1)

Analysis Requested

Remarks

Log Number	Sample Matrix	Date Collected	Time Collected	# of Containers	Type of Container	Pres.	Client Sample ID	Radiochemistry	Temperature	Analysis Requested	Remarks
D1	5011	4/30/12	3:55	1	Glass	None	RN-1	X	21.8°C		
D2	↓	4/30/12	6:01	1	Glass	None	RN-2	X	20.8°C		
D3	↓	5/11/12	2:30	1	Glass	None	RN-3	X	22.5°C		

Relinquished By: [Signature] Date: 5/2/12 Time: 10:00

Preservation Code: 1=HNO3 6=Other

Matrix Code: S=Solid EFF=Effluent

Containers: P=Plastic

Notes:

Accepted By: [Signature] Date: 5/2/12 Time: 10:31

Preservation Code: 2=H2SO4

Matrix Code: W=Water

Containers: G=Glass

Relinquished by: [Signature] Date: 5-2-12 Time: 12:45

Preservation Code: 3=NaOH

Matrix Code: Sludg=Sludge

Containers: V=Vial

Accepted By: [Signature] Date: 5-2-12 Time: 12:45

Preservation Code: 4=HCL

Matrix Code: O=Oil

Containers: B=Bacterial

Relinquished by: [Signature] Date: 5-2-12 Time: 12:45

Preservation Code: 5=None

Matrix Code: INF=Influent

Containers:

1205019

June 01, 2012

Ms. Melissa Knight  
Anacon, Inc.  
730 FM 1959  
Houston, TX 77034

RE: Project: RN  
Pace Project No.: 3068813

Dear Ms. Knight:

Enclosed are the analytical results for sample(s) received by the laboratory on May 03, 2012. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Jacquelyn Collins

jacquelyn.collins@pacelabs.com  
Project Manager

Enclosures



## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc.

## CERTIFICATIONS

Project: RN  
Pace Project No.: 3068813

### Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4 Greensburg, PA 15601  
ACCLASS DOD-ELAP Accreditation #: ADE-1544  
Alabama Certification #: 41590  
Arizona Certification #: AZ0734  
Arkansas Certification  
California/TNI Certification #: 04222CA  
Colorado Certification  
Connecticut Certification #: PH 0694  
Delaware Certification  
Florida/TNI Certification #: E87683  
Guam/PADEP Certification  
Hawaii/PADEP Certification  
Idaho Certification  
Illinois/PADEP Certification  
Indiana/PADEP Certification  
Iowa Certification #: 391  
Kansas/TNI Certification #: E-10358  
Kentucky Certification #: 90133  
Louisiana/TNI Certification #: LA080002  
Louisiana/TNI Certification #: 4086  
Maine Certification #: PA0091  
Maryland Certification #: 308  
Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification  
Missouri Certification #: 235  
Montana Certification #: Cert 0082  
Nevada Certification  
New Hampshire/TNI Certification #: 2976  
New Jersey/TNI Certification #: PA 051  
New Mexico Certification  
New York/TNI Certification #: 10888  
North Carolina Certification #: 42706  
Oregon/TNI Certification #: PA200002  
Pennsylvania/TNI Certification #: 65-00282  
Puerto Rico Certification #: PA01457  
South Dakota Certification  
Tennessee Certification #: TN2867  
Texas/TNI Certification #: T104704188  
Utah/TNI Certification #: ANTE  
Virgin Island/PADEP Certification  
Virginia Certification #: 00112  
Virginia VELAP (Cert # 460198)  
Washington Certification #: C868  
West Virginia Certification #: 143  
Wisconsin/PADEP Certification  
Wyoming Certification #: 8TMS-Q

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, Inc.

