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ENVIRONMENT

Subject:
Pollution Abatement Services Superfund Site – Fourth Operable Unit
Oswego, New York
Annual Progress Report - 2018

Date:
April 4, 2019

Contact:
Jason C. Vogel

Phone:
315.671.9134

Email:
jason.vogel@arcadis.com

Our ref:
B0036444.2018

Dear Ms. Simmons-Pierre:

On behalf of National Grid, please find enclosed the Annual Progress Report which describes the activities performed during 2018 in connection with the fourth operable unit (OU4) at the Pollution Abatement Services (PAS) Superfund Site located in Oswego, New York.

The report has been prepared in accordance with the requirements outlined in Section X of the Consent Decree for OU4 between the United States Environmental Protection Agency (USEPA) and the Settling Defendants (National Grid and General Motors) lodged by the Court on December 15, 1998. Please note that the Settling Defendants originally included National Grid and GM. As indicated previously, GM filed for bankruptcy in 2009.

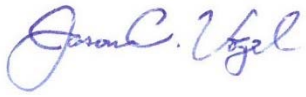
As stated in the Annual Progress Report, monitoring was conducted in 2018 and included sampling and analysis of sediments, sediment traps, and fish tissue. Monitoring will continue in two-year intervals (next sampling in 2020). Pending USEPA approval, the change proposed in the attached report will be incorporated in the next sampling event.

The data usability summary reports for the laboratory analysis of the samples collected in 2018 are included in the Annual Progress Report. Two CDs (same content on each) with the full laboratory data packages is also included.

Please feel free to call me at 315.671.9134 if you have any questions regarding the enclosed.

Sincerely,

Arcadis of New York, Inc.



Jason C. Vogel
Senior Ecologist

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Enclosures:

Attachments

Annual Progress Report - Period Covered: January 1, 2018 - December 31, 2018

Pollution Abatement Services Superfund Site
Oswego, New York
Fourth Operable Unit

Annual Progress Report
Period Covered: January 1, 2018 - December 31, 2018

This document represents the 2018 Annual Progress Report for the fourth operable unit (OU4) at the Pollution Abatement Services (PAS) Superfund Site (the Site) located in Oswego, New York. This progress report has been prepared in accordance with the requirements set forth in Section X of the OU4 Consent Decree lodged by the Court on December 15, 1998 between the United States Environmental Protection Agency (USEPA), and National Grid and General Motors Corporation (the Settling Defendants). The activities conducted pursuant to the requirements of the OU4 Consent Decree for the year 2018 are summarized below.

In accordance with the requirements set forth in the OU4 Consent Decree and the September 1997 Record of Decision (ROD) for OU4 (USEPA, 1997), the August 1999 *PCB Long-Term Monitoring Plan* (Plan) was developed by Blasland, Bouck & Lee, Inc. (BBL) (BBL, 1999). BBL (currently Arcadis) is the USEPA-approved Supervising Contractor identified in the OU4 Consent Decree. The Plan provides a detailed description of the requirements, methods, and procedures for monitoring the polychlorinated biphenyl (PCB) levels in the sediments and fish in White Creek and Wine Creek. The Plan was approved by the USEPA in a July 22, 1999 letter (USEPA, 1999). The monitoring activities identified in the Plan include sampling of surficial sediments (0- to 3-inch), subsurface sediments (3- to 6-inch and 6- to 12-inch), suspended sediment (trap), and biota (fish). In the third Annual Progress Report (BBL, 2000), BBL proposed that subsurface sediment samples not be collected in the future, and that future long-term monitoring events include the continued collection of surficial sediment, sediment trap, and fish samples in accordance with the Plan. USEPA approved this modification to the Plan on May 30, 2001, as documented in BBL's May 31, 2001 letter to the USEPA (BBL, 2001).

On January 7, 2009, USEPA provided comments to the Arcadis (2008) *Annual PCB Long-Term Monitoring Report*. The comments recommended that rather than reducing the sampling frequency to once every three years (as was proposed in the Annual Report), that the monitoring be conducted once every two years for the next two rounds (i.e., sampling in 2010 and 2012).

On January 27, 2014, USEPA provided comments to the *2013 PCB Long-Term Monitoring: 5-Year Review* (Arcadis, 2013) prepared by Arcadis on behalf of National Grid in which Arcadis had recommended discontinuing surficial sediment and sediment trap sampling. Dropping the sediment and sediment trap sampling was recommended since sediment PCB concentrations for most locations were below the site cleanup value of 1 mg/kg. In their comment letter, USEPA agreed with discontinuing the sediment samples from all locations except for Location 3 and all

sediment trap locations except for Location 4 since these locations had shown PCB levels above 1 mg/kg in recent sampling events. As a result, starting with the 2014 monitoring activities, only one sediment sample and one sediment trap sample were collected as part of the biennial monitoring.

I. Actions Taken Toward Compliance with the Consent Decree

During this 2018 reporting period, the fifteenth round of PCB monitoring activities was completed. The monitoring activities were conducted in accordance with the USEPA-approved Plan, as modified in 2001, 2009, and 2014. The monitoring activities included collection of a surficial sediment sample at one location, a sediment trap sample at one location, and fish samples at five locations in White Creek and Wine Creek. A description of the monitoring and a summary of the results are presented in Attachment 1. The references cited herein are also listed in Attachment 1.

II. Analytical Results and Data Generated

The data generated during this reporting period in association with the OU4 Consent Decree are solely related to completing the monitoring identified in the Plan. As previously stated, the monitoring activities included sediment, sediment trap, and fish sampling. Sediment samples were analyzed for PCBs and total organic carbon (TOC), and fish samples were analyzed for PCBs and percent lipids. A summary of that data is presented in Attachment 1.

III. Plans and Reports and other Deliverables Completed or Submitted

The 2017 Annual Progress Report was submitted to USEPA on March 3, 2017.

Pursuant to USEPA's request in August 8, 2018 e-mail correspondence, a risk addendum evaluation using 2014 and 2016 site data was prepared to finalize the 2016 Annual Progress Report. This deliverable was used to support the risk evaluation and remedy effectiveness within the fifth Five Year Review Report and was sent to USEPA via e-mail correspondence dated August 30, 2018.

IV. Planned Activities for 2018

Based on the fourth Five-Year Data Review Report prepared by USEPA (2014), it was recommended that the monitoring continue to be conducted once every two years for the next three rounds (i.e., sampling in 2014, 2016, and 2018).

V. Delays Encountered or Anticipated

No delays were encountered during 2018.

VI. Modifications to Plans or Schedules

There were no modifications to the Plan and/or associated schedules during 2018.

VII. Actions Taken in Support of the Community Relations Plan

In accordance with the requirements of the OU4 Consent Decree, the Settling Defendants will, upon notice by the USEPA, participate in the Community Relations Plan developed by the USEPA. To date USEPA has not requested any participation by the Settling Defendants. Accordingly, no actions have been taken by the Settling Defendants in support of USEPA's Community Relations Plan.

ATTACHMENT 1

Annual PCB Long-Term Monitoring Report (2018)

Attachment 1

ANNUAL PCB LONG-TERM MONITORING REPORT (2018)

Pollution Abatement Services Superfund Site
Oswego, New York
Fourth Operable Unit

1. Introduction

This *Annual PCB Long-Term Monitoring Report (2018)* provides a summary of the polychlorinated biphenyl (PCB) data collected in 2018 at the Pollution Abatement Services (PAS) Superfund Site (the Site) located in Oswego, New York. This report describes the fifteenth year of monitoring data collected under the United States Environmental Protection Agency (USEPA)-approved *PCB Long-Term Monitoring Plan* (Plan) for the fourth operable unit (OU4) of the PAS Site [Blasland, Bouck & Lee, Inc. (BBL), 1999] and the USEPA-approved modification to that Plan (BBL, 2001).

The monitoring activities described in the Plan are in response to the Consent Decree lodged by the Court on December 15, 1998 (USEPA, 1998a), and the September 30, 1997 *Record of Decision* (ROD) for OU4 (USEPA, 1997). The ROD presents the remedial action selected by the USEPA to address PCBs in the sediments of White and Wine Creeks and the adjacent wetlands. The USEPA-selected remedy presented in the OU4 ROD is long-term annual monitoring of PCB levels in sediments and fish in White and Wine Creeks and the adjacent wetlands.

Comments on proposed modifications to the plan (received January 7, 2009) from USEPA for the 2008 Annual PCB Long-Term Monitoring Report (Arcadis, 2008) recommended a sample frequency of every two years till the next Five-Year Data Review Report in early 2013. After the scheduled 2012 monitoring event, additional evaluation of the sampling frequency was conducted and the biennial monitoring schedule continued in 2014, 2016, and 2018. Neither the OU4 Consent Decree (USEPA, 1998a) nor ROD (USEPA, 1997) present a timetable for discontinuing the long-term monitoring activities, other than to state that a Remedial Action Completion Report will be completed within 90 days after the Settling Defendants conclude that the remedial action has been fully performed. The 2018 Fifth Five-Year Review Report (USEPA, 2019) indicates that the need for continued PCB monitoring at the site will be evaluated in the next (2023) five-year review; therefore, additional rounds of monitoring are planned for 2020 and 2022.

As documented in the PAS OU4 Consent Decree (USEPA, 1998a), the 1996 Phase 2 Supplemental Pre-Remedial Design Study (SPRDS) concluded that, although the Site was a source of PCBs before the construction of the containment facility in 1986, the Site is not a present source of PCBs for sediments in White and Wine Creeks or the adjacent wetlands, and

that other potential upstream sources of PCBs exist. Additionally, previous PCB sediment monitoring data, collected prior to 1996, indicate that the associated risk levels were relatively low and that there had been an overall decline in PCB concentrations in the creeks (USEPA, 1998a).

2. Overview of the PCB Long-Term Monitoring Activities

The PCB long-term monitoring activities for the Site identified in the Plan include collecting surficial sediment (0- to 3-inch), subsurface sediment (3- to 6-inch and 6- to 12-inch), suspended sediment (trap), and biota (fish) samples. In the third *Annual Progress Report* (BBL, 2000), BBL proposed that subsurface sediment samples not be collected in the future, and that future long-term monitoring events include the continued collection of only surficial sediment, sediment trap, and fish samples. USEPA approved this modification to the Plan on May 31, 2001 (BBL, 2001).

The results of the previous long-term monitoring events, together with the relevant conclusions, were presented to the USEPA in the previous *Annual Progress Reports* and the five *Five-Year Review Reports* (USEPA, 1998b; BBL, 2003; USEPA, 2008, 2014 and 2019). The data and conclusions presented in these reports confirm the USEPA (1998a) conclusion that sediment PCB concentrations have decreased since the sampling rounds that were conducted prior to 1996.

3. 2018 PCB Long-Term Monitoring Activities

The monitoring activities conducted by Arcadis during the fifteenth (2018) PCB long-term monitoring event focused on White and Wine Creeks at locations upstream, adjacent to, and downstream of the Site. Specific activities included:

- Sampling of surficial (0- to 3-inch) sediment at one location
- Installing and sampling of a sediment trap at one location
- Fish tissue sampling at five locations

As identified in the OU4 ROD and Consent Decree, data generated from the PCB long-term monitoring program are used to monitor PCB concentrations in sediments and fish of White and Wine Creeks.

3.1 Methods

This section identifies the sampling locations and describes the methods that were used for the surficial sediment, sediment trap, and fish sampling, and the laboratory analyses. The methods employed followed the procedures outlined in the approved Plan.

3.1.1 Sample Locations

Historically the Plan identified the collection of co-located sediment, sediment trap, and fish samples from five locations in White and Wine Creeks. The sample locations were identified by 8-foot sections of iron pipe which were driven into the bank during the 1999 sampling round. These locations were determined based on the results of a probing exercise conducted by BBL in 1999 to locate sediment depositional areas and have been sampled during each of the previous sampling events. These locations (shown on Figure 1) are identified below. Based on the January 27, 2014 comment letter from USEPA, surficial sediment samples and sediment trap samples were only collected at one location in 2018 while fish were collected at all five of the historical sample locations.

- Location 1: Upstream (east) of the Site, in White Creek, near historical sample location SS-1. Fish only.
- Location 2: Adjacent to and northeast of the Site, in White Creek, in the vicinity of Phase 2 SPRDS sample location White 11A. Fish only.
- Location 3: Adjacent to and north of the Site, in White Creek, approximately 50 feet downstream of historical sample location SS-3. Fish and sediment.
- Location 4: North of the Site in White Creek, in the vicinity of Phase 2 SPRDS sample location White 12B. Fish and sediment trap.
- Location 5: Downstream (northwest) of the Site, and downstream of the confluence of White and Wine Creeks, in the vicinity of historical sample location SS-4A. Fish only.

3.1.2 Sediment Sampling

Arcadis conducted the sediment sampling from Location 3 on May 17, 2018. Similar to past collection events the surficial sediment sample was collected from 0 to 3 inches using a stainless-steel corer. The corer was pushed into the sediment and slowly pulled out. The top three inches of the sediment cores were extracted from the stainless-steel tube onto an aluminum pan using a brass push rod. The sediment sample was homogenized and placed in an appropriate sample jar for shipment to the laboratory in accordance with procedures identified in the Plan.

3.1.3 Sediment Traps

Arcadis placed a sediment trap at Location 4 on May 17, 2018. The sediment trap consisted of pre-cleaned sample jars placed in a stainless steel pan. The trap was placed on the bottom in a pool at the historical sediment location and allowed to collect sediment for several weeks. The sediment sample from the trap was retrieved by Arcadis on August 23, 2018 and placed in an

appropriate sampling jar for shipment to the laboratory in accordance with the procedures identified in the Plan.

3.1.4 Fish Sampling

Arcadis conducted the electrofishing of White and Wine Creeks on May 16, 2018. The objective of the electrofishing, as identified in the Plan, was to collect three composite fish samples from each location. The target species were creek chub (*Semotilus atromaculatus*) and stickleback (*Culaea inconstans*, *Gasterosteus aculeatus*).

The fish sampling was conducted using a Smith-Root model LR 20-B backpack electrofishing unit. Following collection, the appropriate target fish were placed in labeled Ziploc®-type bags and stored on ice prior to sample processing. Sample processing included dividing the fish into three composite samples per location and recording the number of individuals per sample, length range, and total sample weight. The samples were then wrapped and shipped to the analytical laboratory, in accordance with the procedures detailed in the Plan.

3.1.5 Laboratory Analyses

Laboratory analyses of sediment and sediment trap samples included PCBs and total organic carbon (TOC) in accordance with the requirements in the Plan. The analyses were performed by Columbia Analytical Services, Inc. [now ALS Environmental] (Rochester, New York). The analytical method for PCBs was USEPA SW-846 Method 8082 (USEPA, 1986) [as referenced in the current NYSDEC Analytical Services Protocol (ASP)], and for TOC was USEPA Region 2's Lloyd Kahn Method (USEPA, 1988).

The fish samples were analyzed by Pace Analytical Services, Inc. (Green Bay, Wisconsin) for PCBs using USEPA SW-846 Method 8082, as referenced in the current NYSDEC ASP, and for percent lipids using standard gravimetric techniques.

3.2 2018 PCB Results

This section presents the results from the most recent round of the long-term PCB monitoring program. Figure 2 presents the trends (arithmetic means) in PCB data collected at each location.

3.2.1 Sediment Sampling Results

Analytical results for the surficial sediment sample collected at Location 3 are presented in Table 1. PCBs were detected in the surficial sediment sample at a concentration of 0.56 mg/kg. The TOC concentration in the sediment sample was 28,400 mg/kg (2.84%).

3.2.2 Sediment Trap Sampling Results

Analytical results for the sediment trap sample collected at Location 4 are presented in Table 2. PCBs were detected in the sediment trap sample at a concentration of 0.86 J mg/kg. The TOC concentration in the sediment trap sample was 55,900 mg/kg (5.59%).

3.2.3 Fish Sampling Results

Whole-body composite fish tissue samples (creek chub or brook stickleback) were collected from each of the five sampling locations. Three samples were collected from each location for a total of 15 composite fish samples (14 creek chub samples and one brook stickleback sample).

