

# Canal Sediment Sampling and Analysis

Townsend Canal - C-43 Reservoir Project  
State Road 80, Southwest of the City of La Belle  
Hendry County, Florida  
Contract #4600003427, Work Order No. 2  
Terracon Project No. HD177037  
October 4, 2017



**Prepared for:**

South Florida Water Management District  
West Palm Beach, Florida

**Prepared by:**

Terracon Consultants, Inc.  
West Palm Beach, Florida

[terracon.com](http://terracon.com)

**Terracon**

Environmental



Facilities



Geotechnical



Materials

October 4, 2017



South Florida Water Management District  
Environmental Science Unit  
3301 Gun Club Road  
West Palm Beach, Florida 33406

Attn: Robert Taylor, CEP, Lead Environmental Scientist  
Email: [rtaylor@sfwmd.gov](mailto:rtaylor@sfwmd.gov)  
Phone: (561) 682-2264

Re: Canal Sediment Sampling and Analysis  
Townsend Canal - C-43 Reservoir Project  
State Road 80, Southwest of the City of La Belle  
Hendry County, Florida  
**Contract #4600003427, Work Order No. 2**  
Terracon Project No. HD177037

Dear Mr. Taylor:

Terracon Consultants, Inc. (Terracon) is pleased to submit our report of canal sediment sampling and analysis activities completed at the site referenced above. The report presents analytical data generated from the analysis of sediment samples collected from the bottom of the Townsend Canal within the C-43 Reservoir Project. Terracon conducted the environmental services in general accordance with Terracon proposal No. PHD177037 dated June 19, 2017, and Work Order No. 2 of Contract #4600003427.

Terracon appreciates this opportunity to provide environmental services to the South Florida Water Management District. Should you have any questions or require additional information, please do not hesitate to contact our office.

Sincerely,  
**Terracon Consultants, Inc.**

A handwritten signature in blue ink that reads "James E. Cotton".

James E. Cotton, P.G.  
Project Manager  
Florida License No. PG1785

A handwritten signature in blue ink that reads "Steven A. Harrison".

Steven A. Harrison, P.G.  
Environmental Services  
Department Manager



Terracon Consultants Inc. 1225 Omar Road West Palm Beach, FL 33405

P 561-689-4299 F 561-689-5955 [terracon.com](http://terracon.com)

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Materials

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**Sediment Sampling and Analysis**  
**Townsend Canal**  
**C-43 Reservoir Project**  
**State Road 80, Southwest of the City of La Belle**  
**Hendry County, Florida**  
**Contract #4600003427, Work Order No. 2**  
**Terracon Project No. HD177037**  
**October 4, 2017**

## **1.0 INTRODUCTION AND SITE DESCRIPTION**

The C-43 Reservoir Project is located along the south side of State Road 80, southwest of La Belle, in Western Hendry County, Florida. We understand that the South Florida Water Management District (District) plans to dredge a portion of the Townsend Canal connecting the proposed C-43 Reservoir to the Caloosahatchee River and desires to characterize the sediments in advance of that effort. The segment of the Townsend Canal designated for dredging is located south of the Caloosahatchee River and north of the northwest corner of the C-43 Reservoir project area. As the C-43 project area has been historically used for citrus production and other agricultural activities, there are concerns that the long history of agrichemical usage throughout the area has impacted canal bottom sediments. Due to these concerns, it is necessary to assess sediment quality prior to disturbance of the canal bottom sediments. Evaluation for the presence of agrichemical constituents of concern will enable stakeholders to develop appropriate protocols for management and disposal, if required, of sediments removed from the canal. A Topographic Map showing the location of the work area is included as Exhibit 1. The Sample Location map, provided as Exhibit 2, shows the layout of the work area.

## **2.0 SCOPE OF SERVICES**

The canal sediment sampling effort was conducted to assess for potential concentrations of agrichemical constituents of concern that would be utilized to assist in developing appropriate protocols for managing and disposing the sediments removed from the canal. The scope of services conducted included the following:

- Collection of canal bottom sediments from three locations within the Townsend Canal, as designated by the District
- Laboratory analysis of the collected samples for constituents of concern (COC)
- Analysis of the sediment samples using the synthetic precipitation leaching procedure (SPLP) to evaluate the leaching potential of chromium identified above the Leachability based on groundwater Soil Cleanup Target level as specified in Chapter 62-777, Florida Administrative Code (FAC).

### **3.0 FIELD INVESTIGATION**

Terracon is committed to the safety of all its employees. As such, and in accordance with our *Incident and Injury Free®* safety culture, a site safety pre-task plan was developed to identify potential safety concerns and prepare our personnel to handle conditions during field services. Prior to commencement of on-site activities, Terracon held a meeting with assigned staff and subcontractors to review the proposed work sequence and evaluate work practices for safe completion of the project. Fieldwork was conducted by environmental staff with United States Occupational Safety and Health Administration (OSHA) 1910.120 training. Sediment sampling activities were conducted in general accordance with standard operating procedures (SOP) established by the Florida Department of Environmental Protection (DEP), DEP-SOP-001/01, FS 4000.

#### **3.1 Sediment Sampling**

On July 10, 2017, three sediment samples, designated Canal-1, Canal-2 and Canal-3, were collected from the Townsend Canal at locations designated by the District. The locations of the sediment sample collection points are shown on Exhibit 2, Sample Locations.

The sediment samples were collected using a decontaminated AMS sediment/sludge sampler equipped with a two-inch diameter, 12-inch long, stainless steel barrel with a core tip. The barrel was fitted a polyethylene liner and core catcher to prevent sediment loss during extraction. Stainless steel extensions were attached to the sampler to reach the canal bottom at depths ranging from 10 and 14 feet below the water surface at the sampling locations. The sampler was manually advanced into the sediment profile for sample collection.