### SAMPLE SUMMARY

Project: RN  
Pace Project No.: 3068813

Lab ID	Sample ID	Matrix	Date Collected	Date Received
3068813001	RN-1	Solid	04/30/12 15:55	05/03/12 10:00
3068813002	RN-2	Solid	04/30/12 18:01	05/03/12 10:00
3068813003	RN-3	Solid	05/01/12 14:30	05/03/12 10:00

### REPORT OF LABORATORY ANALYSIS

04

### SAMPLE ANALYTE COUNT

Project: RN  
Pace Project No.: 3068813

Lab ID	Sample ID	Method	Analysts	Analytes Reported
3068813001	RN-1	EPA 901.1m	AEH	10
3068813002	RN-2	EPA 901.1m	AEH	10
3068813003	RN-3	EPA 901.1m	AEH	10

### REPORT OF LABORATORY ANALYSIS

### ANALYTICAL RESULTS

Project: RN  
Pace Project No.: 3068813

Sample: RN-1 Lab ID: 3068813001 Collected: 04/30/12 15:55 Received: 05/03/12 10:00 Matrix: Solid  
PWS: Site ID: Sample Type:

**Results reported on a "dry-weight" basis**

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Bismuth-212	EPA 901.1m	0.1000 ± 0.623 (1.15)	pCi/g	05/25/12 15:20	14913-49-6	
Bismuth-214	EPA 901.1m	4.66 ± 0.364 (0.484)	pCi/g	05/25/12 15:20	14733-03-0	
Lead-212	EPA 901.1m	0.659 ± 0.135 (0.140)	pCi/g	05/25/12 15:20	15092-94-1	
Lead-214	EPA 901.1m	4.79 ± 0.465 (0.159)	pCi/g	05/25/12 15:20	15067-28-4	
Potassium-40	EPA 901.1m	1.77 ± 0.809 (0.805)	pCi/g	05/25/12 15:20	13966-00-2	
Radium-226	EPA 901.1m	4.51 ± 0.450 (0.625)	pCi/g	05/25/12 15:20	13982-63-3	
Radium-228	EPA 901.1m	0.425 ± 0.214 (0.396)	pCi/g	05/25/12 15:20	15262-20-1	
Thallium-208	EPA 901.1m	0.146 ± 0.0790 (0.119)	pCi/g	05/25/12 15:20	14913-50-9	
Thorium-234	EPA 901.1m	1.83 ± 3.42 (5.75)	pCi/g	05/25/12 15:20	15065-10-8	
Uranium-235	EPA 901.1m	-0.121 ± 0.318 (0.543)	pCi/g	05/25/12 15:20	15117-96-1	

Sample: RN-2 Lab ID: 3068813002 Collected: 04/30/12 18:01 Received: 05/03/12 10:00 Matrix: Solid  
PWS: Site ID: Sample Type:

**Results reported on a "dry-weight" basis**

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Bismuth-212	EPA 901.1m	1.000 ± 0.671 (2.15)	pCi/g	05/25/12 15:21	14913-49-6	
Bismuth-214	EPA 901.1m	39.1 ± 2.22 (1.26)	pCi/g	05/25/12 15:21	14733-03-0	
Lead-212	EPA 901.1m	1.19 ± 0.150 (0.282)	pCi/g	05/25/12 15:21	15092-94-1	
Lead-214	EPA 901.1m	38.5 ± 3.74 (0.360)	pCi/g	05/25/12 15:21	15067-28-4	
Potassium-40	EPA 901.1m	2.97 ± 1.55 (2.04)	pCi/g	05/25/12 15:21	13966-00-2	
Radium-226	EPA 901.1m	36.5 ± 3.42 (1.80)	pCi/g	05/25/12 15:21	13982-63-3	
Radium-228	EPA 901.1m	0.898 ± 0.271 (0.610)	pCi/g	05/25/12 15:21	15262-20-1	
Thallium-208	EPA 901.1m	0.316 ± 0.0890 (0.163)	pCi/g	05/25/12 15:21	14913-50-9	
Thorium-234	EPA 901.1m	0.516 ± 2.31 (3.81)	pCi/g	05/25/12 15:21	15065-10-8	
Uranium-235	EPA 901.1m	0.00800 ± 0.665 (1.09)	pCi/g	05/25/12 15:21	15117-96-1	

Sample: RN-3 Lab ID: 3068813003 Collected: 05/01/12 14:30 Received: 05/03/12 10:00 Matrix: Solid  
PWS: Site ID: Sample Type:

**Results reported on a "dry-weight" basis**

Parameters	Method	Act ± Unc (MDC)	Units	Analyzed	CAS No.	Qual
Bismuth-212	EPA 901.1m	3.47 ± 3.11 (5.08)	pCi/g	05/27/12 19:34	14913-49-6	
Bismuth-214	EPA 901.1m	262 ± 12.1 (2.62)	pCi/g	05/27/12 19:34	14733-03-0	
Lead-212	EPA 901.1m	4.87 ± 0.581 (0.758)	pCi/g	05/27/12 19:34	15092-94-1	
Lead-214	EPA 901.1m	274 ± 22.5 (0.933)	pCi/g	05/27/12 19:34	15067-28-4	
Potassium-40	EPA 901.1m	2.28 ± 2.53 (4.32)	pCi/g	05/27/12 19:34	13966-00-2	
Radium-226	EPA 901.1m	254 ± 19.7 (4.41)	pCi/g	05/27/12 19:34	13982-63-3	
Radium-228	EPA 901.1m	4.51 ± 1.31 (1.39)	pCi/g	05/27/12 19:34	15262-20-1	
Thallium-208	EPA 901.1m	1.05 ± 0.201 (0.381)	pCi/g	05/27/12 19:34	14913-50-9	
Thorium-234	EPA 901.1m	-8.930 ± 17.2 (27.0)	pCi/g	05/27/12 19:34	15065-10-8	
Uranium-235	EPA 901.1m	-0.881 ± 1.73 (2.89)	pCi/g	05/27/12 19:34	15117-96-1	

### QUALITY CONTROL DATA

Project: RN  
Pace Project No.: 3068813

---

QC Batch: RADC/11982      Analysis Method: EPA 901.1m  
QC Batch Method: EPA 901.1m      Analysis Description: 901.1 Gamma Spec  
Associated Lab Samples: 3068813001, 3068813002, 3068813003

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METHOD BLANK: 437775      Matrix: Solid  
Associated Lab Samples: 3068813001, 3068813002, 3068813003

Parameter	Act ± Unc (MDC)	Units	Analyzed	Qualifiers
Bismuth-212	-0.018 ± 0.476 (0.892)	pCi/g	05/29/12 14:36	
Bismuth-214	0.154 ± 0.247 (0.517)	pCi/g	05/29/12 14:36	
Lead-212	0.0530 ± 0.0640 (0.115)	pCi/g	05/29/12 14:36	
Lead-214	-0.011 ± 0.0680 (0.123)	pCi/g	05/29/12 14:36	
Potassium-40	0.201 ± 0.511 (1.14)	pCi/g	05/29/12 14:36	
Radium-226	-0.074 ± 0.0880 (0.143)	pCi/g	05/29/12 14:36	
Radium-228	0.0830 ± 0.139 (0.265)	pCi/g	05/29/12 14:36	
Thallium-208	-0.008 ± 0.0350 (0.0620)	pCi/g	05/29/12 14:36	
Thorium-234	1.59 ± 2.39 (4.19)	pCi/g	05/29/12 14:36	
Uranium-235	-0.012 ± 0.187 (0.335)	pCi/g	05/29/12 14:36	

## QUALIFIERS

Project: RN  
Pace Project No.: 3068813

### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PRL - Pace Reporting Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty

(MDC) - Minimum Detectable Concentration

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.





Sample Condition Upon Receipt

Client Name: Anacon

Project # 3068813

*Handwritten initials*

Courier:  Fed Ex  UPS  USPS  Client  Commercial  Pace Other \_\_\_\_\_

Tracking #: 70835197264

Optional:
Proj. Due Date:
Proj. Name:

Custody Seal on Cooler/Box Present:  yes  no Seals intact:  yes  no

Packing Material:  Bubble Wrap  Bubble Bags  None  Other \_\_\_\_\_

Thermometer Used 5 6 7 Type of Ice: Wet Blue None  Samples on ice, cooling process has begun

Cooler Temperature NA

Biological Tissue is Frozen: Yes No

Date and Initials of person examining contents: <u>WEL 5/3/12</u>
---

Temp should be above freezing to 6°C Comments:

Chain of Custody Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3.
Sampler Name & Signature on COC:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	4.
Samples Arrived within Hold Time:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	5.
Short Hold Time Analysis (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	6.
Rush Turn Around Time Requested:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	7.
Sufficient Volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	8.
Correct Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	9.
-Pace Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers Intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	10.
Filtered volume received for Dissolved tests	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	11.
Sample Labels match COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	12.
-Includes date/time/ID/Analysis Matrix: <u>SL</u>		
All containers needing preservation have been checked.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Initial when completed <u>WEL</u> Lot # of added preservative
Samples checked for dechlorination:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14.
Headspace in VOA Vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	15.
Trip Blank Present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	16.
Trip Blank Custody Seals Present	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: \_\_\_\_\_ Field Data Required? Y / N

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/ Resolution: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Project Manager Review: [Signature]

Date: 5/3/12

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)



May 18, 2012

Arun Neupane  
Terracon  
11555 Clay Road  
Houston, TX 77043  
TEL: (713) 408-1493  
FAX (713) 690-8787  
RE: PO# 12E7270

Order No.: 1205009

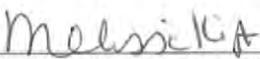
Dear Arun Neupane:

Anacon, Inc. received 12 samples on 5/1/2012 for the analyses presented in the following report.

Analyses are performed with method-required QA/QC samples. These data are provided along with the sample results. There were no problems with the analyses unless noted in a Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

  
Melissa Knight, Lab Manager

Total Number of Pages 013  
(Including Data Package Cover Sheet)

THIS DOCUMENT MEETS NELAC STANDARDS  
NELAC CERTIFICATE # T104704206-010-1

730 FM 1959  
HOUSTON, TX 77034  
(281) 922-7000 Tel.  
(281) 461-0089 Fax



Chain of Custody Record

Toll Free: 1-800-870-3899  
www.anaconlab.com

Shaded Areas for Lab Use Only.

Client: Terracon Consulting

Address: 11555 Clay Blvd

PO#: 12 FT 270

Contact Person: Ann Neupane

Phone Number: 71341081493

Fax Number:

E-mail Address: anneupane@terracon.com

Anacon Log Number: 1205009

Turn Around Time: Standing

Sample Location: Archie's Pipe

Delivered By: River Dicks # 101

Custody Seal (Y/N):

Temperature: None

Sampled By: Ann Neupane

Please Print

Log Number	Sample Matrix	Date Collected	Time Collected	# of Containers	Type of Container	Pres.	Client Sample ID	Matrix Code	Container	Notes
01	501	4/26/12	13:31	1	6LBS	Y	RB-13 (0-1)	S		
02			15:29				RB-20 (1-2)	S		
03			15:40				RB-21 (0-1)	S		
04		4/30/12	11:39				RB-35 (0-1)	S		
05			11:52				RB-36 (1-2)	S		
06			12:29				RB-42 (2-3)	S		
07			12:45				RB-43 (2-3)	S		
08			15:09				RB-51 (2-3)	S		
09			17:01				RB-57 (1-2)	S		
10			17:21				RB-59 (1-2)	S		
11			17:46				RB-60 (1-2)	S		
12			18:22				RB-63 (0-1)	S		

Relinquished By: [Signature] Date: 5/1/12 Time: 9:18  
 Accepted By: [Signature] Date: 5/1/12 Time: 10:07  
 Relinquished By: [Signature] Date: 5/1/12 Time: 10:07  
 Accepted By: [Signature] Date: 5-1-12 Time: 2:5pm  
 Relinquished by: [Signature] Date: 5-1-12 Time: 4:46  
 Accepted By: [Signature] Date: 5-1-12 Time: 5:09

Preservation Code: 1=HNO3, 2=H2SO4, 3=NaOH, 4=HCL, 5=None, 6=Other  
 Matrix Code: S=Solid, W=Water, Slidg=Sludge, O=Oil, INF=Influent, EFF=Effluent  
 Containers: P=Plastic, G=Glass, V=Vial, B=Bacterial

Analysis Requested

Remarks

ORIGINAL

**Anacon, Inc.**

Date: 17-May-12

CLIENT: Terracon  
Lab Order: 1205009  
Project: PO# 12E7270  
Lab ID: 1205009-001