Analytical results for the fish tissue samples are presented in Table 3. PCBs were detected in each of the fish samples (including those from the upstream location). Total PCB concentrations in creek chubs ranged from 0.29 mg/kg (Location 2) to 1.50 mg/kg (Location 4). PCBs were detected in the one brook stickleback sample from Location 2 at a concentration of 0.46 mg/kg. The arithmetic mean total PCB concentration for all of the fish samples collected in 2018 is 0.61 mg/kg.

3.2.4 Discussion

The PCB data collected in 2018 represent the fifteenth round of long-term monitoring data. Summaries of the data from all long-term monitoring events are provided in Table 4 (surficial sediment), Table 5 (sediment trap), and Table 6 (fish). The data are also summarized in Figure 2.

Surficial Sediment

A single sediment sample was collected at Location 3 in 2018 so a spatial comparison between locations is not possible. For surficial sediment (Table 4), the 2018 data are generally consistent with previous long-term monitoring results for Location 3. The 2018 result (0.56 mg/kg) is within the range of historical concentrations, and below the general cleanup level of 1 mg/kg. By comparison, historically the maximum detected PCB concentration at Location 3 has been as high as 2.04 mg/kg (in 2007). Overall, the sediment PCB concentrations observed during the 15-year duration of the long-term monitoring program are much lower than those detected during some of the earlier investigations. For example, the maximum detected PCB concentration in OU-4 sediment during the 1996 SPRDS sampling was 11.4 mg/kg.

Sediment Traps

A single sediment trap samples was collected at Location 4 in 2018 so a spatial comparison between locations is not possible. The 2018 result (0.86 mg/kg) is within the historical range of

PCB concentrations from this location and is below the general PCB cleanup level of 1 mg/kg (Table 5). The highest recorded PCB concentration in sediment trap samples at this location is 5.7 mg/kg (in 2006).

Fish

The 2018 fish data summary along with historical ranges and means is presented in Table 6. Mean total PCB concentrations in fish samples in 2018 were highest at Location 4 (0.98 mg/kg) and lowest at Location 1 (0.38 mg/kg). In 2018, the arithmetic mean PCB concentrations for each location were generally similar to the previous sampling event in 2016. The arithmetic mean PCB concentrations at Locations 1 and 3 were some of the lowest observed at these locations during the long-term monitoring program. The overall yearly mean calculated across all samples and locations in 2018 (0.61 mg/kg) was the third lowest observed since the first year of monitoring in 1999. When PCB concentrations were normalized for lipids, the 2018 data are the lowest or close to the lowest values observed during the monitoring at all of the locations. The overall yearly mean of the lipid-normalized PCB concentrations calculated across all locations in 2018 (11.8 mg/kg lipid) was the third lowest observed during the monitoring period.

Overall Trends

The 2018 surficial sediment, sediment trap, and fish tissue data are generally consistent with previous results in that PCB concentrations fluctuate but remain relatively low and appear to be declining. Historically, PCBs in fish have been highest at Locations 3 and 4 (Figure 2). This area of White Creek flows through the marsh area northeast of the landfill and is characterized by slower water velocity and softer sediment deposits. As such, this area likely represents a net depositional area and a possible sink for the relatively low concentrations of PCBs that remain in the system.

Risk Summary

Ecological risks from the Site were previously evaluated in the site-specific ecological risk assessment (ERA) [Appendix B of the *Focused Feasibility Study* (ENVIRON, 1997)]. According to the food web models presented in the site-specific ERA, a fish PCB concentration of 1.0 mg/kg results in a hazard quotient (HQ) for piscivorous wildlife (i.e., mink) of 0.82. In response to USEPA comments received on the 2016 *Annual PCB Long-Term Monitoring Report* (Arcadis, 2017) and to support the 2018 Five-Year Review Report, an updated risk evaluation was included as an addendum to the 2016 *Annual Progress Report* (Arcadis, 2018). This risk evaluation utilized food web models and incorporated dietary modeling estimates using the 2014 and 2016 sediment data (maximum detected concentration = 0.51 mg/kg) and fish tissue data (95% Upper Confidence Limit [UCL] = 0.648 mg/kg), and again concluded low ecological risks to mink and green heron. Additionally, as part of the 2013 Five-Year Review Report, Arcadis (2013c) submitted a risk evaluation addendum using 2010 and 2012 sediment and fish

data. This risk evaluation concluded low ecological risks to mink and green heron, as predicted previously. Similarly, using the 2018 sediment data (maximum detected concentration = 0.56 mg/kg) and fish tissue data (95% UCL = 0.74 mg/kg) concludes similarly low ecological risk.

4. Summary

In 2018, surficial sediment, suspended sediment, and fish were collected as part of the PCB long-term monitoring program for OU4 of the Site. The data collected in 2018 indicate the following:

- PCBs were detected in the only surficial sediment sample collected in 2018 (from Location 3) at a concentration of 0.56 mg/kg, which is below the general cleanup level of 1 mg/kg. Overall, the sediment PCB concentrations remain much lower than those detected during some of the earlier investigations and appear to be declining.

- PCBs were detected in the one sediment trap sample collected in 2018 (from Location 4) at a concentration of 0.86 mg/kg, which is below the site cleanup level of 1 mg/kg and is the third lowest value from this location since 2004.

- PCBs were detected in each of the fish tissue samples, with a maximum concentration of 1.50 mg/kg. In 2018, the arithmetic mean PCB concentrations for each location were lower than the previous sampling event in 2016 (except for Location 2 and 4 which increased slightly). The mean total PCB values for Location 3 (0.53 mg/kg) was the lowest observed during the fifteen years of PCB monitoring for that location.

- Based on the results of a previous site-specific ecological risk assessment (ENVIRON, 1997) that was updated with the most recent PCB data for the site, the 2018 sediment and fish tissue PCB concentrations represent low ecological risk.

Collectively, the 15 years of long-term monitoring data indicate relatively low PCB concentrations in sediment, sediment trap, and fish tissue. Although PCB concentrations are still somewhat variable, they continue to decline.

Fifteen rounds of monitoring (starting in 1999) have been conducted for White and Wine Creeks. Based on the findings of the 2018 sampling and the historic data, Arcadis recommends that the long-term monitoring program continues as follows:

- Collect two more rounds of fish tissue samples from each of the five locations. PCBs in fish tissue typically represents the highest exposure potential and the primary medium of concern for PCBs in aquatic systems. Repeating the sampling again in 2020 and 2022 will provide two additional years of fish tissue data to characterize potential ecological risk and evaluate overall protectiveness at the site during the next five-year review (scheduled for 2023).

- Discontinue sediment and sediment trap sampling. The most recent data indicate that both sediment and sediment trap PCB concentrations are below the general sediment cleanup value of 1 mg/kg. Additionally, sediment (and mobile material from sediment traps) are less important media for PCB exposure compared to fish.

5. References

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USEPA. 2014. Letter from Patricia Simmons Pierre of USEPA to Mr. David Rigg of ARCADIS regarding Modifications of Periodic Sediment Monitoring Requirements at the *Pollution Abatement Services Superfund Site Operable Unit 4, Oswego, New York.* January 27, 2014

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USEPA. 2019. *Five-Year Review Report. Pollution Abatement Services Superfund Site, City of Oswego, Oswego County, New York*. February 13, 2019.

TABLES

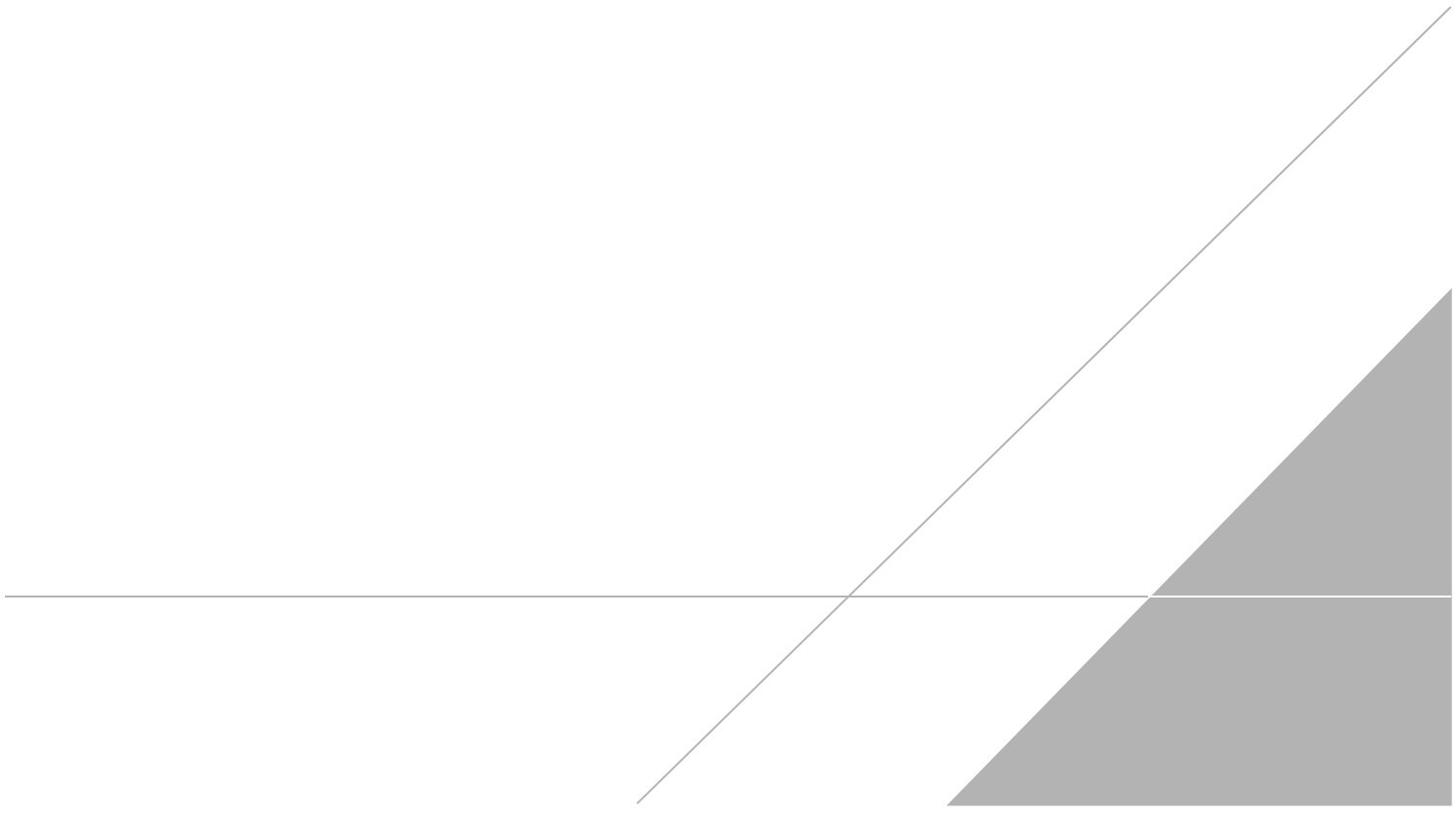


Table 1
Surficial Sediment Sample Results for PCBs and TOC (2018)
Pollution Abatement Services Superfund Site
Operable Unit 4
Oswego, New York
PCB Long-Term Monitoring Program Report

Location	Sample Identification	Total PCB Concentration (mg/kg)	TOC (mg/kg)
3	PAS-SS-301	0.56	28,400

Notes:
1. The sample was collected by Arcadis on May, 17 2018.
2. The sample was analyzed for PCBs using USEPA SW-846 Method 8082 and for total organic carbon (TOC) using USEPA Region 2 Lloyd Kahn Method.
3. The sediment sample was collected from the 0- to 3-inch interval.
4. Total PCB concentrations represent total Aroclors.

Table 2
Sediment Trap Results for PCBs and TOC (2018)
Pollution Abatement Services Superfund Site
Operable Unit 4
Oswego, New York
PCB Long-Term Monitoring Program Report

Location	Sample Identification	Total PCB Concentration (mg/kg)	TOC (mg/kg)
4	PAS-ST-401	0.86 J	55,900

Notes:
1. A sediment trap was placed by Arcadis on May 17, 2018 and retrieved on August 23, 2018.
2. The sample was analyzed for PCBs using USEPA SW-846 Method 8082 and for total organic carbon (TOC) using USEPA Region 2 Lloyd Kahn Method.
3. J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.
4. Total PCB concentrations represent total Aroclors.

Table 3
Fish Tissue Results for PCBs and Percent Lipids (2018)
Pollution Abatement Services Superfund Site
Operable Unit 4
Oswego, New York
PCB Long-Term Monitoring Program Report

Sample Identification	Species	No. of Individuals per Sample	Length Range (cm)	Total Sample Weight (g)	Lipid (%)	Total PCB Concentration (mg/kg)	Lipid-Normalized PCB Concentration (mg/kg-lipid)
Location 1							
PAS-BS-143	Creek chub	3	9.4-10.2	41	4.3	0.35	8.1
PAS-BS-144	Creek chub	4	5.4-6.3	12.5	6.5	0.36	5.6
PAS-BS-145	Creek chub	7	5.0-5.4	12.3	5.8	0.44	7.6
Location 2							
PAS-BS-240	Brook Stickleback	7	4.3-6.3	8.8	4.1	0.46	11.3
PAS-BS-241	Creek chub	5	5.8-6.6	13.4	6.7	0.89	13.3
PAS-BS-242	Creek chub	2	9.8-10.2	26.3	2.6	0.29	11.3
Location 3							
PAS-BS-339	Creek chub	9	5.0-5.6	14.5	5.1	0.59	11.6
PAS-BS-340	Creek chub	4	9.9-10.5	62.5	4.2	0.53	12.6
PAS-BS-341	Creek chub	5	9.7-9.9	61.6	5.0	0.46	9.2
Location 4							
PAS-BS-437	Creek chub	2	8.3-9.7	19.4	5.8	1.50	25.8
PAS-BS-438	Creek chub	8	6.1-6.6	25.4	5.4	0.73	13.5
PAS-BS-439	Creek chub	9	5.3-5.8	20.7	5.5	0.71	12.8
Location 5							
PAS-BS-543	Creek chub	5	8.6-10.3	53.1	5.2	0.55	10.6
PAS-BS-544	Creek chub	7	5.6-7.0	21.1	5.9	0.61	10.4
PAS-BS-545	Creek chub	5	10.3-10.7	67.7	4.8	0.62	12.9

Notes:
1. Samples were collected by Arcadis on May 16, 2018.
2. Samples were analyzed for PCBs using the USEPA SW-846 Method 8020 and for percent lipids using gravimetric techniques.
3. Total PCB concentrations represent total Aroclors.