Sediment sampling equipment was decontaminated prior to the beginning of the sampling and before collecting each sediment sample. The polyethylene liner and core catcher was replaced after the collection of each sediment sample. The sediment sampler was advanced approximately 6 to 8 inches into the sediment profile, until refusal was encountered.

The sediment samples collected were placed in parameter specific laboratory provided pre-cleaned containers, labeled, and placed in an ice-filled cooler. The sediment samples and completed chain-of-custody record were transported to Palm Beach Environmental Laboratories, Inc. in West Palm Beach, Florida, a Florida Department of Health (FDOH) certified and National Environmental Laboratory Accreditation Program (NELAP)-accredited laboratory for analysis for the following constituents of concern:

- Organochlorine pesticides by EPA Method 8081
- Eight Resource Conservation and Recovery Act (RCRA) Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA Method 6020
- Copper by EPA Method 6020

Upon receipt of the laboratory analytical results for total metal concentrations, the sediment samples were re-logged for analysis of leachable chromium by the following method:

- SPLP Chromium by EPA Method 1312

## **4.0 RESULTS**

The chain-of-custody record and laboratory analytical report for the sediment samples are included in Appendix A. The analytical results were not compared with FDEP's Sediment Quality Assessment Guidelines, but with soil cleanup target levels (SCTLs) established in Chapter 62-777, Florida Administrative Code (FAC) as the canal bottom sediments are to be dredged and placed on land for potential reuse. This evaluation is not addressing in-situ sediment quality. As the sediments will be recognized as soils after placed on land, the potential for direct exposure of the constituents of concern is the basis for evaluation within this study. A summary of the sediment analytical results is presented in Table 1. A copy of the analytical report for the sediment samples is included in Appendix A. The analytical report providing the SPLP analysis for chromium is included in Appendix B.

A summary of the parameters which were reported to exceed their direct exposure and leachability based on groundwater SCTLs is provided below.

### **4.1 Observations**

The sediment profile observed within the sampling locations generally consisted of two inches of shell and sand followed approximately 6-8 inches of a dense, gray, clay layer. Refusal was encountered at approximately 8 inches below the sediment as a result of the density of the clay layer. Soft sediments, such as silt or detritus was not observed at the sampling locations. No debris or unusual odors were observed in the sediment samples recovered.

### **4.2 Laboratory Analyses**

#### **Organochlorine Pesticides**

Organochlorine pesticide compounds were not reported at concentrations in excess of laboratory method detection limits (MDLs). However, many of the SCTLs for leachability based on fresh surface water were below the MDLs of many of the compounds. The FDEP does not consider and/or apply SCTLs in the samples analyzed.

## **Metals**

Analytical results reported the presence of tested metals in the sediment samples collected at concentrations above their reported their MDLs and Practical Quantitation Limits (PQLs). The following section presents metals reported at concentrations in excess of their SCTLs.

### **Chromium**

- Chromium was reported to be present in sample Canal-1 at a concentration of 89 milligrams per kilogram (mg/kg) which exceeded the leachability based on groundwater SCTL of 38 mg/kg but was below the residential and commercial direct exposure SCTLs of 210 mg/kg and 470 mg/kg, respectively.
- Chromium was reported to be present in sample Canal-2 at a concentration of 58 mg/kg which exceeded the leachability based on groundwater SCTL of 38 mg/kg but was below the residential and commercial direct exposure SCTLs of 210 mg/kg and 470 mg/kg, respectively.
- Chromium was reported to be present in sample Canal-3 at a concentration of 40 mg/kg which exceeded the leachability based on groundwater SCTL of 38 mg/kg but was below the residential and commercial direct exposure SCTLs of 210 mg/kg and 470 mg/kg, respectively.

### **SPLP Chromium**

- SPLP chromium was reported at the following concentrations:
  - Canal-1 at a concentration of 0.5 micrograms per liter (µg/L)
  - Canal-2 at a concentration of 0.6 µg/L
  - Canal-3 at a concentration of 1.0 µg/L

These concentrations are below the groundwater cleanup target level (GCTL) of 100 µg/L for chromium as specified in Chapter 62-777, FAC.

## **5.0 SUMMARY OF FINDINGS**

Based on the scope of services completed for this investigation, Terracon did not report the tested parameters to be present at concentrations which exceeded the residential or commercial direct exposure SCTLs as specified in Chapter 62-777, FAC. However, chromium was reported to be present at concentrations which exceeded the leachability based on groundwater SCTL as specified in Chapter 62-777, FAC. Further evaluation of the potential for sediments to leach chromium, through SPLP analyses, indicated that chromium was not leaching at concentrations above its GCTL.