Client Sample ID: RB-13 (0-1)  
Collection Date: 4/26/2012 1:31:00 PM

Matrix: SOLID

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
METALS BY ICP-MS FOR SOLIDS						Analyst: RH
Lead	758	0.100	B	mg/Kg	1	5/16/2012 4:17:00 PM

Qualifiers: ND - Not Detected at the Reporting Limit  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
\* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits  
R - RPD outside accepted recovery limits  
E - Value above quantitation range

002

**Anacon, Inc.**

Date: 17-May-12

CLIENT: Terracon  
Lab Order: 1205009  
Project: PO# 12E7270  
Lab ID: 1205009-002

Client Sample ID: RB-20 (1-2)  
Collection Date: 4/26/2012 3:29:00 PM

Matrix: SOLID

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
METALS BY ICP-MS FOR SOLIDS			SW6020			Analyst: RH
Lead	1560	0.100	B	mg/Kg	1	5/16/2012 4:46:00 PM

Qualifiers: ND - Not Detected at the Reporting Limit  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
\* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits  
R - RPD outside accepted recovery limits  
E - Value above quantitation range

003

**Anacon, Inc.**

Date: 17-May-12

CLIENT: Terracon  
Lab Order: 1205009  
Project: PO# 12E7270  
Lab ID: 1205009-003

Client Sample ID: RB-21 (0-1)  
Collection Date: 4/26/2012 3:40:00 PM  
Matrix: SOLID

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
METALS BY ICP-MS FOR SOLIDS			SW6020			Analyst: RH
Lead	61.8	0.100	B	mg/Kg	1	5/16/2012 4:52:00 PM

Qualifiers: ND - Not Detected at the Reporting Limit  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
\* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits  
R - RPD outside accepted recovery limits  
E - Value above quantitation range

001

**Anacon, Inc.**

Date: 17-May-12

CLIENT: Terracon  
Lab Order: 1205009  
Project: PO# 12E7270  
Lab ID: 1205009-004

Client Sample ID: RB-35 (0-1)  
Collection Date: 4/30/2012 11:39:00 AM

Matrix: SOLID

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
METALS BY ICP-MS FOR SOLIDS						Analyst: RH
Lead	11.6	0.100	B	mg/Kg	1	5/16/2012 4:58:00 PM

Qualifiers: ND - Not Detected at the Reporting Limit  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
\* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits  
R - RPD outside accepted recovery limits  
E - Value above quantitation range

005

**Anacon, Inc.**

Date: 17-May-12

CLIENT: Terracon  
Lab Order: 1205009  
Project: PO# 12E7270  
Lab ID: 1205009-005

Client Sample ID: RB-36 (1-2)  
Collection Date: 4/30/2012 11:52:00 AM  
Matrix: SOLID

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
METALS BY ICP-MS FOR SOLIDS			SW6020			Analyst: RH
Lead	646	0.100	B	mg/Kg	1	5/16/2012 5:03:00 PM

**Qualifiers:**  
ND - Not Detected at the Reporting Limit  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
\* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits  
R - RPD outside accepted recovery limits  
E - Value above quantitation range

**Anacon, Inc.**

Date: 17-May-12

CLIENT: Terracon  
Lab Order: 1205009  
Project: PO# 12E7270  
Lab ID: 1205009-006

Client Sample ID: RB-42 (2-3)  
Collection Date: 4/30/2012 12:29:00 PM  
Matrix: SOLID

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
METALS BY ICP-MS FOR SOLIDS			SW6020			Analyst: RH
Lead	174	0.100	B	mg/Kg	1	5/16/2012 5:09:00 PM

**Qualifiers:**  
ND - Not Detected at the Reporting Limit  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
\* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits  
R - RPD outside accepted recovery limits  
E - Value above quantitation range

**Anacon, Inc.**

Date: 17-May-12

CLIENT: Terracon  
Lab Order: 1205009  
Project: PO# 12E7270  
Lab ID: 1205009-007

Client Sample ID: RB-43 (2-3)  
Collection Date: 4/30/2012 12:45:00 PM  
Matrix: SOLID