Table 4
Summary of Historic Surficial Sediment PCB Concentrations
Pollution Abatement Services Superfund Site
Operable Unit 4
Oswego, New York
PCB Long-Term Monitoring Program Report

Year	Total PCB Concentration (mg/kg)				
	Location 1	Location 2	Location 3	Location 4	Location 5
	PAS-SS-101	PAS-SS-201	PAS-SS-301	PAS-SS-401	PAS-SS-501
1999	ND (0.020)	ND (0.030)	ND (0.030)	0.17 J	ND (0.03)
2000	ND (0.021)	0.015 J [0.013 J]	ND (0.042)	0.014 J	ND (0.024)
2001	ND (0.022)	0.042 [0.047]	1.8	0.090	0.034
2002	ND (0.41)	ND (0.052)	0.50	3.1 D	ND (0.049) [ND (0.050)]
2003	ND (0.044)	0.072	0.040 J	0.45	0.21 J [0.047 J]
2004	ND (0.084)	0.054 J	0.30	0.076 J [0.085 J]	0.085 J
2005	ND (0.085)	ND (0.096)	ND (0.080)	ND (0.089) [0.6 J]	0.39
2006	ND (0.10)	0.26	0.70	1.53 [1.76]	0.20
2007	ND (0.087)	ND (0.12)	2.04 J [0.40 J]	0.14	0.23
2008	ND (0.042)	0.14	1.11 [1.41]	0.49	0.25
2010	ND (0.043)	0.137 J	1.07 J	0.639 J [0.509]	0.24 J
2012	ND (0.042)	0.039 J	1.13 J	0.543 J	0.40 UJ [0.27 J]
2014	NA	NA	0.51	NA	NA
2016	NA	NA	0.16	NA	NA
2018	NA	NA	0.56	NA	NA

Notes:
1. ND = Not detected. Each PCB Aroclor was not detected above the laboratory quantitation limit shown in parentheses.
2. NA = Not Applicable. Per the January 27, 2014 comment letter from USEPA, a sediment sample was only collected from Location SS-301 in 2014 and beyond.
3. Duplicate results in brackets.
4. J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.
5. Sediment samples were collected from the 0- to 3-inch interval.
6. Total PCB concentrations represent total Aroclors.
7. D = Concentration is based on a diluted sample analysis.
8. UJ = The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

Table 5
Summary of Historic Sediment Trap PCB Concentrations
Pollution Abatement Services Superfund Site
Operable Unit 4
Oswego, New York
PCB Long-Term Monitoring Program Report

Year	Total PCB Concentration (mg/kg)				
	Location 1	Location 2	Location 3	Location 4	Location 5
	PAS-ST-101	PAS-ST-201	PAS-ST-301	PAS-ST-401	PAS-ST-501
1999	ND (0.080)	0.53	1.2 [1.2]	0.86	0.06
2000	ND (0.033)	0.25	0.62	1.1	0.42 [0.48]
2001	ND (0.12)	0.30 [0.25]	0.42	1.4	0.081
2002	ND (0.15)	0.81 [0.50]	ND (0.17)	0.96	0.19
2003	ND (0.14)	0.32	0.059 J	0.32 J	0.25 J [0.33]
2004	ND (1.0)	0.40 J	0.40 J	1.7 J [1.0 J]	0.40 J
2005	ND (0.073)	0.63 J	1.05 J	1.66 [1.68 J]	1.04 JN
2006	ND (0.38)	0.34	0.39	5.7	0.86 [0.53]
2007	ND (0.44)	0.32	0.49	1.29 [1.30]	0.30
2008	0.090	0.42	0.65	3.60 [5.19]	1.27
2010	0.059 J	1.08 J	0.95 J	2.76 J [3.90 J]	0.40 J
2012	ND (0.18)	0.36 UJ	ND (0.15)	0.38 J [0.67 J]	0.11 UJ
2014	NA	NA	NA	0.54 J	NA
2016	NA	NA	NA	1.08	NA
2018	NA	NA	NA	0.86 J	NA

Notes:
1. ND = Not detected. Each PCB Aroclor was not detected above the laboratory quantitation limit shown in parentheses.
2. NA = Not Applicable. Per the January 27, 2014 comment letter from USEPA, a sediment sample was only collected from one location in 2014 and b
3. Duplicate results in brackets.
4. J = The compound was positively identified; however, the associated numerical value is an estimated concentration only.
5. Total PCB concentrations represent total Aroclors.
6. N = The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
7. UJ = The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

Table 6
Summary of Historic Fish Tissue PCB Concentrations
Pollution Abatement Services Superfund Site
Operable Unit 4
Oswego, New York
PCB Long-Term Monitoring Program Report

Year	Total PCB Concentration (mg/kg)										
	Location 1		Location 2		Location 3		Location 4		Location 5		
	Range	Arithmetic Mean	Range	Arithmetic Mean	Range	Arithmetic Mean	Range	Arithmetic Mean	Range	Arithmetic Mean	Yearly Mean
1999	0.43 - 0.47	0.46	no data	NA	no data	NA	no data	NA	0.33 - 0.52	0.40	0.43
2000	1.10 - 1.50	1.30	2.80 - 3.60	3.23	3.00 - 3.90	3.30	2.70 - 3.30	3.00	0.72 - 0.81	0.77	2.32
2001	1.10 - 1.70	1.40	2.20 - 2.40	2.27	2.40 - 2.80	2.57	2.50 - 3.40	2.90	0.74 - 1.40	1.04	2.02
2002	0.32 - 0.55	0.46	0.87 - 1.30	1.09	0.84 - 1.00	0.93	0.93 - 1.70	1.28	0.67 - 0.96	0.79	0.91
2003	0.098 - 0.26	0.18	0.30 - 0.46	0.38	0.41 - 0.72	0.60	0.25 - 1.20	0.80	0.70 - 2.00	1.33	0.66
2004	0.45 - 0.96	0.65	0.91 - 1.80	1.37	0.99 - 2.80	1.63	1.30 - 1.70	1.50	1.10 - 1.30	1.20	1.27
2005	0.21 - 1.00	0.59	0.74 - 1.70	1.22	0.72 - 0.96	0.82	1.70 - 1.80	1.74	0.45 - 1.49	1.07	1.09
2006	0.37 - 0.54	0.48	0.47 - 0.64	0.53	0.74 - 0.93	0.84	1.28 - 1.50	1.39	0.56 - 0.79	0.70	0.78
2007	0.62 - 0.88	0.79	1.30 - 1.40	1.37	1.00 - 1.20	1.10	1.90 - 1.90	1.90	1.40 - 1.60	1.50	1.24
2008	0.52 - 0.68	0.61	0.93 - 1.10	1.01	0.82 - 1.10	0.97	1.90 - 2.20	2.05	0.54 - 1.00	0.78	1.01
2010	0.53 - 0.93	0.78	1.01 - 1.47	1.30	1.46 - 1.80	1.68	2.14 - 4.09	3.12	1.55 - 2.13	1.76	1.63
2012	0.54 - 0.77	0.67	0.68 - 1.05	0.88	0.64 - 0.85	0.76	2.26 - 2.91	2.62	0.75 - 0.98	0.88	1.16
2014	0.48 - 0.51	0.49	0.83 - 0.92	0.87	0.65 - 1.05	0.86	0.25 - 0.68	0.53	0.13 - 0.33	0.23	0.59
2016	0.35 - 0.57	0.46	0.27 - 0.57	0.39	0.19 - 0.90	0.64	0.48 - 0.82	0.63	0.62 - 0.66	0.64	0.55
2018	0.35 - 0.44	0.38	0.29 - 0.89	0.55	0.46 - 0.59	0.53	0.71 - 1.50	0.98	0.55 - 0.62	0.60	0.61

Year	Lipid-Normalized PCB Concentration (mg/kg-lipid)										
	Location 1		Location 2		Location 3		Location 4		Location 5		
	Range	Arithmetic Mean	Range	Arithmetic Mean	Range	Arithmetic Mean	Range	Arithmetic Mean	Range	Arithmetic Mean	Yearly Mean
1999	8.72 - 10.7	9.82	no data	NA	no data	NA	no data	NA	7.0 - 11	8.50	9.08
2000	24.3 - 33.6	29.6	76.7 - 88.2	83.4	67.7 - 86.7	76.8	83.9 - 90.2	86.2	14 - 16	14.7	58.1
2001	23.8 - 30.7	27.0	42.5 - 50.0	46.9	56.1 - 68.3	61.5	47.8 - 73.3	62.4	11 - 17	13.8	42.3
2002	9.04 - 13.0	10.4	12.1 - 44.1	26.5	17.1 - 30.3	23.5	22.3 - 22.7	22.5	8.3 - 15	10.8	18.7
2003	2.97 - 10.7	6.13	10.9 - 44.3	26.2	23.2 - 41.6	30.2	8.33 - 14.9	12.3	11 - 30	19.6	18.9
2004	18.6 - 35.4	27.3	20.5 - 38.0	31.2	29.5 - 83.8	56.5	25.9 - 48.0	33.9	17 - 20	18.5	33.5
2005	9.50 - 25.1	15.7	34.9 - 45.9	41.9	28.4 - 54.1	40.2	56.1 - 113.3	86.2	17 - 27	22.9	41.4
2006	6.93 - 10.2	8.39	16.3 - 31.0	25.0	19.8 - 21.2	20.5	22.0 - 28.2	25.6	9.3 - 56	11.4	18.0
2007	11.6 - 15.0	13.8	26.5 - 33.1	29.9	21.6 - 29.5	26.6	48.5 - 48.5	48.5	17 - 19	18.3	23.8
2008	11.5 - 15.3	12.9	9.55 - 25.5	18.3	10.8 - 21.6	16.1	55.0 - 56.2	55.6	10 - 14	11.8	20.6
2010	9.52 - 17.4	14.3	20.2 - 21.3	20.9	23.4 - 29.1	26.4	45.5 - 87.0	66.3	27 - 34	31.2	29.4
2012	9.70 - 12.7	11.0	13.3 - 21.6	18.5	13.3 - 16.1	14.5	42.6 - 67.0	57.2	11 - 17	14.5	23.1
2014	6.99 - 10.7	8.47	9.90 - 15.1	12.3	9.94 - 16.4	14.2	8.68 - 11.8	10.6	2 - 7	4.00	9.91
2016	6.90 - 7.59	7.28	4.62 - 11.5	8.52	3.13 - 13.5	9.94	6.53 - 11.1	8.77	9.8 - 10.0	9.90	8.88
2018	5.60 - 8.06	7.10	11.3 - 13.3	12.0	9.16 - 12.6	11.1	12.8 - 25.8	17.4	10.4 - 12.9	11.3	11.8

Notes:
1. ND = Not detected. Each PCB Aroclor was not detected above the laboratory quantitation limit shown in parentheses.
2. Total PCB concentrations represent total Aroclors.
3. NA = Not Available. Fish tissue samples were not collected from this location during this event.
4. Yearly mean is the arithmetic mean of all samples collected for that year.

FIGURES

LEGEND:

- APPROXIMATE LONG-TERM MONITORING FISH SAMPLING LOCATION
- APPROXIMATE LONG-TERM MONITORING SEDIMENT SAMPLING LOCATION
- APPROXIMATE PREVIOUS SEDIMENT SAMPLING LOCATION
- APPROXIMATE STREAM GAUGE LOCATION
- APPROXIMATE SPRDS PHASE II SEDIMENT SAMPLING LOCATION
- FENCE (SITE BOUNDARY)
- SLURRY WALL
- APPROXIMATE LOCATION OF SUBSURFACE LEACHATE COLLECTION TRENCH
- LAND AREAS SUBJECT TO FREQUENT, SHALLOW INUNDATION
- WETLAND AREAS DELINEATED BY MENZIE-CURA & ASSOCIATES, INC. (AUGUST 1992)
- REACH BOUNDARY

NOTES:

1. BASE MAP ADAPTED FROM TOPOGRAPHIC MAP DEVELOPED BY LOCKWOOD MAPPING, INC. BASED ON AN APRIL 14, 1993 AERIAL PHOTOGRAPH; SOME WELL AND STREAM-GAUGE LOCATIONS ARE INFERRED; LOCATION OF SLURRY WALL BASED ON SITE PLAN DRAWN BY DUNN GEOSCIENCE CORP. (DEC. 1984), TITLED "BORING, WELL & TEST PIT PLOT PLAN;" LOCATION OF SUBSURFACE LEACHATE-RECOVERY TRENCHES BASED ON SITE MAP PROVIDED BY O'BRIEN & GERE ENGINEERING INC.
2. SURFACE WATER IS SHOWN IN BLUE; AREAS SHADED GREEN REPRESENT WETLAND AREAS DELINEATED BY MENZIE-CURA & ASSOCIATES, INC. (AUGUST 1992).
3. BOUNDARIES FOR REACH 10 AND REACH 12, AS WELL AS SPRDS PHASE II SAMPLING LOCATIONS WERE PRESENTED IN THE FINAL FOCUSED FEASIBILITY STUDY FOR PCB-IMPACTED SEDIMENTS IN THE VICINITY OF THE PAS SUPERFUND SITE, OSWEGO, NEW YORK (ENVIRON, AUGUST 20, 1997).

0 200' 400'

GRAPHIC SCALE

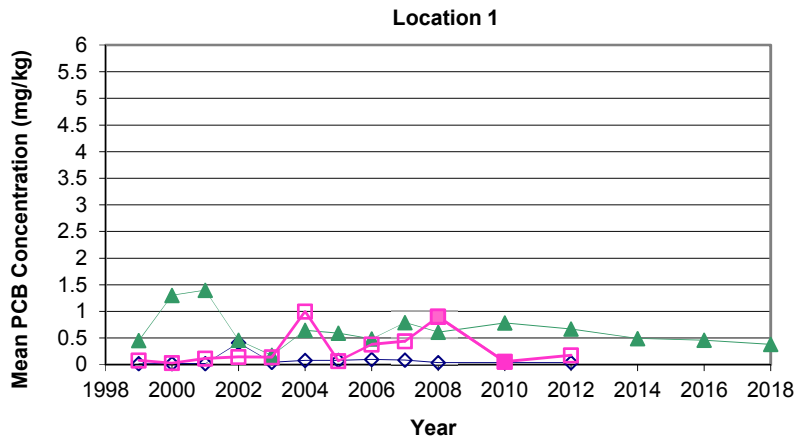
POLLUTION ABATEMENT SERVICES SITE
OSWEGO, NEW YORK

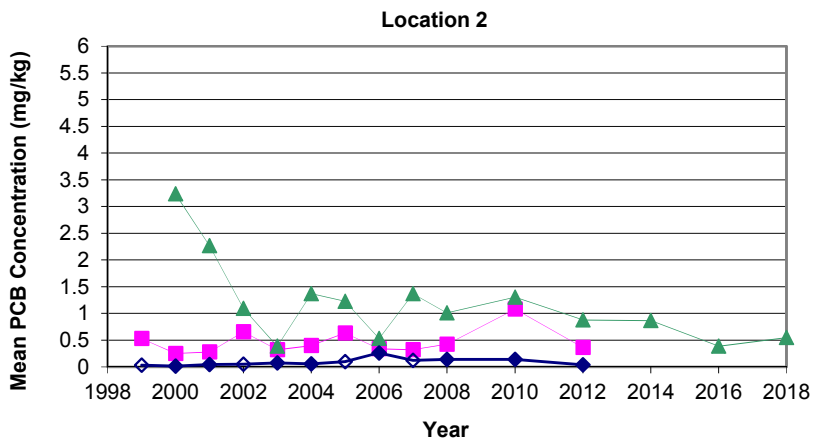
PCB LONG-TERM MONITORING DATA REPORT

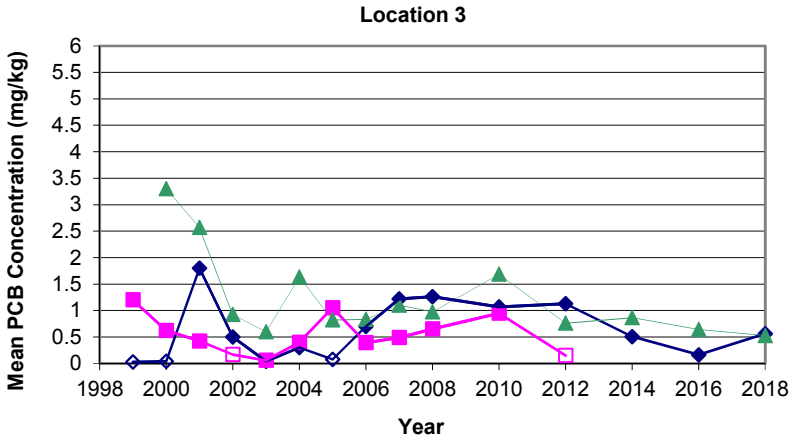
SAMPLE LOCATION MAP

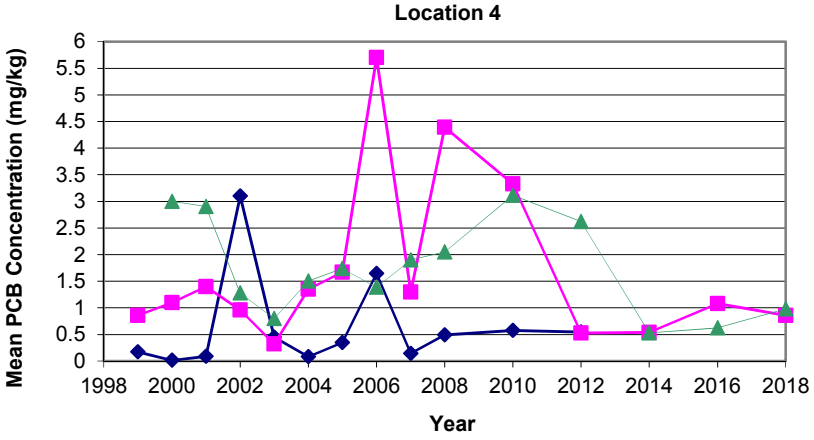
ARCADIS Design & Consultancy for natural and built assets

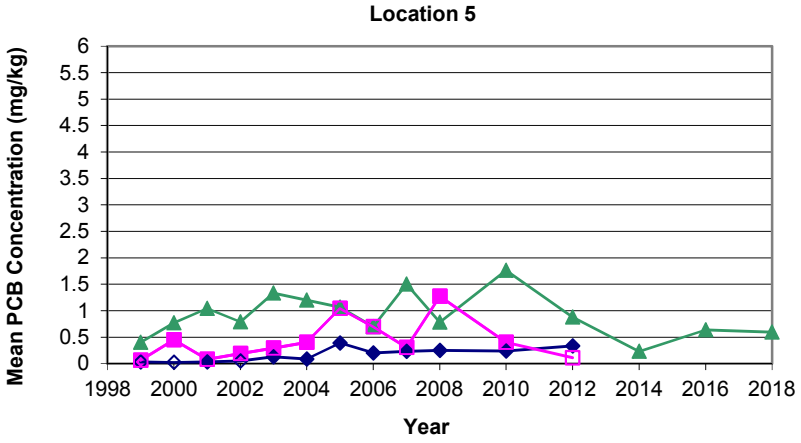
FIGURE 1











Legend:

- Surface Sediment (Detected)
- Surface Sediment (Not Detected)
- Sediment Trap (Detected)
- Sediment Trap (Not Detected)
- Fish Tissue (Arithmetic Mean)

Notes:

1. Locations with observations of all non-detects utilize the sample specific reporting limit to derive an arithmetic mean value.
2. Parent and duplicate sample results are presented as a single value for each location.