## **6.0 RECOMMENDATIONS**

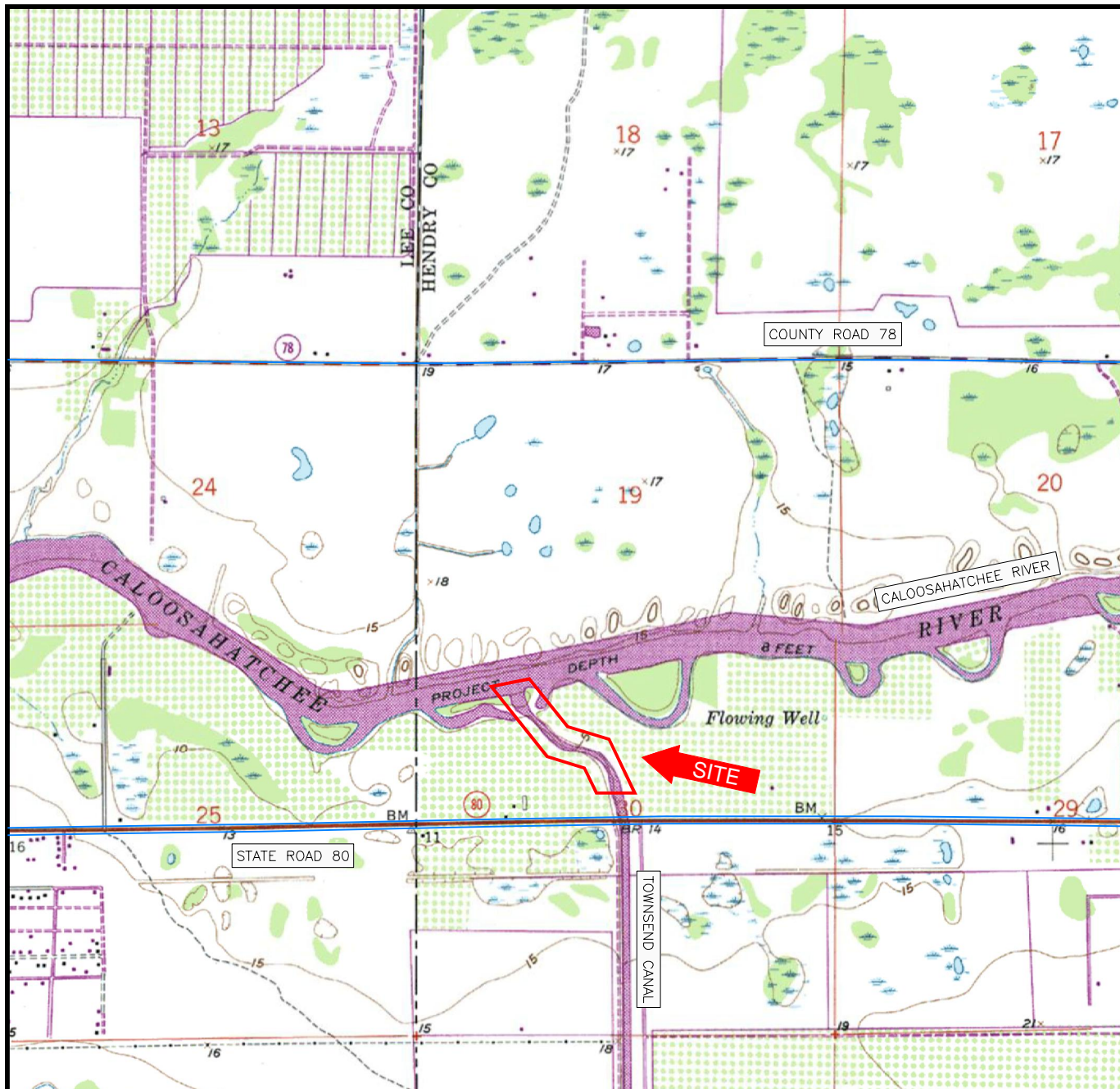
Based on the analytical results of the sediment samples collected during this investigation, Terracon does not recommend further assessment of the sediments proposed to be dredged.

## **EXHIBITS**

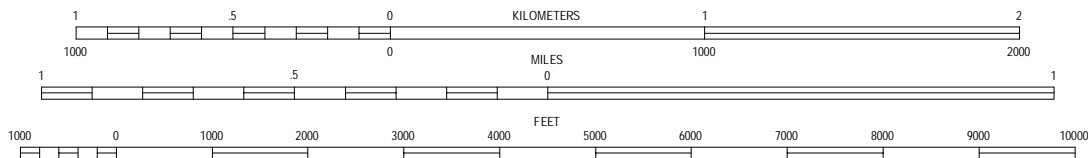
Exhibit 1 - Topographic Vicinity Map

Exhibit 2 – Sample Locations





SCALE 1:24 000



CONTOUR INTERVAL 5 FEET  
NATIONAL GEODETIC VERTICAL DATUM OF 1929

SECTION: 19  
TOWNSHIP: 43 SOUTH  
RANGE: 28 EAST

ALVA, FLORIDA  
ISSUED: 1958    REVISED: 1973  
7.5 MINUTE SERIES (QUADRANGLE)



Aug09, 2017-2:53pm N:\Projects-Other Offices\West Palm Beach\2017\HD177037\cad\7037-usgs 1.dwg

Project Mgr:	SH	Project No.	HD177037
Drawn By:	SW	Scale:	AS SHOWN
Checked By:	SH	File No.	HD177037-1
Approved By:	SH	Date:	8-9-17

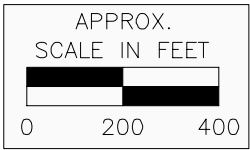
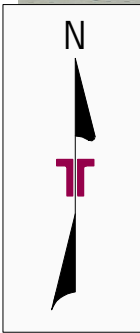
**Terracon**  
Consulting Engineers and Scientists  
1225 OMAR ROAD WEST PALM BEACH, FLORIDA 33405  
PH. (561) 689-4299 FAX. (561) 689-5955

TOPOGRAPHIC VICINITY MAP  
CANAL SEDIMENT SAMPLING  
C-43 RESERVOIR PROJECT  
STATE ROAD 80 - SOUTHWEST OF THE CITY OF LaBELLE  
HENDRY COUNTY, FLORIDA

EXHIBIT  
1



Aug09, 2017-2:54pm N:\Projects-Other Offices\West Palm Beach\2017\HD177037\cad\7037-site 2.dwg