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
METALS BY ICP-MS FOR SOLIDS			SW6020			Analyst: RH
Lead	210	0.100	B	mg/Kg	1	5/16/2012 5:15:00 PM

Qualifiers: ND - Not Detected at the Reporting Limit  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
\* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits  
R - RPD outside accepted recovery limits  
E - Value above quantitation range

**Anacon, Inc.**

Date: 17-May-12

CLIENT: Terracon  
Lab Order: 1205009  
Project: PO# 12E7270  
Lab ID: 1205009-008

Client Sample ID: RB-51 (2-3)  
Collection Date: 4/30/2012 3:09:00 PM  
Matrix: SOLID

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
METALS BY ICP-MS FOR SOLIDS			SW6020			Analyst: RH
Lead	318	0.100	B	mg/Kg	1	5/16/2012 5:21:00 PM

**Qualifiers:**  
ND - Not Detected at the Reporting Limit  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
\* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits  
R - RPD outside accepted recovery limits  
E - Value above quantitation range

009

**Anacon, Inc.**

Date: 17-May-12

**CLIENT:** Terracon  
**Lab Order:** 1205009  
**Project:** PO# 12E7270  
**Lab ID:** 1205009-009

**Client Sample ID:** RB-57 (1-2)  
**Collection Date:** 4/30/2012 5:01:00 PM

**Matrix:** SOLID

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
<b>METALS BY ICP-MS FOR SOLIDS</b>			<b>SW6020</b>			Analyst: RH
Lead	1310	0.100	B	mg/Kg	1	5/16/2012 5:38:00 PM

**Qualifiers:**  
ND - Not Detected at the Reporting Limit  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
\* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits  
R - RPD outside accepted recovery limits  
E - Value above quantitation range

**Anacon, Inc.**

Date: 17-May-12

CLIENT: Terracon  
Lab Order: 1205009  
Project: PO# 12E7270  
Lab ID: 1205009-010

Client Sample ID: RB-59 (1-2)  
Collection Date: 4/30/2012 5:21:00 PM

Matrix: SOLID

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
METALS BY ICP-MS FOR SOLIDS			SW6020			Analyst: RH
Lead	754	0.100	B	mg/Kg	1	5/16/2012 5:49:00 PM

Qualifiers: ND - Not Detected at the Reporting Limit  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
\* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits  
R - RPD outside accepted recovery limits  
E - Value above quantitation range

**Anacon, Inc.**

Date: 17-May-12

**CLIENT:** Terracon  
**Lab Order:** 1205009  
**Project:** PO# 12E7270  
**Lab ID:** 1205009-011

**Client Sample ID:** RB-60 (1-2)  
**Collection Date:** 4/30/2012 5:46:00 PM  
**Matrix:** SOLID

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
METALS BY ICP-MS FOR SOLIDS			SW6020			Analyst: RH
Lead	907	0.100	B	mg/Kg	1	5/16/2012 5:55:00 PM

**Qualifiers:**  
ND - Not Detected at the Reporting Limit  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
\* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits  
R - RPD outside accepted recovery limits  
E - Value above quantitation range

**Anacon, Inc.**

Date: 17-May-12

CLIENT: Terracon  
Lab Order: 1205009  
Project: PO# 12E7270  
Lab ID: 1205009-012

Client Sample ID: RB-63 (0-1)  
Collection Date: 4/30/2012 6:22:00 PM  
Matrix: SOLID

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
METALS BY ICP-MS FOR SOLIDS			SW6020			Analyst: RH
Lead	288	0.100	B	mg/Kg	1	5/16/2012 6:01:00 PM

Qualifiers: ND - Not Detected at the Reporting Limit  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
\* - Value exceeds Maximum Contaminant Level

S - Spike Recovery outside accepted recovery limits  
R - RPD outside accepted recovery limits  
E - Value above quantitation range

013

CLIENT: Terracon  
 Work Order: 1205009

Project: PO# 12E7270

ANALYTICAL QC SUMMARY REPORT

TestCode: 6020\_S

Sample ID: BLK051512DDL	SampType: MBLK	TestCode: 6020_S	Units: mg/Kg	Prep Date:	Run ID: ICP-MS #1_120516A
Client ID: ZZZZZ	Batch ID: R32868	TestNo: SW6020		Analysis Date: 5/16/2012	SeqNo: 405257
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC LowLimit HighLimit RPD Ref Val %RPD RPDLimit Qual
Lead	0.8118	0.100			