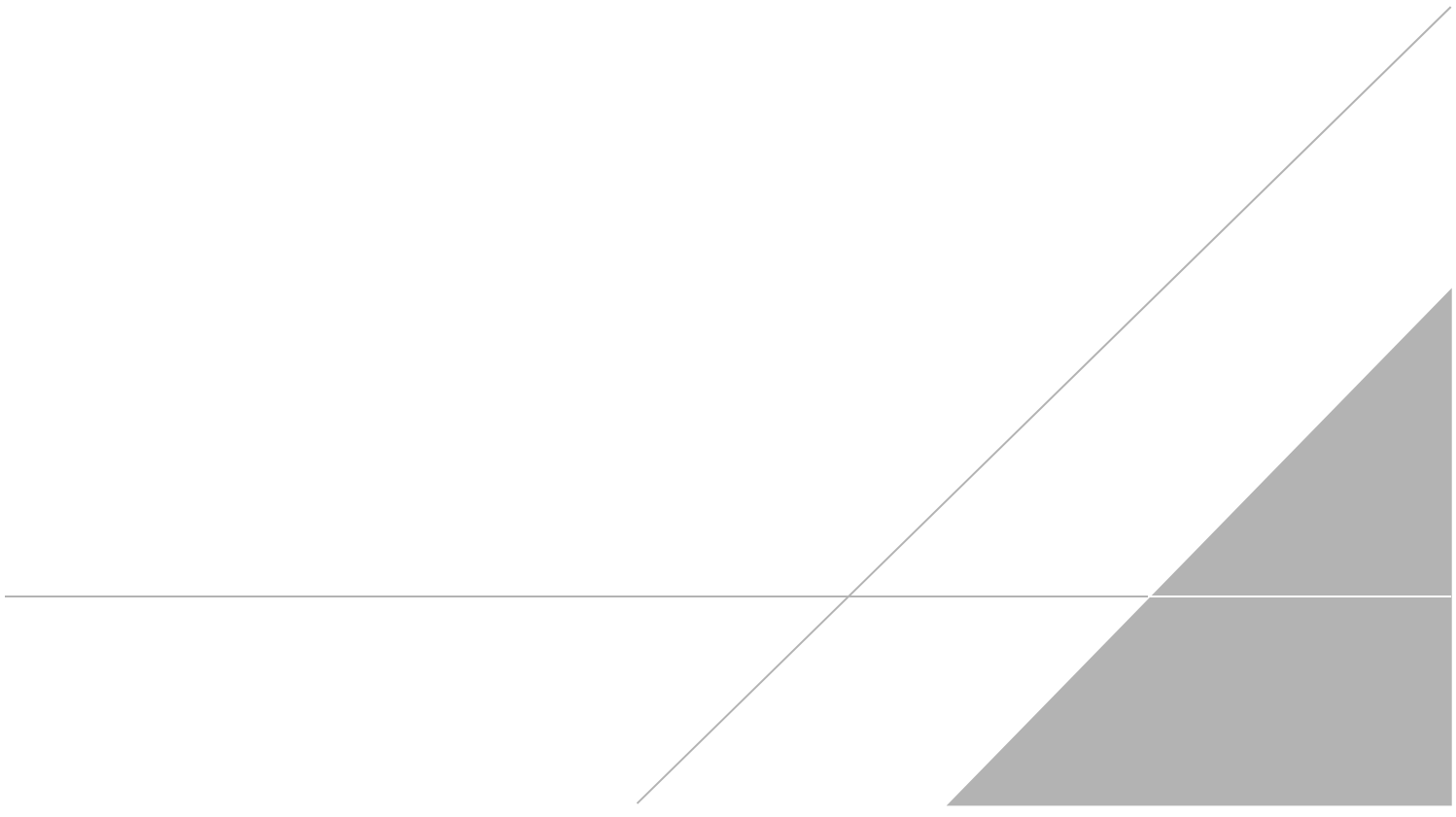
POLLUTION ABATEMENT SERVICES SITE
OSWEGO, NEW YORK
ANNUAL PCB LONG-TERM MONITORING REPORT

PCB DATA SUMMARY

ARCADIS

FIGURE
2

DATA USABILITY SUMMARY REPORTS



ARCADIS Design & Consultancy for natural and built assets

National Grid – Oswego

Oswego, New York

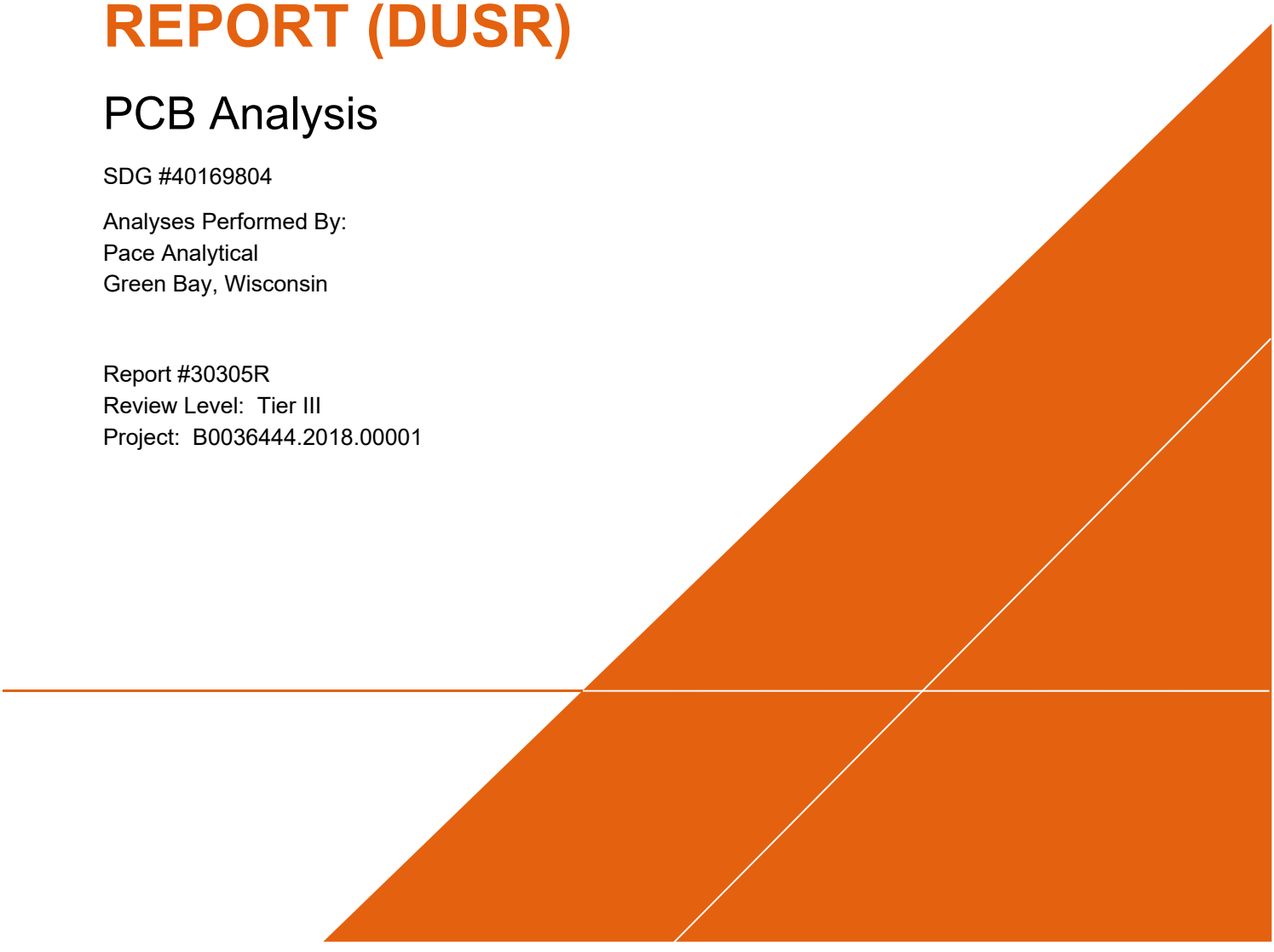
DATA USABILITY SUMMARY REPORT (DUSR)

PCB Analysis

SDG #40169804

Analyses Performed By:
Pace Analytical
Green Bay, Wisconsin

Report #30305R
Review Level: Tier III
Project: B0036444.2018.00001



SUMMARY

This Data Usability Summary Report summarizes the review of Sample Delivery Group (SDG) #40169804 for samples collected in association with the National Grid - Oswego Site. In addition to the Tier III evaluation, a review of data package completeness, evaluation of the chains of custody (COC), and qualification of annotated sample result sheets were performed. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. The following samples were analyzed:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	PCB	TOC
PAS-BS-143	40169804001	Tissue	5/16/2018		X	
PAS-BS-144	40169804002	Tissue	5/16/2018		X	
PAS-BS-145	40169804003	Tissue	5/16/2018		X	
PAS-BS-240	40169804004	Tissue	5/16/2018		X	
PAS-BS-241	40169804005	Tissue	5/16/2018		X	
PAS-BS-242	40169804006	Tissue	5/16/2018		X	
PAS-BS-339	40169804007	Tissue	5/16/2018		X	
PAS-BS-340	40169804008	Tissue	5/16/2018		X	
PAS-BS-341	40169804009	Tissue	5/16/2018		X	
PAS-BS-437	40169804010	Tissue	5/16/2018		X	
PAS-BS-438	40169804011	Tissue	5/16/2018		X	
PAS-BS-439	40169804012	Tissue	5/16/2018		X	
PAS-BS-543	40169804013	Tissue	5/16/2018		X	
PAS-BS-544	40169804014	Tissue	5/16/2018		X	
PAS-BS-545	40169804015	Tissue	5/16/2018		X	

Notes:
PCB = Polychlorinated biphenyl

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of Quality Assurance (QA) or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

DATA USABILITY SUMMARY REPORT

ORGANIC ANALYSIS INTRODUCTION

Samples were analyzed according to U.S. Environmental Protection Agency (EPA) SW 846 Method 8082, as referenced in the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP) (NYSDEC 2005). Data were reviewed in accordance with EPA Region II guidelines (EPA standard operating procedure [SOP] HW-45 Revision 1, October 2006).

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

  U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

POLYCHLORINATED BIPHENYLS (PCBs) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
SW-846 8082	Soil/Tissue	14 days from collection to extraction and 40 days from extraction to analysis	Cool to <6 °C

Note:
< = less than
°C = degrees Celsius

The holding time above is a recommendation. PCBs are very stable in a variety of matrices, and holding times, under the conditions listed above, may be as long as a year per SW-846 8082A (February 2007).

All samples were stored frozen (< -10°C) until time of extraction. All samples were analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the MDL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Instrument Performance

Instrumentation performance is verified by evaluating the chromatographic resolution of standards/surrogates as well as reviewing the chromatographic baseline. At the beginning of each 12-hour period during which samples or standards are analyzed, the retention time (RT) windows are verified for the identification of target compounds.

The instrument performance and column resolution were acceptable.

4. Calibration

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

4.1 Initial Calibration

A maximum RSD of 20% is allowed or a correlation coefficient greater than 0.99. Multiple-point calibrations were performed for Aroclor 1016, 1242, 1248, 1254, and 1260 only. Single-point calibrations were performed for the remaining Aroclors.

4.2 Continuing Calibration

All target compounds associated with the continuing calibration standard must exhibit a percent difference (%D) less than the control limit (20%).

All Aroclors associated with calibrations were within the specified control limits.

5. Surrogates/System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. PCB analysis requires that one of the two PCB surrogate compounds exhibit recoveries within the laboratory-established acceptance limits.

All surrogate recoveries reported from the primary column were within control limits.

6. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

The MS/MSD analysis was not performed on a sample location within this SDG.

7. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS analysis exhibited recoveries within the control limits.

8. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 50% for tissue matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of three times the RL is applied for tissue matrices.

A field duplicate was not performed on a sample within this SDG.

9. Compound Identification

The retention times of all quantitated peaks must fall within the calculated retention time windows for both the primary and confirmation columns. When dual column analysis is performed the relative percent difference (%RPD) of detected sample results must be less than 25%.

The second column was used for conformational purposes only.

10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PCBs

PCBs; SW-846 8082	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY (GC/ECD)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Rinse/Equipment blanks	X				X
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R		X		X	
LCS/LCSD Precision (RPD)		X		X	
Matrix Spike (MS) %R	X				X
Matrix Spike Duplicate(MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Field/Lab Duplicate (RPD)	X				X
Surrogate Spike Recoveries		X		X	
Column (RPD) (If dual column is performed-not confirmation purposes only)	X				X
Dilution Factor		X		X	
Moisture Content		X		X	
Tier III Validation					
Initial calibration %RSDs		X		X	
Continuing calibration %Ds		X		X	
System performance and column resolution		X		X	
Compound identification and quantitation					
A. Quantitation Reports		X		X	
B. RT of sample compounds within the established RT windows		X		X	
C. Pattern identification		X		X	
D. Transcription/calculation errors present		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:

1. %D = Percent difference
2. %R = Percent recovery
3. %RSD = Relative standard deviation
4. GC/FID = Gas chromatography
5. LCS = Laboratory control sample
6. LCSD = Laboratory control sample duplicate
7. MS = Matrix spike
8. MSD = Matrix spike duplicate
9. PCB = Polychlorinated biphenyl
10. RPD = Relative percent difference
11. RT = Retention time

SAMPLE COMPLIANCE REPORT

Sample Delivery Group (SDG)	Sampling Date	Protocol	Sample ID	Matrix	Compliancy[1]					Noncompliance
					VOC	SVOC	PCB	MET	MISC	
40169804	5/16/2018	USEPA/SW846	PAS-BS-143	Tissue	--	--	yes	--	--	
	5/16/2018	USEPA/SW846	PAS-BS-144	Tissue	--	--	yes	--	--	
	5/16/2018	USEPA/SW846	PAS-BS-145	Tissue	--	--	yes	--	--	
	5/16/2018	USEPA/SW846	PAS-BS-240	Tissue	--	--	yes	--	--	
	5/16/2018	USEPA/SW846	PAS-BS-241	Tissue	--	--	yes	--	--	
	5/16/2018	USEPA/SW846	PAS-BS-242	Tissue	--	--	yes	--	--	
	5/16/2018	USEPA/SW846	PAS-BS-339	Tissue	--	--	yes	--	--	
	5/16/2018	USEPA/SW846	PAS-BS-340	Tissue	--	--	yes	--	--	
	5/16/2018	USEPA/SW846	PAS-BS-341	Tissue	--	--	yes	--	--	
	5/16/2018	USEPA/SW846	PAS-BS-437	Tissue	--	--	yes	--	--	
	5/16/2018	USEPA/SW846	PAS-BS-438	Tissue	--	--	yes	--	--	
	5/16/2018	USEPA/SW846	PAS-BS-439	Tissue	--	--	yes	--	--	
	5/16/2018	USEPA/SW846	PAS-BS-543	Tissue	--	--	yes	--	--	
	5/16/2018	USEPA/SW846	PAS-BS-544	Tissue	--	--	yes	--	--	
	5/16/2018	USEPA/SW846	PAS-BS-545	Tissue	--	--	yes	--	--	

Note:

1 Samples which are compliant with no added validation qualifiers are listed as "yes". Samples which are non-compliant or which have added qualifiers are listed as "no". A "no" designation does not necessarily indicate that the data have been rejected or are otherwise unusable.