Project Mng:	SH	Project No.	HD177037
Drawn By:	SW	Scale:	AS SHOWN
Checked By:	SH	File No.	HD177037-2
Approved By:	SH	Date:	8-9-17

**Terracon**  
Consulting Engineers and Scientists

1225 OMAR ROAD WEST PALM BEACH, FLORIDA 33405  
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SAMPLE LOCATIONS
CANAL SEDIMENT SAMPLING
C-43 RESERVOIR PROJECT
STATE ROAD 80 - SOUTHWEST OF THE CITY OF LaBELLE
HENDRY COUNTY, FLORIDA

EXHIBIT
2

## TABLES

Sediment Analytical Results  
Townsend Canal  
C-43 Reservoir Project  
Hendry County, Florida  
July 10, 2017  
Project Number HD177037

Sample Location	Table II, Ch. 62-777 FAC Soil Cleanup Target Levels				Units	CANAL -1	CANAL-2	CANAL-3
	Leachability Based on Groundwater Criteria	Direct Exposure Residential	Direct Exposure Commercial	Groundwater Cleanup Target Levels		7/10/2017	7/10/2017	7/10/2017
Metals by EPA Method 6010/7470/1312								
Arsenic		2.1	12		mg/kg	0.97 I	1.30	0.7 I
Barium	1,600	120	130,000		mg/kg	23.00	30.00	19.00
Cadmiummm	7.5	82	1,700		mg/kg	2.90	0.95	0.71
Chromium	38	210	470		mg/kg	89.0	58.0	40.0
SPLP Chromium				100	µg/L	0.5	0.6	1.0
Copper		150	89,000		mg/kg	8.30	5.00	2.10
Lead		400	1,400		mg/kg	4.50	2.80	1.80
Mercury	2.1	3	17		mg/kg	0.009	0.008	0.009
Selenium	5.2	440	11,000		mg/kg	2.5	1.4	1.4
Silver	17	410	8,200		mg/kg	0.06	0.02U	0.02U
Organochlorine Pesticides by EPA Method 8081								
4,4'-DDD	5.8	4.2	22		mg/kg	0.07U	0.07U	0.07U
4,4'-DDE	18	2.9	15		mg/kg	0.04U	0.04U	0.04U
4,4'-DDT	11	2.9	15		mg/kg	0.03U	0.03U	0.03U
Aldrin	0.2	0.06	0.3		mg/kg	0.03U	0.03U	0.03U
Chlordane (Technical)	9.6	2.8	14		mg/kg	0.1U	0.1U	0.1U
gamma-Chlordane					mg/kg	0.04U	0.04U	0.04U
alphaChlordane					mg/kg	0.04U	0.04U	0.04U
Dieldrin	0.002	0.06	0.3		mg/kg	0.04U	0.04U	0.04U
Endosulfan I					mg/kg	0.03U	0.03U	0.03U
Endosulfan II					mg/kg	0.05U	0.05U	0.05U
Endosulfan sulfate (alpha+beta+sulfate)	3.8	450	7600		mg/kg	0.04U	0.04U	0.04U
Endrin	1	25	510		mg/kg	0.01U	0.01U	0.01U
Endrin aldehyde					mg/kg	0.04U	0.04U	0.04U
Endrin ketone					mg/kg	0.03U	0.03U	0.03U
Heptachlor	23	0.2	1		mg/kg	0.04U	0.04U	0.04U
Heptachlor epoxide	0.6	0.1	0.5		mg/kg	0.04U	0.04U	0.04U
Methoxychlor	160	420	8,800		mg/kg	0.1U	0.1U	0.1U
Toxaphene	31	0.9	4.5		mg/kg	0.1U	0.1U	0.1U
alpha-BHC	0.0003	0.1	0.6		mg/kg	0.03U	0.03U	0.03U
beta-BHC	0.001	0.5	2.4		mg/kg	0.05U	0.05U	0.05U
delta-BHC	0.2	24	490		mg/kg	0.04U	0.04U	0.04U
gamma-BHC (Lindane)	0.009	0.7	2.5		mg/kg	0.04U	0.04U	0.04U

**Notes:**

Bold - exceeds an SCTL established in Table 2 of Chapter 62-777, FAC.

"U" flag indicates concentration was below the method detection limit (MDL).

"I" flag indicates concentration was between the MDL and practical quantitation limit (PQL).

## **APPENDIX A**

### Sediment Analytical Report





Palm Beach Environmental  
Laboratories Inc.



Steve Harrison  
Terracon WPB  
West Palm Beach, FL 33405  
(561) 689-4299  
LOG #: 0015682

July 26, 2017

Enclosed is the laboratory report for your project. All results meet the requirements of the NELAC standards.

Please note the following:

- (1) The samples were received as stated on the chain of custody, correctly labeled and at the proper temperature unless otherwise noted. The results contained in this report relate only to the items tested or to the samples as received by the laboratory.
- (2) This report may not be reproduced except in full, without the written approval of the laboratory. Any anomalies are noted in the case narrative.
- (3) Results for all solid matrices are reported in dry weight unless otherwise noted.
- (4) Results for all liquid matrices are analyzed as received in the laboratory unless otherwise noted.
- (5) Samples are disposed of within 30 days of their receipt by the laboratory.
- (6) A statement of Qualifiers is available upon request.
- (7) Certain analyses are subcontracted to outside NELAC certified laboratories and are designated on your report.
- (8) Precision & Accuracy will be provided when clients require a measure of estimated uncertainty.
- (9) The issuance of the final Certificate of Analysis takes precedence over any previous Preliminary Report Preliminary Data should not be used for regular purposes. Authorized signature(s) is provided on final report only

Please contact me if you have any questions or concerns regarding this report.