Sample ID: BLK051112DDL	SampType: MBLK	TestCode: 6020_S	Units: mg/Kg	Prep Date:	Run ID: ICP-MS #1_120516A
Client ID: ZZZZZ	Batch ID: R32868	TestNo: SW6020		Analysis Date: 5/16/2012	SeqNo: 405266
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC LowLimit HighLimit RPD Ref Val %RPD RPDLimit Qual
Lead	0.5436	0.100			

Sample ID: LCS051512DDL	SampType: LCS	TestCode: 6020_S	Units: mg/Kg	Prep Date:	Run ID: ICP-MS #1_120516A
Client ID: ZZZZZ	Batch ID: R32868	TestNo: SW6020		Analysis Date: 5/16/2012	SeqNo: 405258
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC LowLimit HighLimit RPD Ref Val %RPD RPDLimit Qual
Lead	5.505	0.100	5	0.5436	99.2 80 120 0 0 B

Sample ID: LCS051112DDL	SampType: LCS	TestCode: 6020_S	Units: mg/Kg	Prep Date:	Run ID: ICP-MS #1_120516A
Client ID: ZZZZZ	Batch ID: R32868	TestNo: SW6020		Analysis Date: 5/16/2012	SeqNo: 405267
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC LowLimit HighLimit RPD Ref Val %RPD RPDLimit Qual
Lead	5.664	0.100	5	0.5436	102 80 120 0 0 B

Sample ID: 1205147-001A MS	SampType: MS	TestCode: 6020_S	Units: mg/Kg	Prep Date:	Run ID: ICP-MS #1_120516A
Client ID: ZZZZZ	Batch ID: R32868	TestNo: SW6020		Analysis Date: 5/16/2012	SeqNo: 405259
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC LowLimit HighLimit RPD Ref Val %RPD RPDLimit Qual
Lead	4.91	0.100	5	0.1501	95.2 75 125 0 0 B

Qualifiers: ND - Not Detected at the Reporting Limit  
 J - Analyte detected below quantitation limits  
 S - Spike Recovery outside accepted recovery limits  
 R - RPD outside accepted recovery limits  
 B - Analyte detected in the associated Method Blank

CLIENT: Terracon  
 Work Order: 1205009  
 Project: PO# 12E7270

ANALYTICAL QC SUMMARY REPORT  
 TestCode: 6020\_S

Sample ID	Batch ID	Result	TestCode	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Sample ID: 1205008-001A MSD	Batch ID: R32868	12.91	TestCode: 6020_S	5	6.289	132	75	125	0	0	20	BS
Client ID: ZZZZZ	Batch ID: R32868		TestNo: SW6020							SeqNo: 405268		
Analyle			PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead												
Sample ID: 1205009-009A MS	Batch ID: R32868	2631	TestCode: 6020_S	5	1312	26400	75	125	0	0	20	BS
Client ID: RB-57 (1-2)	Batch ID: R32868		TestNo: SW6020							SeqNo: 405280		
Analyle			PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead												
Sample ID: 1205147-001A MSD	Batch ID: R32868	5.17	TestCode: 6020_S	5	0.1501	100	75	125	4.91	5.16	20	B
Client ID: ZZZZZ	Batch ID: R32868		TestNo: SW6020							SeqNo: 405269		
Analyle			PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead												
Sample ID: 1205008-001A MSD	Batch ID: R32868	13.45	TestCode: 6020_S	5	6.289	143	75	125	12.91	4.10	20	BS
Client ID: RB-57 (1-2)	Batch ID: R32868		TestNo: SW6020							SeqNo: 405281		
Analyle			PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Lead												

Qualifiers: ND - Not Detected at the Reporting Limit  
 J - Analyte detected below quantitation limits  
 S - Spike Recovery outside accepted recovery limits  
 R - RPD outside accepted recovery limits  
 B - Analyte detected in the associated Method Blank  
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