VALIDATION PERFORMED BY: Todd Church

SIGNATURE: 

DATE: August 7, 2018

PEER REVIEW: Dennis Capria

DATE: August 21, 2018

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS

ARCADIS
Infrastructure · Water · Environment · Buildings

ID#:

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

Page 1 of 1

40169804
Lab Work Order #

Send Results to:

Contact & Company Name: Matt Frachelton / Arcadis	Telephone: 315.671.9687
Address: 110 West Fayette St. Suite 300	Fax:
City: Syracuse State: NY Zip:	E-mail Address: Matthew.Frachelton@arcadis.com
Project Name/Location (City, State): PAS Fish Sampling	Project #: B00 36444.20KB.00001
Sampler's Printed Name: Matt Frachelton	Sampler's Signature:

Keys

Preservation Key:
A. H_2SO_4
B. HCL
C. HNO_3
D. NaOH
E. None
F. Other: _____
G. Other: _____
H. Other: _____

Container Information Key:
1. 40 ml Vial
2. 1 L Amber
3. 250 ml Plastic
4. 500 ml Plastic
5. Encore
6. 2 oz. Glass
7. 4 oz. Glass
8. 8 oz. Glass
9. Other: Ice/freeze: paper
10. Other: _____

Matrix Key:
SO - Soil
W - Water
T - Tissue
SE - Sediment
SL - Sludge
A - Air
NL - NAPL/Oil
SW - Sample Wipe
Other: _____

Sample ID	Collection Date	Collection Time	Type (✓) Comp	Type (✓) Grab	Matrix	Preservative	Filtered (✓)	# of Containers	Container Information	PCB Aroclors	% Lipids	MS/MSD
						F	-	1/sample	9			
001 PAS-BS-143	5/16/18	1030	X		T					X	X	
002 PAS-BS-144												
003 PAS-BS-145												
004 PAS-BS-240		1200										
005 PAS-BS-241												
006 PAS-BS-242												
007 PAS-BS-339		1255										
008 PAS-BS-340												
009 PAS-BS-341												
010 PAS-BS-437		1400										
011 PAS-BS-438												
012 PAS-BS-439												
013 PAS-BS-543		1445										
014 PAS-BS-544												
015 PAS-BS-545												X

Special Instructions/Comments:

☐ Special QA/QC Instructions(✓):

REMARKS

Please Analyze Wide-bQ-1 composite samples as done previously and in accordance with the 1999 QAPP.

Please call Jason Vogel (315-671-9134) or Matt Frachelton (315.671.9687) with questions

Laboratory Information and Receipt

Lab Name: PACE Analytical	Cooler Custody Seal (✓)
☒ Cooler packed with ice (✓)	☑ Intact ☐ Not Intact
Specify Turnaround Requirements: Standard	Sample Receipt:
Shipping Tracking #:	Condition/Cooler Temp: 5°C

Relinquished By	Received By	Relinquished By	Laboratory Received By
Printed Name: Matt Frachelton	Printed Name:	Printed Name:	Printed Name:
Signature:	Signature:	Signature:	Signature:
Firm: Arcadis	Firm/Courier:	Firm/Courier: Fedex	Firm: Pace
Date/Time: 5/24/18 1300	Date/Time:	Date/Time: 5/25/18 0950	Date/Time: 5/25/18 0950

Distribution: WHITE – Laboratory returns with results YELLOW – Lab copy PINK – Retained by ARCADIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

QUALIFIERS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

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.

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

TNI - The NELAC Institute.

WORKORDER QUALIFIERS

WO: 40169804

[1] Fish stored at <-10 degrees Celsius.

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ANALYTICAL RESULTS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

Sample: PAS-BS-143 **Lab ID: 40169804001** Collected: 05/16/18 10:30 Received: 05/25/18 09:50 Matrix: Tissue

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB, Tissue	Analytical Method: EPA 8082 Preparation Method: EPA 3540								
PCB-1016 (Aroclor 1016)	ND	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 20:43	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 20:43	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 20:43	11141-16-5	
PCB-1242 (Aroclor 1242)	**101**	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 20:43	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 20:43	12672-29-6	
PCB-1254 (Aroclor 1254)	**177**	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 20:43	11097-69-1	
PCB-1260 (Aroclor 1260)	**68.5**	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 20:43	11096-82-5	
PCB, Total	346.5 ~~**347**~~	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 20:43	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	75	%	61-102		1	06/21/18 09:49	06/25/18 20:43	877-09-8	
Decachlorobiphenyl (S)	88	%	60-112		1	06/21/18 09:49	06/25/18 20:43	2051-24-3	
Lipid	Analytical Method: Pace Lipid								
Lipid	**4.3**	%			1		06/25/18 11:50		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

Sample: PAS-BS-144 **Lab ID: 40169804002** Collected: 05/16/18 10:30 Received: 05/25/18 09:50 Matrix: Tissue

Results reported on a "wet-weight" basis

Parameters		Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB, Tissue		Analytical Method: EPA 8082 Preparation Method: EPA 3540								
PCB-1016 (Aroclor 1016)		ND	ug/kg	48.9	24.5	1	06/21/18 09:49	06/25/18 21:01	12674-11-2	
PCB-1221 (Aroclor 1221)		ND	ug/kg	48.9	24.5	1	06/21/18 09:49	06/25/18 21:01	11104-28-2	
PCB-1232 (Aroclor 1232)		ND	ug/kg	48.9	24.5	1	06/21/18 09:49	06/25/18 21:01	11141-16-5	
PCB-1242 (Aroclor 1242)		**138**	ug/kg	48.9	24.5	1	06/21/18 09:49	06/25/18 21:01	53469-21-9	
PCB-1248 (Aroclor 1248)		ND	ug/kg	48.9	24.5	1	06/21/18 09:49	06/25/18 21:01	12672-29-6	
PCB-1254 (Aroclor 1254)		**164**	ug/kg	48.9	24.5	1	06/21/18 09:49	06/25/18 21:01	11097-69-1	
PCB-1260 (Aroclor 1260)		**62.3**	ug/kg	48.9	24.5	1	06/21/18 09:49	06/25/18 21:01	11096-82-5	
PCB, Total	364.3	~~**365**~~	ug/kg	48.9	24.5	1	06/21/18 09:49	06/25/18 21:01	1336-36-3	
Surrogates										
Tetrachloro-m-xylene (S)		76	%	61-102		1	06/21/18 09:49	06/25/18 21:01	877-09-8	
Decachlorobiphenyl (S)		83	%	60-112		1	06/21/18 09:49	06/25/18 21:01	2051-24-3	
Lipid		Analytical Method: Pace Lipid								
Lipid		**6.5**	%			1		06/25/18 11:50		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

Sample: PAS-BS-145 **Lab ID: 40169804003** Collected: 05/16/18 10:30 Received: 05/25/18 09:50 Matrix: Tissue

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB, Tissue	Analytical Method: EPA 8082 Preparation Method: EPA 3540								
PCB-1016 (Aroclor 1016)	ND	ug/kg	51.4	25.7	1	06/21/18 09:49	06/25/18 21:19	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	51.4	25.7	1	06/21/18 09:49	06/25/18 21:19	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	51.4	25.7	1	06/21/18 09:49	06/25/18 21:19	11141-16-5	
PCB-1242 (Aroclor 1242)	**145**	ug/kg	51.4	25.7	1	06/21/18 09:49	06/25/18 21:19	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	51.4	25.7	1	06/21/18 09:49	06/25/18 21:19	12672-29-6	
PCB-1254 (Aroclor 1254)	**221**	ug/kg	51.4	25.7	1	06/21/18 09:49	06/25/18 21:19	11097-69-1	
PCB-1260 (Aroclor 1260)	**77.5**	ug/kg	51.4	25.7	1	06/21/18 09:49	06/25/18 21:19	11096-82-5	
PCB, Total	443.5 ~~**443**~~	ug/kg	51.4	25.7	1	06/21/18 09:49	06/25/18 21:19	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	78	%	61-102		1	06/21/18 09:49	06/25/18 21:19	877-09-8	
Decachlorobiphenyl (S)	83	%	60-112		1	06/21/18 09:49	06/25/18 21:19	2051-24-3	
Lipid	Analytical Method: Pace Lipid								
Lipid	**5.8**	%			1		06/25/18 11:50		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

Sample: PAS-BS-240 **Lab ID: 40169804004** Collected: 05/16/18 12:00 Received: 05/25/18 09:50 Matrix: Tissue

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB, Tissue	Analytical Method: EPA 8082 Preparation Method: EPA 3540								
PCB-1016 (Aroclor 1016)	ND	ug/kg	67.4	33.7	1	06/21/18 09:49	06/25/18 21:37	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	67.4	33.7	1	06/21/18 09:49	06/25/18 21:37	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	67.4	33.7	1	06/21/18 09:49	06/25/18 21:37	11141-16-5	
PCB-1242 (Aroclor 1242)	**152**	ug/kg	67.4	33.7	1	06/21/18 09:49	06/25/18 21:37	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	67.4	33.7	1	06/21/18 09:49	06/25/18 21:37	12672-29-6	
PCB-1254 (Aroclor 1254)	**232**	ug/kg	67.4	33.7	1	06/21/18 09:49	06/25/18 21:37	11097-69-1	
PCB-1260 (Aroclor 1260)	**79.3**	ug/kg	67.4	33.7	1	06/21/18 09:49	06/25/18 21:37	11096-82-5	
PCB, Total	463.3 ~~**463**~~	ug/kg	67.4	33.7	1	06/21/18 09:49	06/25/18 21:37	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	74	%	61-102		1	06/21/18 09:49	06/25/18 21:37	877-09-8	
Decachlorobiphenyl (S)	86	%	60-112		1	06/21/18 09:49	06/25/18 21:37	2051-24-3	
Lipid	Analytical Method: Pace Lipid								
Lipid	**4.1**	%			1		06/25/18 11:50		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

Sample: PAS-BS-241 **Lab ID: 40169804005** Collected: 05/16/18 12:00 Received: 05/25/18 09:50 Matrix: Tissue

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB, Tissue	Analytical Method: EPA 8082 Preparation Method: EPA 3540								
PCB-1016 (Aroclor 1016)	ND	ug/kg	47.7	23.8	1	06/21/18 09:49	06/25/18 21:54	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	47.7	23.8	1	06/21/18 09:49	06/25/18 21:54	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	47.7	23.8	1	06/21/18 09:49	06/25/18 21:54	11141-16-5	
PCB-1242 (Aroclor 1242)	**244**	ug/kg	47.7	23.8	1	06/21/18 09:49	06/25/18 21:54	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	47.7	23.8	1	06/21/18 09:49	06/25/18 21:54	12672-29-6	
PCB-1254 (Aroclor 1254)	**499**	ug/kg	47.7	23.8	1	06/21/18 09:49	06/25/18 21:54	11097-69-1	
PCB-1260 (Aroclor 1260)	**150**	ug/kg	47.7	23.8	1	06/21/18 09:49	06/25/18 21:54	11096-82-5	
PCB, Total	**893**	ug/kg	47.7	23.8	1	06/21/18 09:49	06/25/18 21:54	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	76	%	61-102		1	06/21/18 09:49	06/25/18 21:54	877-09-8	
Decachlorobiphenyl (S)	84	%	60-112		1	06/21/18 09:49	06/25/18 21:54	2051-24-3	
Lipid	Analytical Method: Pace Lipid								
Lipid	**6.7**	%			1		06/25/18 11:50		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

Sample: PAS-BS-242 **Lab ID: 40169804006** Collected: 05/16/18 12:00 Received: 05/25/18 09:50 Matrix: Tissue

Results reported on a "wet-weight" basis

Parameters		Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB, Tissue		Analytical Method: EPA 8082 Preparation Method: EPA 3540								
PCB-1016 (Aroclor 1016)		ND	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 22:48	12674-11-2	
PCB-1221 (Aroclor 1221)		ND	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 22:48	11104-28-2	
PCB-1232 (Aroclor 1232)		ND	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 22:48	11141-16-5	
PCB-1242 (Aroclor 1242)		**90.4**	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 22:48	53469-21-9	
PCB-1248 (Aroclor 1248)		ND	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 22:48	12672-29-6	
PCB-1254 (Aroclor 1254)		**151**	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 22:48	11097-69-1	
PCB-1260 (Aroclor 1260)		**52.7**	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 22:48	11096-82-5	
PCB, Total	294.1	~~**294**~~	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 22:48	1336-36-3	
Surrogates										
Tetrachloro-m-xylene (S)		79	%	61-102		1	06/21/18 09:49	06/25/18 22:48	877-09-8	
Decachlorobiphenyl (S)		85	%	60-112		1	06/21/18 09:49	06/25/18 22:48	2051-24-3	
Lipid		Analytical Method: Pace Lipid								
Lipid		**2.6**	%			1		06/25/18 11:50		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

Sample: PAS-BS-339 **Lab ID: 40169804007** Collected: 05/16/18 12:55 Received: 05/25/18 09:50 Matrix: Tissue

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB, Tissue	Analytical Method: EPA 8082 Preparation Method: EPA 3540								
PCB-1016 (Aroclor 1016)	ND	ug/kg	42.6	21.3	1	06/21/18 09:49	06/25/18 23:05	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	42.6	21.3	1	06/21/18 09:49	06/25/18 23:05	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	42.6	21.3	1	06/21/18 09:49	06/25/18 23:05	11141-16-5	
PCB-1242 (Aroclor 1242)	**175**	ug/kg	42.6	21.3	1	06/21/18 09:49	06/25/18 23:05	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	42.6	21.3	1	06/21/18 09:49	06/25/18 23:05	12672-29-6	
PCB-1254 (Aroclor 1254)	**325**	ug/kg	42.6	21.3	1	06/21/18 09:49	06/25/18 23:05	11097-69-1	
PCB-1260 (Aroclor 1260)	**89.9**	ug/kg	42.6	21.3	1	06/21/18 09:49	06/25/18 23:05	11096-82-5	
PCB, Total	589.9 ~~**590**~~	ug/kg	42.6	21.3	1	06/21/18 09:49	06/25/18 23:05	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	80	%	61-102		1	06/21/18 09:49	06/25/18 23:05	877-09-8	
Decachlorobiphenyl (S)	90	%	60-112		1	06/21/18 09:49	06/25/18 23:05	2051-24-3	
Lipid	Analytical Method: Pace Lipid								
Lipid	**5.1**	%			1		06/25/18 11:50		

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

Sample: PAS-BS-340 **Lab ID: 40169804008** Collected: 05/16/18 12:55 Received: 05/25/18 09:50 Matrix: Tissue