Sincerely,

Pamela Shore  
QA Officer



Palm Beach Environmental  
Laboratories Inc.

## CERTIFICATE OF ANALYSIS

Terracon WPB

1225 Omar Road

West Palm Beach, FL 33405

ATTN: Steve Harrison

PHONE: (561) 689-4299 FAX: (561) 689-5955

LOG #: 0015682

COC#: 24895

REPORTED: 7/26/2017 2:57:49PM

PROJECT #: [none]

PROJECT: C-43 Reservoir

Description: Canal-1

Lab ID: 0015682-01

Sampled: 07/10/17 10:45

Matrix: Soil

Sampled By: Andrew Petric

Received: 07/10/17 14:50

### EPA Method 8081A

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction	Analysis	Analyst
									Date	Date	
319-84-6	alpha-BHC	0.03	U	ug/kg	EPA 3545 / 8081A	1	0.03	0.1	07/14/17	07/15/17	DD
58-89-9	gamma-BHC (Lindane)	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
76-44-8	Heptachlor	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
309-00-2	Aldrin	0.03	U	ug/kg	EPA 3545 / 8081A	1	0.03	0.1	07/14/17	07/15/17	DD
319-85-7	beta-BHC	0.05	U	ug/kg	EPA 3545 / 8081A	1	0.05	0.1	07/14/17	07/15/17	DD
319-86-8	delta-BHC	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
1024-57-3	Heptachlor epoxide	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
959-98-8	Endosulfan I	0.03	U	ug/kg	EPA 3545 / 8081A	1	0.03	0.1	07/14/17	07/15/17	DD
5566-34-7	gamma-Chlordane	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
5103-71-9	alpha-Chlordane	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
72-55-9	4,4-DDE	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
60-57-1	Dieldrin	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
72-20-8	Endrin	0.01	U	ug/kg	EPA 3545 / 8081A	1	0.01	0.1	07/14/17	07/15/17	DD
33213-65-9	Endosulfan II	0.05	U	ug/kg	EPA 3545 / 8081A	1	0.05	0.1	07/14/17	07/15/17	DD
72-54-8	4,4-DDD	0.07	U	ug/kg	EPA 3545 / 8081A	1	0.07	0.1	07/14/17	07/15/17	DD
50-29-3	4,4-DDT	0.03	U	ug/kg	EPA 3545 / 8081A	1	0.03	0.1	07/14/17	07/15/17	DD
7421-93-4	Endrin aldehyde	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
1031-07-8	Endosulfan sulfate	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
72-43-5	Methoxychlor	0.1	U	ug/kg	EPA 3545 / 8081A	1	0.1	0.1	07/14/17	07/15/17	DD
53494-70-5	Endrin Ketone	0.03	U	ug/kg	EPA 3545 / 8081A	1	0.03	0.1	07/14/17	07/15/17	DD
NA	Total Chlordane	0.1	U	ug/kg	EPA 3545 / 8081A	1	0.1	0.1	07/14/17	07/15/17	DD
8001-35-2	Toxaphene	0.1	U	ug/kg	EPA 3545 / 8081A	1	0.1	0.1	07/14/17	07/15/17	DD
		% Recovery	Q	% Recovery Limits							
2051-24-3	Surrogate: Decachlorobiphenyl	85.3 %		Limit 41-170							
877-09-8	Surrogate: Tetrachloro-m-xylene	102 %		Limit 40-175							



Palm Beach Environmental  
Laboratories Inc.

## CERTIFICATE OF ANALYSIS

Terracon WPB

1225 Omar Road

West Palm Beach, FL 33405

ATTN: Steve Harrison

PHONE: (561) 689-4299 FAX: (561) 689-5955

LOG #: 0015682

COC#: 24895

REPORTED: 7/26/2017 2:57:49PM

PROJECT #: [none]

PROJECT: C-43 Reservoir

Description: Canal-1

Lab ID: 0015682-01

Sampled: 07/10/17 10:45

Matrix: Soil

Sampled By: Andrew Petric

Received: 07/10/17 14:50

### Metals by EPA 6000/7000 Series Methods

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction	Analysis	Analyst
									Date	Date	
7440-38-2	Arsenic	0.970	AL1, I	mg/kg dry	EPA 6020B	10	0.096	1.20	07/24/17	07/24/17	SL
7440-39-3	Barium	23.0	AL1	mg/kg dry	EPA 6020B	10	0.002	0.007	07/24/17	07/24/17	SL
7440-43-9	Cadmium	2.90	AL1	mg/kg dry	EPA 6020B	10	0.350	0.543	07/24/17	07/24/17	SL
7440-47-3	Chromium	89.0	AL1	mg/kg dry	EPA 6020B	10	0.001	0.02	07/24/17	07/24/17	SL
7440-50-8	Copper	8.30	AL1	mg/kg dry	EPA 6020B	10	0.130	0.870	07/24/17	07/24/17	SL
7439-92-1	Lead	4.50	AL1	mg/kg dry	EPA 6020B	10	0.300	0.087	07/24/17	07/24/17	SL
7439-97-6	Mercury	0.009	AL1	mg/kg dry	EPA 7471	1	0.00001	0.00007	07/24/17	07/17/17	SL
7782-49-2	Selenium	2.5	AL1	mg/kg dry	EPA 6020B	10	0.007	0.06	07/24/17	07/24/17	SL
7440-22-4	Silver	0.06	AL1, I	mg/kg dry	EPA 6020B	10	0.03	0.6	07/24/17	07/24/17	SL

### Percent Dry Weight

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction	Analysis	Analyst
									Date	Date	
NA	% Solids	39.0	AL1	%	Calculation	1	1.0	1.0	07/17/17	07/17/17	SL





Palm Beach Environmental  
Laboratories Inc.