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB, Tissue	Analytical Method: EPA 8082 Preparation Method: EPA 3540								
PCB-1016 (Aroclor 1016)	ND	ug/kg	50.0	25.0	2	06/21/18 09:49	06/25/18 23:23	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	50.0	25.0	2	06/21/18 09:49	06/25/18 23:23	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	50.0	25.0	2	06/21/18 09:49	06/25/18 23:23	11141-16-5	
PCB-1242 (Aroclor 1242)	**134**	ug/kg	50.0	25.0	2	06/21/18 09:49	06/25/18 23:23	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	50.0	25.0	2	06/21/18 09:49	06/25/18 23:23	12672-29-6	
PCB-1254 (Aroclor 1254)	**295**	ug/kg	50.0	25.0	2	06/21/18 09:49	06/25/18 23:23	11097-69-1	
PCB-1260 (Aroclor 1260)	**102**	ug/kg	50.0	25.0	2	06/21/18 09:49	06/25/18 23:23	11096-82-5	
PCB, Total	**532**	ug/kg	50.0	25.0	2	06/21/18 09:49	06/25/18 23:23	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	75	%	61-102		2	06/21/18 09:49	06/25/18 23:23	877-09-8	
Decachlorobiphenyl (S)	83	%	60-112		2	06/21/18 09:49	06/25/18 23:23	2051-24-3	
Lipid	Analytical Method: Pace Lipid								
Lipid	**4.2**	%			1		06/25/18 11:50		

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

Sample: PAS-BS-341 **Lab ID: 40169804009** Collected: 05/16/18 12:55 Received: 05/25/18 09:50 Matrix: Tissue

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB, Tissue	Analytical Method: EPA 8082 Preparation Method: EPA 3540								
PCB-1016 (Aroclor 1016)	ND	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 23:41	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 23:41	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 23:41	11141-16-5	
PCB-1242 (Aroclor 1242)	**110**	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 23:41	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 23:41	12672-29-6	
PCB-1254 (Aroclor 1254)	**256**	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 23:41	11097-69-1	
PCB-1260 (Aroclor 1260)	**91.9**	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 23:41	11096-82-5	
PCB, Total	457.9 ~~**459**~~	ug/kg	25.0	12.5	1	06/21/18 09:49	06/25/18 23:41	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	76	%	61-102		1	06/21/18 09:49	06/25/18 23:41	877-09-8	
Decachlorobiphenyl (S)	89	%	60-112		1	06/21/18 09:49	06/25/18 23:41	2051-24-3	
Lipid	Analytical Method: Pace Lipid								
Lipid	**5.0**	%			1		06/25/18 11:50		

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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(920)469-2436

ANALYTICAL RESULTS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

Sample: PAS-BS-437 **Lab ID: 40169804010** Collected: 05/16/18 14:00 Received: 05/25/18 09:50 Matrix: Tissue

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB, Tissue	Analytical Method: EPA 8082 Preparation Method: EPA 3540								
PCB-1016 (Aroclor 1016)	ND	ug/kg	149	74.4	5	06/21/18 09:49	06/25/18 23:59	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	149	74.4	5	06/21/18 09:49	06/25/18 23:59	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	149	74.4	5	06/21/18 09:49	06/25/18 23:59	11141-16-5	
PCB-1242 (Aroclor 1242)	**256**	ug/kg	149	74.4	5	06/21/18 09:49	06/25/18 23:59	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	149	74.4	5	06/21/18 09:49	06/25/18 23:59	12672-29-6	
PCB-1254 (Aroclor 1254)	**877**	ug/kg	149	74.4	5	06/21/18 09:49	06/25/18 23:59	11097-69-1	
PCB-1260 (Aroclor 1260)	**363**	ug/kg	149	74.4	5	06/21/18 09:49	06/25/18 23:59	11096-82-5	
PCB, Total	~~**1500**~~ 1496	ug/kg	149	74.4	5	06/21/18 09:49	06/25/18 23:59	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	85	%	61-102		5	06/21/18 09:49	06/25/18 23:59	877-09-8	
Decachlorobiphenyl (S)	87	%	60-112		5	06/21/18 09:49	06/25/18 23:59	2051-24-3	
Lipid	Analytical Method: Pace Lipid								
Lipid	**5.8**	%			1		06/25/18 11:50		

REPORT OF LABORATORY ANALYSIS

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(920)469-2436

ANALYTICAL RESULTS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

Sample: PAS-BS-438 **Lab ID: 40169804011** Collected: 05/16/18 14:00 Received: 05/25/18 09:50 Matrix: Tissue

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB, Tissue	Analytical Method: EPA 8082 Preparation Method: EPA 3540								
PCB-1016 (Aroclor 1016)	ND	ug/kg	100	50.0	4	06/21/18 09:49	06/26/18 00:16	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	100	50.0	4	06/21/18 09:49	06/26/18 00:16	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	100	50.0	4	06/21/18 09:49	06/26/18 00:16	11141-16-5	
PCB-1242 (Aroclor 1242)	**212**	ug/kg	100	50.0	4	06/21/18 09:49	06/26/18 00:16	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	100	50.0	4	06/21/18 09:49	06/26/18 00:16	12672-29-6	
PCB-1254 (Aroclor 1254)	**392**	ug/kg	100	50.0	4	06/21/18 09:49	06/26/18 00:16	11097-69-1	
PCB-1260 (Aroclor 1260)	**123**	ug/kg	100	50.0	4	06/21/18 09:49	06/26/18 00:16	11096-82-5	
PCB, Total	727 ~~**726**~~	ug/kg	100	50.0	4	06/21/18 09:49	06/26/18 00:16	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	84	%	61-102		4	06/21/18 09:49	06/26/18 00:16	877-09-8	
Decachlorobiphenyl (S)	88	%	60-112		4	06/21/18 09:49	06/26/18 00:16	2051-24-3	
Lipid	Analytical Method: Pace Lipid								
Lipid	**5.4**	%			1		06/25/18 11:50		

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

Sample: PAS-BS-439 **Lab ID: 40169804012** Collected: 05/16/18 14:00 Received: 05/25/18 09:50 Matrix: Tissue

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB, Tissue	Analytical Method: EPA 8082 Preparation Method: EPA 3540								
PCB-1016 (Aroclor 1016)	ND	ug/kg	61.0	30.5	2	06/21/18 09:49	06/26/18 00:34	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	61.0	30.5	2	06/21/18 09:49	06/26/18 00:34	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	61.0	30.5	2	06/21/18 09:49	06/26/18 00:34	11141-16-5	
PCB-1242 (Aroclor 1242)	**173**	ug/kg	61.0	30.5	2	06/21/18 09:49	06/26/18 00:34	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	61.0	30.5	2	06/21/18 09:49	06/26/18 00:34	12672-29-6	
PCB-1254 (Aroclor 1254)	**407**	ug/kg	61.0	30.5	2	06/21/18 09:49	06/26/18 00:34	11097-69-1	
PCB-1260 (Aroclor 1260)	**126**	ug/kg	61.0	30.5	2	06/21/18 09:49	06/26/18 00:34	11096-82-5	
PCB, Total	**706**	ug/kg	61.0	30.5	2	06/21/18 09:49	06/26/18 00:34	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	78	%	61-102		2	06/21/18 09:49	06/26/18 00:34	877-09-8	
Decachlorobiphenyl (S)	84	%	60-112		2	06/21/18 09:49	06/26/18 00:34	2051-24-3	
Lipid	Analytical Method: Pace Lipid								
Lipid	**5.5**	%			1		06/25/18 11:50		

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

Sample: PAS-BS-543 **Lab ID: 40169804013** Collected: 05/16/18 14:45 Received: 05/25/18 09:50 Matrix: Tissue

Results reported on a "wet-weight" basis

Parameters		Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB, Tissue		Analytical Method: EPA 8082 Preparation Method: EPA 3540								
PCB-1016 (Aroclor 1016)		ND	ug/kg	49.9	25.0	2	06/21/18 09:49	06/26/18 00:52	12674-11-2	
PCB-1221 (Aroclor 1221)		ND	ug/kg	49.9	25.0	2	06/21/18 09:49	06/26/18 00:52	11104-28-2	
PCB-1232 (Aroclor 1232)		ND	ug/kg	49.9	25.0	2	06/21/18 09:49	06/26/18 00:52	11141-16-5	
PCB-1242 (Aroclor 1242)		**86.7**	ug/kg	49.9	25.0	2	06/21/18 09:49	06/26/18 00:52	53469-21-9	
PCB-1248 (Aroclor 1248)		ND	ug/kg	49.9	25.0	2	06/21/18 09:49	06/26/18 00:52	12672-29-6	
PCB-1254 (Aroclor 1254)		**346**	ug/kg	49.9	25.0	2	06/21/18 09:49	06/26/18 00:52	11097-69-1	
PCB-1260 (Aroclor 1260)		**121**	ug/kg	49.9	25.0	2	06/21/18 09:49	06/26/18 00:52	11096-82-5	
PCB, Total	553.7	~~**554**~~	ug/kg	49.9	25.0	2	06/21/18 09:49	06/26/18 00:52	1336-36-3	
Surrogates										
Tetrachloro-m-xylene (S)		85	%	61-102		2	06/21/18 09:49	06/26/18 00:52	877-09-8	
Decachlorobiphenyl (S)		90	%	60-112		2	06/21/18 09:49	06/26/18 00:52	2051-24-3	
Lipid		Analytical Method: Pace Lipid								
Lipid		**5.2**	%			1		06/25/18 11:50		

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1241 Bellevue Street - Suite 9
Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

Sample: PAS-BS-544 **Lab ID: 40169804014** Collected: 05/16/18 14:45 Received: 05/25/18 09:50 Matrix: Tissue

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB, Tissue	Analytical Method: EPA 8082 Preparation Method: EPA 3540								
PCB-1016 (Aroclor 1016)	ND	ug/kg	60.3	30.1	2	06/21/18 09:49	06/26/18 01:10	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	60.3	30.1	2	06/21/18 09:49	06/26/18 01:10	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	60.3	30.1	2	06/21/18 09:49	06/26/18 01:10	11141-16-5	
PCB-1242 (Aroclor 1242)	**174**	ug/kg	60.3	30.1	2	06/21/18 09:49	06/26/18 01:10	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	60.3	30.1	2	06/21/18 09:49	06/26/18 01:10	12672-29-6	
PCB-1254 (Aroclor 1254)	**330**	ug/kg	60.3	30.1	2	06/21/18 09:49	06/26/18 01:10	11097-69-1	
PCB-1260 (Aroclor 1260)	**110**	ug/kg	60.3	30.1	2	06/21/18 09:49	06/26/18 01:10	11096-82-5	
PCB, Total	**614**	ug/kg	60.3	30.1	2	06/21/18 09:49	06/26/18 01:10	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	81	%	61-102		2	06/21/18 09:49	06/26/18 01:10	877-09-8	
Decachlorobiphenyl (S)	85	%	60-112		2	06/21/18 09:49	06/26/18 01:10	2051-24-3	
Lipid	Analytical Method: Pace Lipid								
Lipid	**5.9**	%			1		06/25/18 11:50		

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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Green Bay, WI 54302
(920)469-2436

ANALYTICAL RESULTS

Project: B00.36444.2018.00001 PAS FISH
Pace Project No.: 40169804

Sample: PAS-BS-545 **Lab ID: 40169804015** Collected: 05/16/18 14:45 Received: 05/25/18 09:50 Matrix: Tissue

Results reported on a "wet-weight" basis

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB, Tissue	Analytical Method: EPA 8082 Preparation Method: EPA 3540								
PCB-1016 (Aroclor 1016)	ND	ug/kg	50.1	25.0	2	06/21/18 09:49	06/26/18 01:27	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	50.1	25.0	2	06/21/18 09:49	06/26/18 01:27	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	50.1	25.0	2	06/21/18 09:49	06/26/18 01:27	11141-16-5	
PCB-1242 (Aroclor 1242)	**71.5**	ug/kg	50.1	25.0	2	06/21/18 09:49	06/26/18 01:27	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	50.1	25.0	2	06/21/18 09:49	06/26/18 01:27	12672-29-6	
PCB-1254 (Aroclor 1254)	**399**	ug/kg	50.1	25.0	2	06/21/18 09:49	06/26/18 01:27	11097-69-1	
PCB-1260 (Aroclor 1260)	**151**	ug/kg	50.1	25.0	2	06/21/18 09:49	06/26/18 01:27	11096-82-5	
PCB, Total	621.5 ~~**621**~~	ug/kg	50.1	25.0	2	06/21/18 09:49	06/26/18 01:27	1336-36-3	
Surrogates									
Tetrachloro-m-xylene (S)	79	%	61-102		2	06/21/18 09:49	06/26/18 01:27	877-09-8	
Decachlorobiphenyl (S)	83	%	60-112		2	06/21/18 09:49	06/26/18 01:27	2051-24-3	
Lipid	Analytical Method: Pace Lipid								
Lipid	**4.8**	%			1		06/25/18 11:50		

REPORT OF LABORATORY ANALYSIS

ARCADIS Design & Consultancy for natural and built assets

National Grid-PAS Site

DATA USABILITY SUMMARY REPORT (DUSR)

Oswego, New York

PCB and TOC Analyses

SDG #R1808121

Analyses Performed By:
ALS Environmental
Rochester, New York

Report #31007R
Review Level: Tier III
Project: B0036444.2018.00002

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #R1808121 and R1609051 for samples collected in association with the National Grid-PAS site in Oswego, New York. The review was conducted as a Tier III evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

SDG Number	Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
						VOC	SVOC	PCB	MET	MISC
R1808121	PAS-ST-401	R1808121-001	Soil	8/23/2018				X		X

Notes:

1. MISC: Miscellaneous parameter-Lloyd Kahn (Total Organic Carbon-TOC).
2. Matrix spike/matrix spike duplicate (MS/MSD) analysis was performed on sample location PAS-ST-401.

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 Method 8082A. Data were reviewed in accordance with USEPA National Functional Guidelines of October 1999.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

  U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

POLYCHLORINATED BIPHENYLS (PCBs) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
SW-846 8082A	Soil	14 days from collection to extraction and 40 days from extraction to analysis	Cool to <6 °C

All samples were analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the MDL in the associated blanks; therefore, detected sample results were not associated with blank contamination in either SDGs.

3. System Performance

System performance and column resolution were acceptable.

4. Calibration

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

4.1 Initial Calibration

A maximum RSD of 20% is allowed or a correlation coefficient greater than 0.99. Multiple-point calibrations were performed for Aroclor 1016 and 1260 only. Single-point calibrations were performed for the remaining Aroclors.

4.2 Continuing Calibration

All target compounds associated with the continuing calibration standard must exhibit a percent difference (%D) less than the control limit (15%).

All calibration criteria were within the control limits.

5. Surrogates/System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. PCB

analysis requires that one of the two PCB surrogate compounds exhibit recoveries within the laboratory-established acceptance limits.

All surrogate recoveries reported from the primary column were within control limits.

6. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

Sample locations associated with the MS/MSD exhibiting recoveries outside of the control limits are presented in the following table.

Sample Locations	Compound	MS Recovery	MSD Recovery
PAS-ST-401	Aroclor 1016	AC	AC
	Aroclor 1260	<LL but >10%	AC

Note:
AC = Acceptable

The criteria used to evaluate the MS/MSD recoveries are presented in the following table. In the case of an MS/MSD deviation, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< the lower control limit (LL) but > 10%	Non-detect	UJ
	Detect	J
< 10%	Non-detect	R
	Detect	J
Parent sample concentration > four times the MS/MSD spiking solution concentration.	Detect	No Action
	Non-detect	

Sample locations associated with MS/MSD recoveries exhibiting an RPD greater than of the control limit presented in the following table.

Sample Locations	Compound
PAS-ST-401	Aroclor 1016
	Aroclor 1260

The criteria used to evaluate the RPD between the MS/MSD recoveries are presented in the following table. In the case of an RPD deviation, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> UL	Non-detect	UJ
	Detect	J

7. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

The LCS/LCSD analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS/LCSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS/LCSD analysis exhibited recoveries within the control limits in both SDGs.

8. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 50% sediment matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of three times the RL is applied for sediment matrices.

A field duplicate was not collected with a sample associated with either SDGs.

9. Compound Identification

The retention times of all quantitated peaks must fall within the calculated retention time windows for both the primary and confirmation columns. When dual column analysis is performed the relative percent difference (%RPD) of detected sample results must be less than 40%.

The dual column analysis exhibited an acceptable %RPD between columns.