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1225 Omar Road

West Palm Beach, FL 33405

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REPORTED: 7/26/2017 2:57:49PM

PROJECT #: [none]

PROJECT: C-43 Reservoir

Description: Canall-2

Lab ID: 0015682-02

Sampled: 07/10/17 11:15

Matrix: Soil

Sampled By: Andrew Petric

Received: 07/10/17 14:50

### EPA Method 8081A

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction	Analysis	Analyst
									Date	Date	
319-84-6	alpha-BHC	0.03	U	ug/kg	EPA 3545 / 8081A	1	0.03	0.1	07/14/17	07/15/17	DD
58-89-9	gamma-BHC (Lindane)	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
76-44-8	Heptachlor	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
309-00-2	Aldrin	0.03	U	ug/kg	EPA 3545 / 8081A	1	0.03	0.1	07/14/17	07/15/17	DD
319-85-7	beta-BHC	0.05	U	ug/kg	EPA 3545 / 8081A	1	0.05	0.1	07/14/17	07/15/17	DD
319-86-8	delta-BHC	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
1024-57-3	Heptachlor epoxide	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
959-98-8	Endosulfan I	0.03	U	ug/kg	EPA 3545 / 8081A	1	0.03	0.1	07/14/17	07/15/17	DD
5566-34-7	gamma-Chlordane	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
5103-71-9	alpha-Chlordane	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
72-55-9	4,4-DDE	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
60-57-1	Dieldrin	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
72-20-8	Endrin	0.01	U	ug/kg	EPA 3545 / 8081A	1	0.01	0.1	07/14/17	07/15/17	DD
33213-65-9	Endosulfan II	0.05	U	ug/kg	EPA 3545 / 8081A	1	0.05	0.1	07/14/17	07/15/17	DD
72-54-8	4,4-DDD	0.07	U	ug/kg	EPA 3545 / 8081A	1	0.07	0.1	07/14/17	07/15/17	DD
50-29-3	4,4-DDT	0.03	U	ug/kg	EPA 3545 / 8081A	1	0.03	0.1	07/14/17	07/15/17	DD
7421-93-4	Endrin aldehyde	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
1031-07-8	Endosulfan sulfate	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
72-43-5	Methoxychlor	0.1	U	ug/kg	EPA 3545 / 8081A	1	0.1	0.1	07/14/17	07/15/17	DD
53494-70-5	Endrin Ketone	0.03	U	ug/kg	EPA 3545 / 8081A	1	0.03	0.1	07/14/17	07/15/17	DD
NA	Total Chlordane	0.1	U	ug/kg	EPA 3545 / 8081A	1	0.1	0.1	07/14/17	07/15/17	DD
8001-35-2	Toxaphene	0.1	U	ug/kg	EPA 3545 / 8081A	1	0.1	0.1	07/14/17	07/15/17	DD
		% Recovery	Q	% Recovery Limits							
2051-24-3	Surrogate: Decachlorobiphenyl	104 %		Limit 41-170							
877-09-8	Surrogate: Tetrachloro-m-xylene	113 %		Limit 40-175							



Palm Beach Environmental  
Laboratories Inc.

## CERTIFICATE OF ANALYSIS

Terracon WPB

1225 Omar Road

West Palm Beach, FL 33405

ATTN: Steve Harrison

PHONE: (561) 689-4299 FAX: (561) 689-5955

LOG #: 0015682

COC#: 24895

REPORTED: 7/26/2017 2:57:49PM

PROJECT #: [none]

PROJECT: C-43 Reservoir

Description: Canall-2

Lab ID: 0015682-02

Sampled: 07/10/17 11:15

Matrix: Soil

Sampled By: Andrew Petric

Received: 07/10/17 14:50

### Metals by EPA 6000/7000 Series Methods

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction	Analysis	Analyst
									Date	Date	
7440-38-2	Arsenic	1.30	AL1	mg/kg dry	EPA 6020B	10	0.069	0.890	07/14/17	07/14/17	SL
7440-39-3	Barium	30.0	AL1	mg/kg dry	EPA 6020B	10	0.001	0.005	07/14/17	07/14/17	SL
7440-43-9	Cadmium	0.950	AL1	mg/kg dry	EPA 6020B	10	0.025	0.440	07/14/17	07/14/17	SL
7440-47-3	Chromium	58.0	AL1	mg/kg dry	EPA 6020B	10	0.001	0.02	07/14/17	07/14/17	SL
7440-50-8	Copper	5.00	AL1	mg/kg dry	EPA 6020B	10	0.096	0.620	07/14/17	07/14/17	SL
7439-92-1	Lead	2.80	AL1	mg/kg dry	EPA 6020B	10	0.210	0.620	07/14/17	07/14/17	SL
7439-97-6	Mercury	0.008	AL1	mg/kg dry	EPA 7471	1	0.000008	0.00005	07/14/17	07/17/17	SL
7782-49-2	Selenium	1.4	AL1	mg/kg dry	EPA 6020B	10	0.005	0.04	07/14/17	07/14/17	SL
7440-22-4	Silver	0.02	U, AL1	mg/kg dry	EPA 6020B	10	0.02	0.4	07/14/17	07/14/17	SL

### Percent Dry Weight

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction	Analysis	Analyst
									Date	Date	
NA	% Solids	55.0	AL1	%	Calculation	1	1.0	1.0	07/17/17	07/17/17	SL



Palm Beach Environmental  
Laboratories Inc.

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Terracon WPB

1225 Omar Road

West Palm Beach, FL 33405

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PHONE: (561) 689-4299 FAX: (561) 689-5955

LOG #: 0015682

COC#: 24895

REPORTED: 7/26/2017 2:57:49PM

PROJECT #: [none]

PROJECT: C-43 Reservoir

Description: Canall-3

Lab ID: 0015682-03

Sampled: 07/10/17 11:45

Matrix: Soil

Sampled By: Andrew Petric

Received: 07/10/17 14:50

### EPA Method 8081A

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction	Analysis	Analyst
									Date	Date	
319-84-6	alpha-BHC	0.03	U	ug/kg	EPA 3545 / 8081A	1	0.03	0.1	07/14/17	07/15/17	DD
58-89-9	gamma-BHC (Lindane)	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
76-44-8	Heptachlor	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
309-00-2	Aldrin	0.03	U	ug/kg	EPA 3545 / 8081A	1	0.03	0.1	07/14/17	07/15/17	DD
319-85-7	beta-BHC	0.05	U	ug/kg	EPA 3545 / 8081A	1	0.05	0.1	07/14/17	07/15/17	DD
319-86-8	delta-BHC	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
1024-57-3	Heptachlor epoxide	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
959-98-8	Endosulfan I	0.03	U	ug/kg	EPA 3545 / 8081A	1	0.03	0.1	07/14/17	07/15/17	DD
5566-34-7	gamma-Chlordane	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
5103-71-9	alpha-Chlordane	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
72-55-9	4,4-DDE	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
60-57-1	Dieldrin	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
72-20-8	Endrin	0.01	U	ug/kg	EPA 3545 / 8081A	1	0.01	0.1	07/14/17	07/15/17	DD
33213-65-9	Endosulfan II	0.05	U	ug/kg	EPA 3545 / 8081A	1	0.05	0.1	07/14/17	07/15/17	DD
72-54-8	4,4-DDD	0.07	U	ug/kg	EPA 3545 / 8081A	1	0.07	0.1	07/14/17	07/15/17	DD
50-29-3	4,4-DDT	0.03	U	ug/kg	EPA 3545 / 8081A	1	0.03	0.1	07/14/17	07/15/17	DD
7421-93-4	Endrin aldehyde	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
1031-07-8	Endosulfan sulfate	0.04	U	ug/kg	EPA 3545 / 8081A	1	0.04	0.1	07/14/17	07/15/17	DD
72-43-5	Methoxychlor	0.1	U	ug/kg	EPA 3545 / 8081A	1	0.1	0.1	07/14/17	07/15/17	DD
53494-70-5	Endrin Ketone	0.03	U	ug/kg	EPA 3545 / 8081A	1	0.03	0.1	07/14/17	07/15/17	DD
NA	Total Chlordane	0.1	U	ug/kg	EPA 3545 / 8081A	1	0.1	0.1	07/14/17	07/15/17	DD
8001-35-2	Toxaphene	0.1	U	ug/kg	EPA 3545 / 8081A	1	0.1	0.1	07/14/17	07/15/17	DD
		% Recovery	Q	% Recovery Limits							
2051-24-3	Surrogate: Decachlorobiphenyl	100 %		Limit 41-170							
877-09-8	Surrogate: Tetrachloro-m-xylene	109 %		Limit 40-175							



Palm Beach Environmental  
Laboratories Inc.

## CERTIFICATE OF ANALYSIS

Terracon WPB

1225 Omar Road

West Palm Beach, FL 33405

ATTN: Steve Harrison

PHONE: (561) 689-4299 FAX: (561) 689-5955

LOG #: 0015682

COC#: 24895

REPORTED: 7/26/2017 2:57:49PM

PROJECT #: [none]

PROJECT: C-43 Reservoir

Description: Canall-3

Lab ID: 0015682-03

Sampled: 07/10/17 11:45

Matrix: Soil

Sampled By: Andrew Petric

Received: 07/10/17 14:50

### Metals by EPA 6000/7000 Series Methods

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction	Analysis	Analyst
									Date	Date	
7440-38-2	Arsenic	0.700	AL1, I	mg/kg dry	EPA 6020B	10	0.064	0.836	07/14/17	07/14/17	SL
7440-39-3	Barium	19.0	AL1	mg/kg dry	EPA 6020B	10	0.001	0.005	07/14/17	07/14/17	SL
7440-43-9	Cadmium	0.710	AL1	mg/kg dry	EPA 6020B	10	0.023	0.420	07/14/17	07/14/17	SL
7440-47-3	Chromium	40.0	AL1	mg/kg dry	EPA 6020B	10	0.0009	0.02	07/14/17	07/14/17	SL
7440-50-8	Copper	2.10	AL1	mg/kg dry	EPA 6020B	10	0.090	0.580	07/14/17	07/14/17	SL
7439-92-1	Lead	1.80	AL1	mg/kg dry	EPA 6020B	10	0.200	0.580	07/14/17	07/14/17	SL
7439-97-6	Mercury	0.009	AL1	mg/kg dry	EPA 7471	1	0.000007	0.00005	07/14/17	07/17/17	SL
7782-49-2	Selenium	1.4	AL1	mg/kg dry	EPA 6020B	10	0.005	0.04	07/14/17	07/14/17	SL
7440-22-4	Silver	0.02	U, AL1	mg/kg dry	EPA 6020B	10	0.02	0.04	07/14/17	07/14/17	SL

### Percent Dry Weight

CAS #	Parameter	Results	Q	Units	Method	DF	MDL	PQL	Extraction	Analysis	Analyst
									Date	Date	
NA	% Solids	58.0	AL1	%	Calculation	1	1.0	1.0	07/17/17	07/17/17	SL



Palm Beach Environmental  
Laboratories Inc.