10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PCBs

PCBs; SW-846 8082A	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY (GC/ECD)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks	X				X
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R		X	X		
Matrix Spike Duplicate(MSD) %R		X	X		
MS/MSD Precision (RPD)		X	X		
Field/Lab Duplicate (RPD)					X
Surrogate Spike Recoveries		X		X	
Column (RPD)		X		X	
Dilution Factor		X		X	
Moisture Content		X		X	
Tier III Validation					
Initial calibration %RSDs		X		X	
Continuing calibration %Ds		X		X	
System performance and column resolution		X		X	
Compound identification and quantitation					
A. Quantitation Reports		X		X	
B. RT of sample compounds within the established RT windows		X		X	
C. Pattern identification		X		X	
D. Transcription/calculation errors present		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:
%RSD – relative standard deviation
%R - percent recovery
RPD - relative percent difference,
%D – difference

INORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) Method Lloyd Kahn Total Organic Carbon (TOC). Data were reviewed in accordance with USEPA National Functional Guidelines of July 2002.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and that it was already subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with the USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

  U The analyte was analyzed for but not detected. The associated value is the analyte instrument detection limit.

  J The reported value was obtained from a reading less than the reporting limit (RL), but greater than or equal to the method detection limit (MDL).

- Quantitation (Q) Qualifiers

  E The reported value is estimated due to the presence of interference.

  N Spiked sample recovery is not within control limits.

  * Duplicate analysis is not within control limits.

- Validation Qualifiers

  J The analyte was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The analyte was not detected above the reported sample detection limit. However, the reported limit is approximate and may or may not represent the actual limit of detection.

  UB Analyte considered non-detect at the listed value due to associated blank contamination.

  R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

GENERAL CHEMISTRY ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
Total Organic Carbon by EPA Lloyd Kahn	Soil	14 days from collection to analysis	Cool to <6 °C.

All samples were analyzed within the specified holding times.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Analytes were not detected above the MDL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Calibration

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

The correct number and type of standards were analyzed. The correlation coefficient of the initial calibration was greater than 0.995 and all initial calibration verification standard recoveries were within control limits.

All calibration standard recoveries were within the control limit.

4. Matrix Spike (MS)/Laboratory Duplicate Analysis

MS and laboratory duplicate data are used to assess the precision and accuracy of the analytical method.

4.1 MS Analysis

All analytes must exhibit a percent recovery within the established acceptance limits of 75% to 125%. The MS recovery control limits do not apply for MS performed on sample locations where the analyte's concentration detected in the parent sample exceeds the MS concentration by a factor of four or greater. In instance where this is true, the data will not be qualified even if the percent recovery does not meet the control limits and the laboratory flag will be removed.

The MS analysis was not performed on sample location associated with SDG R1605840 for TOC analysis.

The MS analysis was not performed on a sample location within this SDG.

4.2 Laboratory Duplicate Analysis

The laboratory duplicate relative percent difference (RPD) criterion is applied when parent and duplicate sample concentrations are greater than or equal to 5 times the RL. A control limit of 20% for water matrices and 35% for soil matrices is applied when the criteria above is true. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of one times the RL is applied for water matrices and two times the RL for soil matrices.

The laboratory duplicate sample was not performed on a sample location associated with either SDG.

5. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 50% for sediment matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of three times the RL is applied for sediment matrices.

Field duplicate analysis was not performed on a sample location associated with either SDG.

6. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The analytes associated with the LCS analysis must exhibit a percent recovery between the control limits of 80% and 120%.

The LCS analysis exhibited recoveries within the control limits.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR GENERAL CHEMISTRY

General Chemistry: EPA Lloyd Kahn	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
Miscellaneous Instrumentation					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks	X				X
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate (LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R					X
Matrix Spike Duplicate (MSD) %R					X
MS/MSD Precision (RPD)					X
Field/Lab Duplicate (RPD)					X
Dilution Factor		X		X	
Moisture Content		X		X	
Tier III Validation					
Initial calibration %RSD or correlation coefficient		X		X	
Continuing calibration %R		X		X	
Raw Data					
Transcription/calculation errors present		X		X	
Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:
%RSD – relative standard deviation
%R - percent recovery
RPD - relative percent difference,
%D – difference

SAMPLE COMPLIANCE REPORT

SAMPLE COMPLIANCE REPORT

Sample Delivery Group (SDG)	Sampling Date	Protocol	Sample ID	Matrix	Compliancy[1]					Noncompliance
					VOC	SVOC	PCB	MET	MISC	
R1808121	8/23/2018	SW-846	PAS-ST-401	Soil	--	--	No	--	Yes	PCB – MS/MSD percent recoveries and relative percent differences

Note:

1 Samples which are compliant with no added validation qualifiers are listed as "yes". Samples which are non-compliant or which have added qualifiers are listed as "no". A "no" designation does not necessarily indicate that the data have been rejected or are otherwise unusable.

VALIDATION PERFORMED BY: Todd Church

SIGNATURE: 

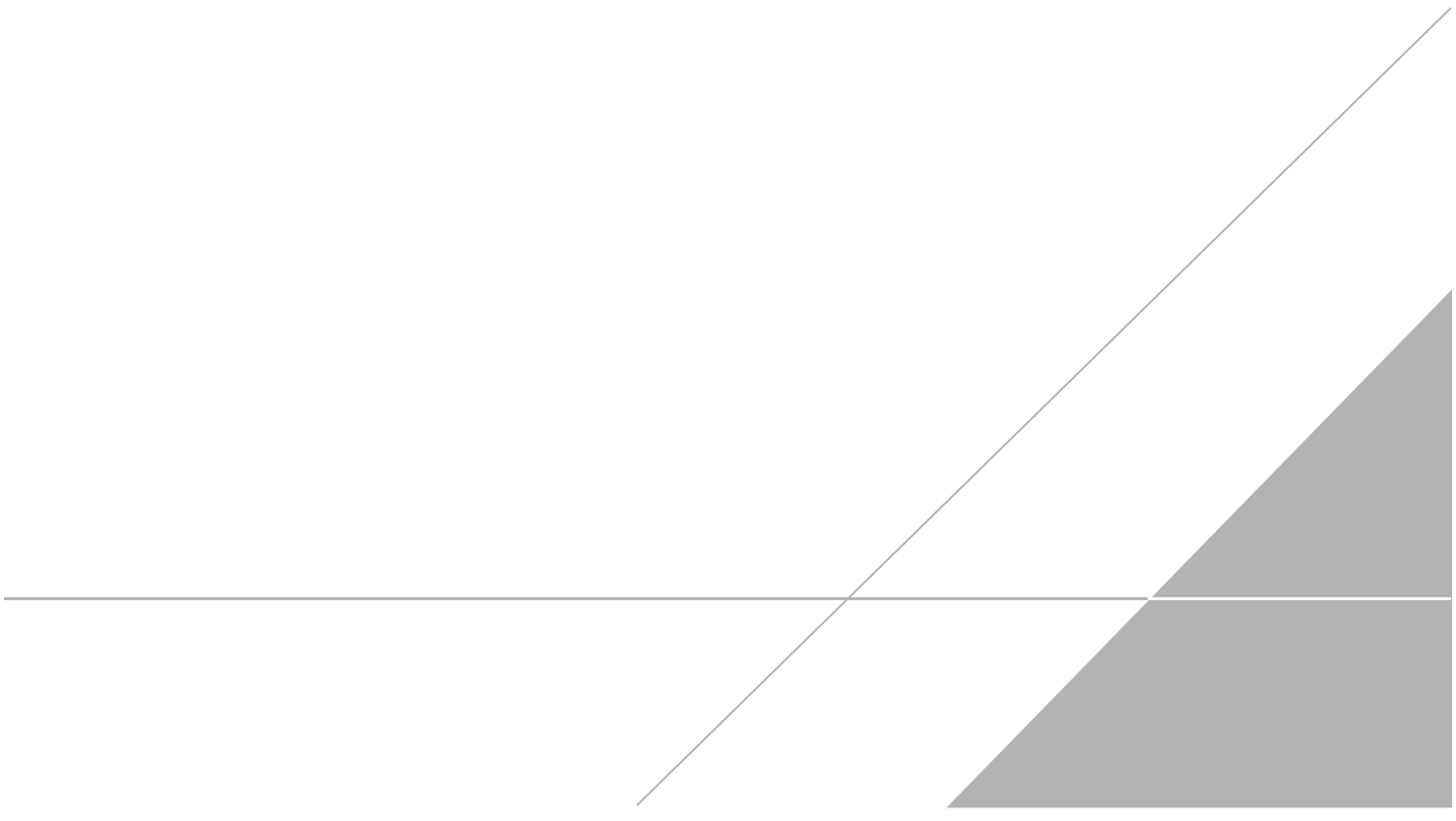
DATE: November 9, 2018

PEER REVIEW: Dennis Capria

DATE: December 5, 2018

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS



ALS Environmental

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

17166

1565 Jefferson Road, Building 300, Suite 360 • Rochester, NY 14623 | +1 585 288 5380 +1 585 288 8475 (fax) PAGE ____ OF 1

Project Name: PAS LONG TERM MONITORING	Project Number: B0036444.2018
Project Manager: JASON VOGEL	Report CC:
Company/Address: ARCADIS 110 WEST FAYETTE ST SYRACUSE, NY 13202	
Phone #	Email
Sampler's Signature	Sampler's Printed Name: TIM HENSER

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOAs ○ 8260 ○ 624 ○ CLP	GC/MS SVOAs ○ 8270 ○ 625	GC VOAs ○ 8021 ○ 601/602	PESTICIDES ○ 8081 ○ 608	PCBs ○ 8082 ○ 608	METALS: TOTAL (List in comments below)	METALS: DISSOLVED (List in comments below)	PCB 8082	Hoyle Lake TOC	PCBs MS/MSD	TOC MS/MSD	REMARKS/ ALTERNATE DESCRIPTION
[redacted]																	
PAS-ST-401		8/23/18	1000	SED	4								X	X	X	X	

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other ____

SPECIAL INSTRUCTIONS/COMMENTS
Metals
- STANDARD TAT
- REQUIRES FULL DATA PACKAGE DELIVERABLES

See QAPP ☐

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 1 day ____ 2 day ____ 3 day
____ 4 day ____ 5 day
REQUESTED REPORT DATE: ____

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
Edata ____ Yes ____ No

INVOICE INFORMATION
PO# B0036444.
BILL TO:

STATE WHERE SAMPLES WERE COLLECTED

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: [signature]	Signature: Gary Bohan	Signature	Signature	Signature	Signature
Printed Name: TIM HENSER	Printed Name: Gary Bohan	Printed Name	Printed Name	Printed Name	
Firm: ARCADIS	Firm: ALS	Firm	Firm	Firm	
Date/Time: 8/23/18 1700	Date/Time: 8/24/18 0950	Date/Time	Date/Time	Date/Time	

R1808121 5
ARCADIS of New York, Inc.
PAS Long Term Monitoring

Distribution: White - Lab Copy; Yellow - Return to Originator

ALS Laboratory Group

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Analytical Report

Client:	ARCADIS U.S., Inc. (formerly ARCADIS of New York)	**Service Request:**	R1808121
Project:	PAS Long Term Monitoring/B00364.44.2018	**Date Collected:**	08/23/18 10:00
Sample Matrix:	Soil	**Date Received:**	08/24/18 09:50
Sample Name:	PAS-ST-401	**Units:**	ug/Kg
Lab Code:	R1808121-001	**Basis:**	Dry

Polychlorinated Biphenyls (PCBs) by GC

Analysis Method: 8082A
Prep Method: EPA 3541

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Aroclor 1016	ND U J	120	1	09/06/18 15:58	8/29/18	
Aroclor 1221	ND U J	250	1	09/06/18 15:58	8/29/18	
Aroclor 1232	ND U J	120	1	09/06/18 15:58	8/29/18	
Aroclor 1242	ND U J	120	1	09/06/18 15:58	8/29/18	
Aroclor 1248	**460** J	120	1	09/06/18 15:58	8/29/18	
Aroclor 1254	**240** J	120	1	09/06/18 15:58	8/29/18	
Aroclor 1260	**160** J	120	1	09/06/18 15:58	8/29/18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Decachlorobiphenyl	81	22 - 128	09/06/18 15:58	
Tetrachloro-m-xylene	51	14 - 119	09/06/18 15:58	

Analytical Report

Client:	ARCADIS U.S., Inc. (formerly ARCADIS of New York)	**Service Request:**	R1808121
Project:	PAS Long Term Monitoring/B00364.44.2018	**Date Collected:**	08/23/18 10:00
Sample Matrix:	Soil	**Date Received:**	08/24/18 09:50
Sample Name:	PAS-ST-401	**Basis:**	Dry, per Method
Lab Code:	R1808121-001		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Carbon, Total Organic (TOC)	EPA LKahn 7-27-1988	**55900**	mg/Kg	5900	1	08/29/18 18:28	

Analytical Report

Client:	ARCADIS U.S., Inc. (formerly ARCADIS of New York)	**Service Request:**	R1808121
Project:	PAS Long Term Monitoring/B00364.44.2018	**Date Collected:**	08/23/18 10:00
Sample Matrix:	Soil	**Date Received:**	08/24/18 09:50
Sample Name:	PAS-ST-401	**Basis:**	NA
Lab Code:	R1808121-001		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Total Solids	ALS SOP	**26.9**	Percent	-	1	08/28/18 16:50	

ARCADIS Design & Consultancy for natural and built assets

National Grid-PAS Site

DATA USABILITY SUMMARY REPORT (DUSR)

Oswego, New York

PCB and TOC Analyses

SDG #R1804584

Analyses Performed By:
ALS Environmental
Rochester, New York

Report #31672R
Review Level: Tier III
Project: B0036444.2018.00002

SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #R1804584 and R1609051 for samples collected in association with the National Grid-PAS site in Oswego, New York. The review was conducted as a Tier III evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

SDG Number	Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
						VOC	SVOC	PCB	MET	MISC
R1804584	PAS-SS-301(0-3)	R1804584-001	Sediment	5/17/2018				X		X
R1804584	PAS-RB-051718	R1804584-002	Water	5/17/2018				X		

Notes:

1. MISC: Miscellaneous parameter-Lloyd Kahn (Total Organic Carbon-TOC).
2. Matrix spike/matrix spike duplicate (MS/MSD) analysis was performed on sample location **PAS-S5-30(0-3)**.

ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:
QA - Quality Assurance

ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 Method 8082A. Data were reviewed in accordance with USEPA National Functional Guidelines of October 1999.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional Guidelines:

- Concentration (C) Qualifiers

  U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.

  B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.

- Quantitation (Q) Qualifiers

  E The compound was quantitated above the calibration range.

  D Concentration is based on a diluted sample analysis.

- Validation Qualifiers

  J The compound was positively identified; however, the associated numerical value is an estimated concentration only.

  UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.

  JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.

  UB Compound considered non-detect at the listed value due to associated blank contamination.

  N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

  R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

POLYCHLORINATED BIPHENYLS (PCBs) ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
SW-846 8082A	Soil	14 days from collection to extraction and 40 days from extraction to analysis	Cool to <6 °C

All samples were analyzed within the specified holding time criteria.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the MDL in the associated blanks; therefore, detected sample results were not associated with blank contamination in either SDGs.

3. System Performance

System performance and column resolution were acceptable.

4. Calibration

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

4.1 Initial Calibration

A maximum RSD of 20% is allowed or a correlation coefficient greater than 0.99. Multiple-point calibrations were performed for all Aroclors.

4.2 Continuing Calibration

All target compounds associated with the continuing calibration standard must exhibit a percent difference (%D) less than the control limit (15%).

All calibration criteria were within the control limits.

5. Surrogates/System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. PCB analysis requires that one of the two PCB surrogate compounds exhibit recoveries within the laboratory-established acceptance limits.

All surrogate recoveries reported from the primary column were within control limits.

6. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

The MS/MSD exhibited acceptable recoveries and RPD between the MS/MSD recoveries.

7. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

The LCS/LCSD analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS/LCSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS/LCSD analysis exhibited recoveries within the control limits.

8. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 50% sediment matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of three times the RL is applied for sediment matrices.

A field duplicate was not collected with a sample associated with either SDGs.

9. Compound Identification

The retention times of all quantitated peaks must fall within the calculated retention time windows for both the primary and confirmation columns. When dual column analysis is performed the relative percent difference (%RPD) of detected sample results must be less than 40%.

The dual column analysis exhibited an acceptable %RPD between columns.

10. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR PCBs

PCBs; SW-846 8082A	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY (GC/ECD)					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks	X				X
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate (LCSD) %R		X		X	
LCS/LCSD Precision (RPD)		X		X	
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate (MSD) %R		X		X	
MS/MSD Precision (RPD)		X		X	
Field/Lab Duplicate (RPD)	X				X
Surrogate Spike Recoveries		X		X	
Column (RPD)		X		X	
Dilution Factor		X		X	
Moisture Content		X		X	
Tier III Validation					
Initial calibration %RSDs		X		X	
Continuing calibration %Ds		X		X	
System performance and column resolution		X		X	
Compound identification and quantitation					
A. Quantitation Reports		X		X	
B. RT of sample compounds within the established RT windows		X		X	
C. Pattern identification		X		X	
D. Transcription/calculation errors present		X		X	
E. Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:
%RSD – relative standard deviation
%R - percent recovery
RPD - relative percent difference,
%D – difference

INORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) Method Lloyd Kahn Total Organic Carbon (TOC). Data were reviewed in accordance with USEPA National Functional Guidelines of July 2002.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and that it was already subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with the USEPA National Functional Guidelines:

- Concentration (C) Qualifiers
  - U The analyte was analyzed for but not detected. The associated value is the analyte instrument detection limit.
  - J The reported value was obtained from a reading less than the reporting limit (RL), but greater than or equal to the method detection limit (MDL).
- Quantitation (Q) Qualifiers
  - E The reported value is estimated due to the presence of interference.
  - N Spiked sample recovery is not within control limits.
  - * Duplicate analysis is not within control limits.
- Validation Qualifiers
  - J The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The analyte was not detected above the reported sample detection limit. However, the reported limit is approximate and may or may not represent the actual limit of detection.
  - UB Analyte considered non-detect at the listed value due to associated blank contamination.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

GENERAL CHEMISTRY ANALYSES

1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
Total Organic Carbon by EPA Lloyd Kahn	Soil	14 days from collection to analysis	Cool to <6 °C.

All samples were analyzed within the specified holding times.

2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Analytes were not detected above the MDL in the associated blanks; therefore, detected sample results were not associated with blank contamination.

3. Calibration

Satisfactory instrument calibration is established to ensure that the instrument is capable of producing acceptable quantitative data. An initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an experimental sequence. The continuing calibration verifies that the instrument daily performance is satisfactory.

The correct number and type of standards were analyzed. The correlation coefficient of the initial calibration was greater than 0.995 and all initial calibration verification standard recoveries were within control limits.

All calibration standard recoveries were within the control limit.

4. Matrix Spike (MS)/Laboratory Duplicate Analysis

MS and laboratory duplicate data are used to assess the precision and accuracy of the analytical method.

4.1 MS Analysis

All analytes must exhibit a percent recovery within the established acceptance limits of 75% to 125%. The MS recovery control limits do not apply for MS performed on sample locations where the analyte's concentration detected in the parent sample exceeds the MS concentration by a factor of four or greater. In instance where this is true, the data will not be qualified even if the percent recovery does not meet the control limits and the laboratory flag will be removed.

The MS/MSD exhibited acceptable recoveries and RPD between the MS/MSD recoveries.

4.2 Laboratory Duplicate Analysis

The laboratory duplicate relative percent difference (RPD) criterion is applied when parent and duplicate sample concentrations are greater than or equal to 5 times the RL. A control limit of 20% for water matrices and 35% for soil matrices is applied when the criteria above is true. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of one times the RL is applied for water matrices and two times the RL for soil matrices.

The laboratory duplicate sample was not performed on a sample location associated with either SDG.

5. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 50% for sediment matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of three times the RL is applied for sediment matrices.

Field duplicate analysis was not performed on a sample location associated with either SDG.

6. Laboratory Control Sample (LCS) Analysis

The LCS analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The analytes associated with the LCS analysis must exhibit a percent recovery between the control limits of 80% and 120%.

The LCS analysis exhibited recoveries within the control limits.

7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

DATA VALIDATION CHECKLIST FOR GENERAL CHEMISTRY

General Chemistry: EPA Lloyd Kahn	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
Miscellaneous Instrumentation					
Tier II Validation					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks	X				X
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate (LCSD) %R	X				X
LCS/LCSD Precision (RPD)	X				X
Matrix Spike (MS) %R		X		X	
Matrix Spike Duplicate (MSD) %R		X		X	
MS/MSD Precision (RPD)		X		X	
Field/Lab Duplicate (RPD)	X				X
Dilution Factor		X		X	
Moisture Content		X		X	
Tier III Validation					
Initial calibration %RSD or correlation coefficient		X		X	
Continuing calibration %R		X		X	
Raw Data					
Transcription/calculation errors present		X		X	
Reporting limits adjusted to reflect sample dilutions		X		X	

Notes:
%RSD – relative standard deviation
%R - percent recovery
RPD - relative percent difference,
%D – difference

SAMPLE COMPLIANCE REPORT

SAMPLE COMPLIANCE REPORT

Sample Delivery Group (SDG)	Sampling Date	Protocol	Sample ID	Matrix	Compliancy[1]					Noncompliance
					VOC	SVOC	PCB	MET	MISC	
R18084584	5/17/18	SW-846	PAS-SS-301(0-3)	Sediment	--	--	Yes	--	Yes	
R18084584	5/17/18	SW-846	PAS-RB-051718	Water	--	--	Yes	--	--	

Note:

1 Samples which are compliant with no added validation qualifiers are listed as "yes". Samples which are non-compliant or which have added qualifiers are listed as "no". A "no" designation does not necessarily indicate that the data have been rejected or are otherwise unusable.

VALIDATION PERFORMED BY: Todd Church

SIGNATURE: 

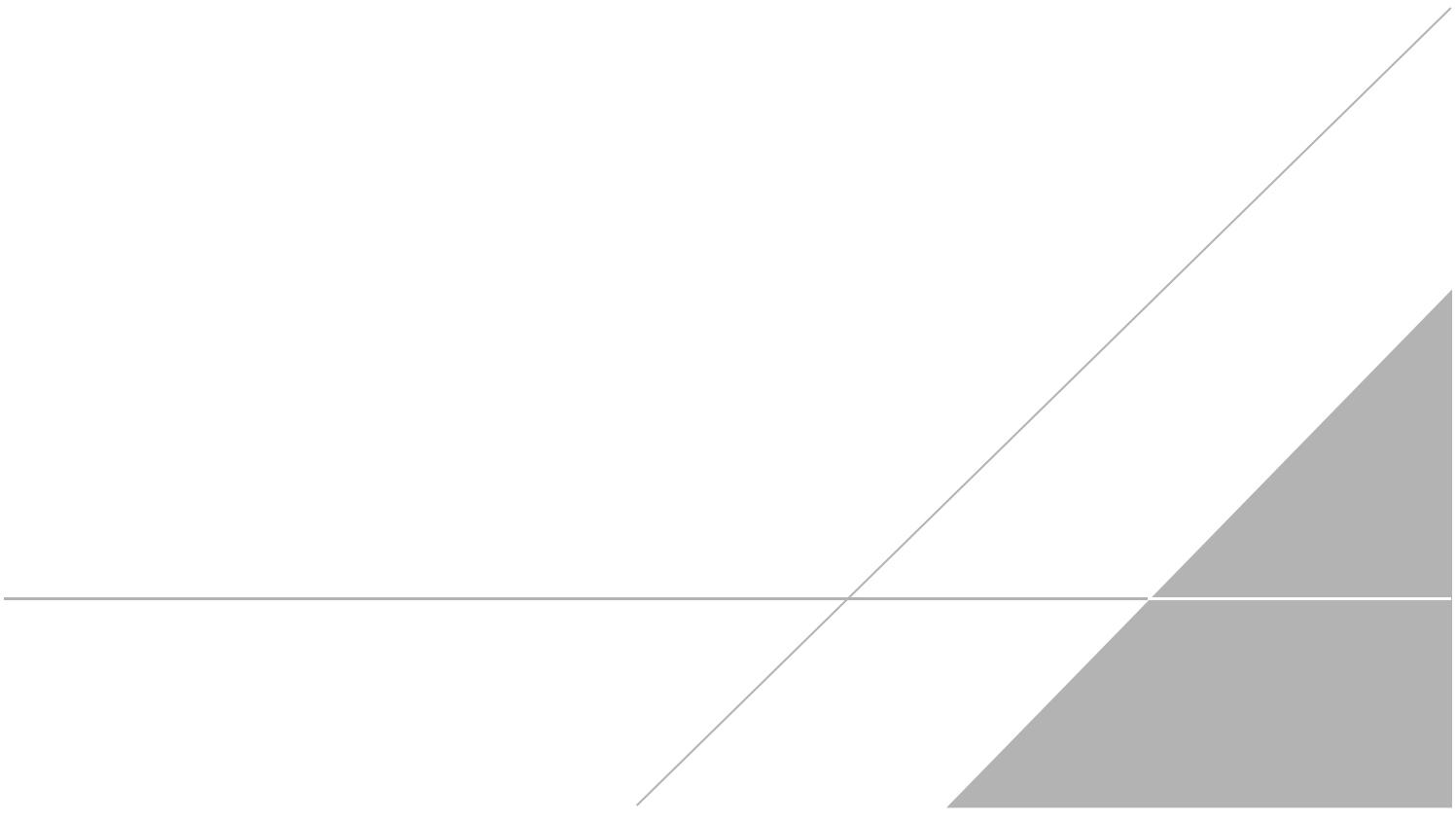
DATE: February 4, 2019

PEER REVIEW: Dennis Capria

DATE: February 7, 2019

CHAIN OF CUSTODY

CORRECTED SAMPLE ANALYSIS DATA SHEETS



CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM 51426

1565 Jefferson Road, Building 300, Suite 360 • Rochester, NY 14623 | +1 585 288 5380 +1 585 288 8475 (fax) PAGE 1 OF

Project Name: PAS LONG TERM MONITORING	Project Number: B00364.44.2015
Project Manager: JASON VOLGER	Report CC:
Company/Address: ARCADIS, 110 WEST FAYETTE ST, SYRACUSE, NY 13202	
Phone #	Email
Sampler's Signature	Sampler's Printed Name: J HENSON

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE

CLIENT SAMPLE ID	FOR OFFICE USE ONLY LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	NUMBER OF CONTAINERS	GC/MS VOAs • 8260 • 624 • CLP	GC/MS SVOAs • 8270 • 625	GC VOAs • 8021 • 601/602	PESTICIDES • 8081 • 608	PCBs • 8082 • 608	METALS, TOTAL (List in comments below)	METALS, DISSOLVED (List in comments below)	PCBs 8082 PCB	VOA Kaw TOC	PCBs 8082 MS/MSD	TOC MS/MSD				
PAS-SS-301(0-3")		5/17/18	915	SED	4								X	X	X	X				
PAS-RB-051718		5/17/18	11:00	W	1								X							

Preservative Key
0. NONE
1. HCL
2. HNO_3
3. H_2SO_4
4. NaOH
5. Zn. Acetate
6. MeOH
7. $NaHSO_4$
8. Other _____

REMARKS/ ALTERNATE DESCRIPTION

SPECIAL INSTRUCTIONS/COMMENTS
Metals
— STANDARD TURN
— REQUIRES FULL PACKAGE DELIVERABLES

See QAPP ☐

STATE WHERE SAMPLES WERE COLLECTED

TURNAROUND REQUIREMENTS
____ RUSH (SURCHARGES APPLY)
____ 1 day ____ 2 day ____ 3 day
____ 4 day ____ 5 day
____ Standard (10 business days-No Surcharge)
REQUESTED REPORT DATE

REPORT REQUIREMENTS
____ I. Results Only
____ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III. Results + QC and Calibration Summaries
____ IV. Data Validation Report with Raw Data
Edata ____ Yes ____ No

INVOICE INFORMATION
PO # B00364.44.2015
BILL TO: ARCADIS

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	Signature	Signature	Signature	Signature	Signature
Printed Name: J. Henson	Printed Name: Gregory O. Emerson	Printed Name	Printed Name	Printed Name	
Firm: ARCADIS	Firm: ALS	Firm	Firm	Firm	
Date/Time: 5/17/18 1245	Date/Time: 5-18-18 09:05	Date/Time	Date/Time	Date/Time	

R1804584 5
ARCADIS of New York, Inc.
PAS Long Term Monitoring

Distribution: White - Lab Copy; Yellow - Return to Originator

ALS Laboratory Group

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Analytical Report

Client:	ARCADIS U.S., Inc. (formerly ARCADIS of New York)	**Service Request:**	R1804584
Project:	PAS Long Term Monitoring/B00 364.44.2018	**Date Collected:**	05/17/18 09:15
Sample Matrix:	Soil	**Date Received:**	05/18/18 09:05
Sample Name:	PAS-SS-301(0-3)	**Units:**	ug/Kg
Lab Code:	R1804584-001	**Basis:**	Dry

Polychlorinated Biphenyls (PCBs) by GC

Analysis Method: 8082A
Prep Method: EPA 3541

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Aroclor 1016	ND U	89	1	05/30/18 15:38	5/23/18	
Aroclor 1221	ND U	180	1	05/30/18 15:38	5/23/18	
Aroclor 1232	ND U	89	1	05/30/18 15:38	5/23/18	
Aroclor 1242	ND U	89	1	05/30/18 15:38	5/23/18	
Aroclor 1248	**340**	89	1	05/30/18 15:38	5/23/18	
Aroclor 1254	**220**	89	1	05/30/18 15:38	5/23/18	
Aroclor 1260	ND U	89	1	05/30/18 15:38	5/23/18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Decachlorobiphenyl	84	22 - 128	05/30/18 15:38	
Tetrachloro-m-xylene	67	14 - 119	05/30/18 15:38	

ALS Group USA, Corp.
dba ALS Environmental

Analytical Report

Client:	ARCADIS U.S., Inc. (formerly ARCADIS of New York)	**Service Request:**	R1804584
Project:	PAS Long Term Monitoring/B00 364.44.2018	**Date Collected:**	05/17/18 11:00
Sample Matrix:	Water	**Date Received:**	05/18/18 09:05
Sample Name:	PAS-RB-051718	**Units:**	ug/L
Lab Code:	R1804584-002	**Basis:**	NA

Polychlorinated Biphenyls (PCBs) by GC

Analysis Method: 8082A
Prep Method: EPA 3510C

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Aroclor 1016	ND U	0.94	1	05/29/18 14:52	5/23/18	
Aroclor 1221	ND U	1.9	1	05/29/18 14:52	5/23/18	
Aroclor 1232	ND U	0.94	1	05/29/18 14:52	5/23/18	
Aroclor 1242	ND U	0.94	1	05/29/18 14:52	5/23/18	
Aroclor 1248	ND U	0.94	1	05/29/18 14:52	5/23/18	
Aroclor 1254	ND U	0.94	1	05/29/18 14:52	5/23/18	
Aroclor 1260	ND U	0.94	1	05/29/18 14:52	5/23/18	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
Decachlorobiphenyl	22	10 - 152	05/29/18 14:52	
Tetrachloro-m-xylene	62	14 - 129	05/29/18 14:52	

Analytical Report

Client:	ARCADIS U.S., Inc. (formerly ARCADIS of New York)	**Service Request:**	R1804584
Project:	PAS Long Term Monitoring/B00 364.44.2018	**Date Collected:**	05/17/18 09:15
Sample Matrix:	Soil	**Date Received:**	05/18/18 09:05
Sample Name:	PAS-SS-301(0-3)	**Basis:**	Dry, per Method
Lab Code:	R1804584-001		

Inorganic Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Q
Carbon, Total Organic (TOC)	EPA LKahn 7-27-1988	**28400**	mg/Kg	2600	1	05/30/18 19:23	