### Notes and Definitions

U	Analyte included in the analysis, but not detected
I	The reported value is between the laboratory Method Detection Limit & the laboratory Practical Quantitation Limit
AL1	Analysis performed by Advanced Environmental Cert# E82574 6681 Southpoint Parkway Jacksonville FL 32216

## **APPENDIX B**

### SPLP Chromium Analytical Report



Palm Beach Environmental  
Laboratories Inc.



Steve Harrison  
Terracon WPB  
West Palm Beach, FL 33405  
(561) 689-4299  
LOG #: 0015682

September 19, 2017

Enclosed is the laboratory report for your project. All results meet the requirements of the NELAC standards.

Please note the following:

- (1) The samples were received as stated on the chain of custody, correctly labeled and at the proper temperature unless otherwise noted. The results contained in this report relate only to the items tested or to the samples as received by the laboratory.
- (2) This report may not be reproduced except in full, without the written approval of the laboratory. Any anomalies are noted in the case narrative.
- (3) Results for all solid matrices are reported in dry weight unless otherwise noted.
- (4) Results for all liquid matrices are analyzed as received in the laboratory unless otherwise noted.
- (5) Samples are disposed of within 30 days of their receipt by the laboratory.
- (6) A statement of Qualifiers is available upon request.
- (7) Certain analyses are subcontracted to outside NELAC certified laboratories and are designated on your report.
- (8) Precision & Accuracy will be provided when clients require a measure of estimated uncertainty.
- (9) The issuance of the final Certificate of Analysis takes precedence over any previous Preliminary Report. Preliminary Data should not be used for regular purposes. Authorized signature(s) is provided on final report only.

Please contact me if you have any questions or concerns regarding this report.

Sincerely,

Pamela Shore  
QA Officer



Palm Beach Environmental  
Laboratories Inc.

## CERTIFICATE OF ANALYSIS

Terracon WPB

1225 Omar Road

West Palm Beach, FL 33405

**ATTN:** Steve Harrison

**PHONE:** (561) 689-4299 **FAX:** (561) 689-5955

**LOG #:** 0015682

**COC#:** 24895

**REPORTED:** 9/19/2017 4:53:21PM

**PROJECT #:** [none]

**PROJECT:** C-43 Reservoir

**Description:** Canal-1

**Lab ID:** 0015682-01

**Sampled:** 07/10/17 10:45

**Matrix:** Soil

**Sampled By:** Andrew Petric

**Received:** 07/10/17 14:50

### Metals SPLP EPA 1312

<u>CAS #</u>	<u>Parameter</u>	<u>Results</u>	<u>Q</u>	<u>Units</u>	<u>Method</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<u>Extraction</u> <u>Date</u>	<u>Analysis</u> <u>Date</u>	<u>Analyst</u>
7440-47-3	Chromium	0.0005	AL1, I	mg/L	EPA 6020B	1	0.0001	0.002	09/04/17	09/15/17	SL





Palm Beach Environmental  
Laboratories Inc.

## CERTIFICATE OF ANALYSIS

Terracon WPB

1225 Omar Road

West Palm Beach, FL 33405

**ATTN:** Steve Harrison

**PHONE:** (561) 689-4299 **FAX:** (561) 689-5955

**LOG #:** 0015682

**COC#:** 24895

**REPORTED:** 9/19/2017 4:53:21PM

**PROJECT #:** [none]

**PROJECT:** C-43 Reservoir

**Description:** Canall-2

**Lab ID:** 0015682-02

**Sampled:** 07/10/17 11:15

**Matrix:** Soil

**Sampled By:** Andrew Petric

**Received:** 07/10/17 14:50

### Metals SPLP EPA 1312

<u>CAS #</u>	<u>Parameter</u>	<u>Results</u>	<u>Q</u>	<u>Units</u>	<u>Method</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<u>Extraction</u> <u>Date</u>	<u>Analysis</u> <u>Date</u>	<u>Analyst</u>
7440-47-3	Chromium	0.0006	AL1, I	mg/L	EPA 6020B	1	0.0001	0.002	09/04/17	09/15/17	SL



Palm Beach Environmental  
Laboratories Inc.

## CERTIFICATE OF ANALYSIS

Terracon WPB

1225 Omar Road

West Palm Beach, FL 33405

**ATTN:** Steve Harrison

**PHONE:** (561) 689-4299 **FAX:** (561) 689-5955

**LOG #:** 0015682

**COC#:** 24895

**REPORTED:** 9/19/2017 4:53:21PM

**PROJECT #:** [none]

**PROJECT:** C-43 Reservoir

**Description:** Canall-3

**Lab ID:** 0015682-03

**Sampled:** 07/10/17 11:45

**Matrix:** Soil

**Sampled By:** Andrew Petric

**Received:** 07/10/17 14:50

### Metals SPLP EPA 1312

<u>CAS #</u>	<u>Parameter</u>	<u>Results</u>	<u>Q</u>	<u>Units</u>	<u>Method</u>	<u>DF</u>	<u>MDL</u>	<u>PQL</u>	<u>Extraction</u> <u>Date</u>	<u>Analysis</u> <u>Date</u>	<u>Analyst</u>
7440-47-3	Chromium	0.001	AL1, I	mg/L	EPA 6020B	1	0.0001	0.002	09/04/17	09/15/17	SL



Palm Beach Environmental  
Laboratories Inc.

### Notes and Definitions

I The reported value is between the laboratory Method Detection Limit & the laboratory Practical Quantitation Limit

AL1 Analysis performed by Advanced Environmental Cert# E82574  
6681 Southpoint Parkway Jacksonville FL 32216